

# III EVALUATION MEETING OF THE PROGRAM BIOTA/FAPESP – THE BIODIVERSITY VIRTUAL INSTITUTE

## ANNUAL REPORT 3

**08 – 11/12/2001 – Hotel Fonte Colina Verde**

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**1 - Project Title** – MOLECULAR ECOLOGY AND POLYPHASIC TAXONOMY OF BACTERIA OF ENVIRONMENTAL AND AGRI-INDUSTRIAL IMPORTANCE. FUNDAÇÃO ANDRÉ TOSELLO (CAMPINAS), ICB/USP, USP/SÃO CARLOS, CBMEG/UNICAMP, CETESB (SP), INSTITUTO BIOLÓGICO (CAMPINAS).

**2 – Coordinator** – Gilson Paulo Manfio - CCT

**3 – HOMEPAGE** - <http://www.bdt.org.br/bacteria/>

**4 - Number of records added to the SINBIOTA databank: 44**

**5 – Summary of Activities carried out between October/00 and October/01**

The Project is comprised by six sub-projects, scheduled to be concluded at the end of 2002. Summary of activities are described below.

**Sub-Project 1 : Diversity of thiobacilli in anthropic environments**

- Strains isolated in the previous samplings and samples collected in this period were subjected to molecular typing at CBMEG/UNICAMP. The 16S-23S spacer region of a total of 90 putative *A. thiooxidans* strains are currently being analysed by RFLP and sequencing.
- Presentation of results at the 9<sup>th</sup> International Symposium of Microbial Ecology meeting in Amsterdam (August 2001) by the Sub-Project Coordinator (Stoppe, N.C., Veríssimo, R.V., Murad, G.F., Bergamo, R.F., Paulino, L.C., Manfio, G.P., Ottoboni, L.M.M., Sato, M.I.Z. Characterization of *Acidithiobacillus* SPP. isolated from estuarine environments in São Paulo State, Brazil, by the analysis of rDNA spacers).
- Publication of a paper on the molecular characterization of *Acidithiobacilli* isolated from mine waste (Molecular characterization of *Acidithiobacillus ferrooxidans* and *A. thiooxidans* strains isolated from mine wastes in Brazil, Paulino *et al.*, *Antonie van Leeuwenhoek* **80** (1): 65-75, 2001), describing the application of rDNA spacer analysis for the discrimination of isolated into these species.
- Safe deposit of strains at the Coleção de Culturas Tropical (CCT) not performed (see Sub-Project 6).
- Ricardo Verzegnassi Veríssimo, previously a technician in the project, successfully applied for a M.Sc at CBMEG/UNICAMP.

**Sub-Project 2: Diversity of endophytic nitrogen fixing bacteria**

- Paper “Molecular characterization of nitrogen fixing bacteria associates to plants”, Heindhardt *et al.*, submitted for publication in *FEMS Microbiology Ecology*. 18 nitrogen-fixing bacteria isolated from maize, sugar cane and cassava were characterized by molecular methods (RAPD, ARDRA and 16S rDNA sequencing). Strain-plant species correspondences were observed and a new bacterial species detected.
- A total of 150 strains of nitrogen-fixing endophytic and/or plant and lichen-associated bacteria were isolated. Most of these strains were: 1) tested for the presence of *nif* H gene and for nitrogen fixation through the acetylene reduction assay; 2) taxonomically identified by 16S rDNA sequencing analysis and

conventional biochemical tests; 3) and characterized by RAPD and ARDRA patterns.

- 16S rDNA sequence data of 08 strains were deposited in the GenBank.
- In the near future, as soon as the molecular analyses are completed, all the information will be added to the SINBIOTA databank.
- M.Sc. student Patrícia Locosque Ramos (ICB/USP) started her project with a grant from FAPESP (00/05402-0): “Molecular characterization of nitrogen fixing bacteria associated to economically important grasses”. Preliminary results were presented at the 47<sup>th</sup> National Congress of SBG (October 2-5, 2001) and at the 21<sup>th</sup> National Congress of Microbiology (October 21-25, 2001, see Ramos, PL *et al.*, “Caracterização Molecular de Bactérias Fixadoras de N<sub>2</sub> em Gramíneas de Importância Econômica, Resumos, pg 10).
- Deposit of strains done at CCT, though future of strains uncertain due to recent problems (see Sub-Project 6).

### **Sub-Project 3: Diversity of bacteria and archaea degrading xenobiotics**

- Nine sediment samples collected in the estuarine region of Santos were subjected to enrichment procedures. A total of 9 and 5 consortia, using hydrocarbons and biphenyl as the sole sources of carbon, respectively, were established. 61 bacteria were isolated using both compounds. These isolates and consortia are being tested for capacity to degrade PCBs and several aromatics and aliphatics hydrocarbons.
- Genes associated with biodegradation ability for naphthalene, toluene and xylene were detected in some of the isolates. The primers for study of diversity of aliphatic genes by DGGE were designed and tested with positive control strains.
- Sub-Project Coordinator attended the 9<sup>th</sup> International Symposium of Microbial Ecology meeting in Amsterdam (August 2001). Three poster presented at the meeting.
- The graduate student Debora Rodrigues presented the poster “Isolation and Characterization of hydrocarbons and polychlorinated biphenyl bacterial consortia from Santos Estuary” (Rodrigues, D.F.; Lopez, A.C.; Yogui, G.T.; Montone, R.C.; Manfio, G.; Pellizari, V.H.) at the “XXI Congresso Brasileiro de Microbiologia” (Foz do Iguaçu, October 2001).
- First genomic libraries sequenced by Fernanda Francischetti Piza (Ph.D., FAPESP, “Molecular ecology of bacteria associated to sediments under impact of organochloride compounds in rivers from Baixada Santista” in October 2001.
- Data will be entered into SINBIOTA after initial taxonomic characterization of isolates and identification of DGGE profiles.

### **Sub-Project 4: Diversity of plant pathogenic xanthomonads**

- Dra. Suzete Destefano (Pos-Doc) integrated research staff at Instituto Biológico in 2000 and established the routines for the molecular characterization of phytopathogenic bacteria.
- A total of 50 *Xanthomonas* species/ and or pathovars have added to IBSBF Culture Collection, isolated and identified mostly by the staff of LBV. All the strains were preserved by lyophilisation and in glycerol at -80° C.
- Several reference xanthomonads were analysed by RFLP of PCR-amplified 16S-23S rDNA spacer region, including *X. cucurbitae*, *X. melonis*, *X. sacchari*, *X.*

*albilineans*, *X. axonopodis*, pathogenic to sugarcane. The diversity of *X. campestris* isolated from different geographical regions of the State of São Paulo was also investigated by rep-PCR (REP-, ERIC-, and BOX-PCR). Results of these works will allow the design of specific primers for the detection and identification of phytopathogens which affect important crops in the State. Species data will be included into SINBIOTA database after completion of the work.

- Results of research presented in the phytopathology meeting of the area and submitted to publication:
- Destéfano, S.A.L.; J. Rodrigues Neto; G.P. Manfio; D.M. Balani & M. Ferreira. Análise da diversidade genética de *Xanthomonas campestris* pv. *campestris* por REP-PCR. **Summa Phytopathologica**, 27 (1) : 107 (Resumo 077), 2001.
- Rodrigues Neto, J.; S.A.L. Destéfano,.; V.A Malavolta Jr.; D.M. Balani & M. Ferreira. Caracterização de uma linhagem de *Xanthomonas axonopodis* pv. *aurantifolii* (Tipo C) produtora de pigmento escuro. **Summa Phytopathologica**, 27 (1) : 109 (Resumo 086), 2001.
- Destéfano, S.A.L.; I.M.G. Almeida; V.A Malavolta Jr.; M.F.S. Papa; D.M. Balani & M. Ferreira. Caracterização molecular de *Xanthomonas campestris* pv. *mangiferaeindicae* isolada de caju. **Summa Phytopathologica**, 27 (1) : 117 (Resumo 130), 2001.
- Destéfano, S.A.L.; J. Rodrigues Neto; D.M. Balani & M. Ferreira. Diferenciação de *Xanthomonas cucurbitae* e *Xanthomonas melonis* baseada em PCR-RFLP da região espaçadora 16S-23S. **Fitopatol. Bras.**, 26 : 283 (Resumo 049), 2001.
- Destéfano, S.A.L.; J. Rodrigues Neto; D.M. Balani & M. Ferreira. Análise da região espaçadora 16S-23S em linhagens de *Xanthomonas* patogênicas à cana-de-açúcar. **Fitopatol. Bras.**, 26 : 283 (Resumo 050), 2001.
- Destéfano, S.A.L.; J. Rodrigues Neto; D.M. Balani & M. Ferreira. Diferenciação de patovares de *Xanthomonas axonopodis* que causam doenças em citros. **Fitopatol. Bras.**, 26 : 283 (Resumo 051), 2001.
  - Destéfano, S.A.L.; J. Rodrigues Neto. Characterization of a brown pigment producer strain of *Xanthomonas axonopodis* pv. *aurantifolii* Type C. **Summa Phytopathologica** (submitted).
  - Destéfano, S.A.L.; J. Rodrigues Neto; D.M. Balani & M. Ferreira. Rapid identification of *Xanthomonas* species pathogenic to sugarcane by PCR-RFLP analysis. **Plant Disease** (submitted).

#### **Sub-Project 5: Diversity of agri-industrial bacteria**

- Cleber Rabelo da Roza (Ph.D., UNICAMP, Bolsa CAPES) gathered molecular data on *Bacillus sporothermodurans* isolated from UHT milk products from several environmental sources. Isolates were all typed by using rep-PCR.
- Maria Inácia Stach (M.Sc., UNICAMP) left the project (Systematics and technological characterization of *Alicyclobacillus* spp. contaminants of citrus juices in the State of São Paulo) for a job at Bayer SA, due to problems experinced at CCT.
- Dr Sílvia Eguchi left the project and job at CCT at the begining of 2001. Dr. Manfio assumed Coordination of the group.

- The collection of more than 300 isolates, representing 24 sampling efforts, was catalogued and part of the data entered into SINBIOTA. Fate of additional strains deposited at CCT unclear.

#### **Sub-Project 6: Polyphasic taxonomy and culture collection**

- In the first semester, serious administrative problems at the CCT compromised the development of the project. In June, the Curator of the Collection, Ms. Cristina Umino, left the Institution. In July, the Coordinator (Dr. Manfio) started negotiating moving the projects, research staff and equipment to the University of Campinas (UNICAMP). Problems escalated and Dr. Manfio left the institution in September 03<sup>rd</sup>. Research students not allowed to enter the Institution after October 29<sup>th</sup>.
- Emergency arrangements with researchers at UNICAMP and Instituto Biológico provided alternative lab space for students. Transfer of storage of most strains from the project to a freezer at UNICAMP.
- The SDMS database software (Strain Data Management System) finished. Input of data from strains deposited and links to molecular data halted.
- Sequencing and phylogenetic analysis support for the other groups provided by members of the research staff (DNA sequencer ALF Express installed and running).

#### **Scientific Meetings and Other Activities**

- Dr. Martin Embley, from the Natural History Museum (UK), and other international lecturers, presented a training course on “Molecular Phylogeny” (July-Aug/2001), at the University of Campinas.
- Visit of Dr. James Tiedje (Center for Microbial Ecology Michigan State University) to ICB/USP (October 27) to discuss results and strategy on Sub-Project 3.
- Several Sub-Project coordinators and some students attended the International Microbial Ecology Meeting in Amsterdam (Holland).

#### **6 - Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways of solving this lacunae problem.**

For environmental bacteria and archaea, particularly isolates recovered from previously poorly studied environments, such as tropical the sediments in Baixada Santista, or endophytic plants, taxonomic identification of isolates must rely on molecular methods. Thus, sequencing of 16S rDNA and phylogenetic analysis was the method of choice. During this year, we identified at least three novel species of bacteria from the samples analysed, including a novel species of *Acidithiobacillus* and a new nitrogen-fixing *Strenotrophomonas*. Description of novel microbial species is a problem, due to the amount of phenotypical and chemical data that needs to be gathered for such task. Collaboration with international groups may sometimes be required in order to get critical results (such as G+C content of DNA, determined by using thermally controlled spectrophotometers or by HPLC).

#### **7 – Indicate geographical gaps knowledge within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem.**

Considering microorganisms, there is very limited information for the vast majority of areas in Brazil. Even in places where sampling was conducted more often, a few taxa were analysed.



**1 - Project Title – ALGAL FLORA OF THE STATE OF SÃO PAULO**

**2 – Coordinator(s) – Carlos Eduardo de Mattos Bicudo – IBt/SMA**

**3 – HOMEPAGE – does not have**

**4 - Number of records added to the SINBIOTA databank:**

Introduction of data from material collected in the SinBiota Program has just recently started with the input of the Trentepohliaceae (Trentepohliophyceae) data and will be immediately followed by those of the Desmidiaceae (Zygnemaphyceae) genera *Xanthidium*, *Bourrellyodesmus*, and *Octacanthium*.

**5 – Summary of activities carried out between October/00 and October/01**

5.1. Sampling expeditions and material collected

After approval of the present project, a careful survey of all material deposited at the Algae Section of the Instituto de Botânica Herbarium was carried out checking every access card to the collection against its respective vial, in order to know the following about the freshwater wet samples: (1) if there still existed material in the vial and under what physical condition; (2) the geographical distribution of the wet samples collection of the herbarium; and (3) which habitat (planktonic or periphytic) and which type of environment [running (lotic), stagnant (lentic), or almost still water (semilentic)]. For the marine material a similar survey was carried out by comparing the access cards and their respective exsiccatae aiming at knowing the following: (1) whether there still existed the material and under what physical conditions; (2) the geographical distribution of sampling units collected; and (3) from which littoral region (supra, meso or infralittoral) material was collected.

Referring to the freshwater material, it was realized that there were some gaps in the geographical distribution of samples gathered due partly to access problems to some localities, partly to the evanescence of some sampling units, and partly to the never visiting the site. There also was some tendency towards collecting much more in lentic (lakes, ponds, swamps) and semilentic (reservoirs) systems than in lotic (rivers, brooks, creeks) ones. It was finally realized that sampling of phytoplankton material was much more intense than that of periphyton. In what regards the marine forms, it was concluded that very little material was collected from the infralittoral region, since the latter was almost never dealt with in Prof. Joly and his students' works.

Consequently, first step was to collect more material in order to fulfill the gaps pointed out above. Thus, the marine algae group of specialists realized 12 field trips including northern and central littoral of the State of São Paulo (Baía de Castelhanos, Baía de Picinguaba, Baía de Ubatimir, Enseada do Mar Virado, Ilha Anchieta, Ilha Bela, Ilha da Ponta, Ilha da Raposa, Ilha das Couves, Ilha São Sebastião, Ilha de Ubatimir, Ilha Vitória, Praia Mansa, Praia do Gato, Laje de Santos, Praia Brava, Praia da Pedra do Sino, Praia de Ubatimir, Praia do Bueno, Praia do Félix, Praia do Jabaquara, Praia do Lambert, Praia do Munduba, Praia do Sítio São Pedro, Praia do Tenório e Praia do Tijucopava). And the freshwater algae group of specialists realized 10 field trips to the following areas of the state: Aguaí, Ajicê, Alfredo Guedes, Álvares Florence, Araraquara, Araras, Artur Nogueira, Aspásia, Boa

Esperança do Sul, Cachoeira de Emas, Colina, Colômbia, Cosmorama, Echaporã, Estrela do Norte, Fátima Paulista, Florínia, Francisco Morato, Guachos, Guapiaçu, Guariroba, Guzolândia, Ibirá, Ibitu, Iepê, Itajobi, Itapura, Junqueirópolis, Mairiporã, Mariápolis, Martinópolis, Mira Estrela, Mirante do Paranapanema, Monte Aprazível, Morungaba, Nantes, Nhandeara, Nova Europa, Nova Granada, Nova Independência, Novo Horizonte, Pacaembu, Palmital, Paraguaçu Paulista, Paulicéia, Piacatu, Piquete, Pirapozinho, Pitangueiras, Ponta Linda, Populina, Porto Castilho, Presidente Bernardes, Presidente Venceslau, Salesópolis, Salmourão, Salto Grande, Santa Bárbara do Rio Pardo, Santa Cruz do Rio Pardo, Santa Eudoxia, Santa Rita do Passa Quatro, Santa Rosa de Viterbo, Santo Antonio do Arancanguá, Santo Expedito, São Luiz do Paraitinga, São Pedro do Turvo, Serra Azul, Tabajara, Taquaritinga, Valparaíso, and Zacarias.

All samples collected after start of present project (“**Algal Flora of the State of São Paulo**”) were georeferred according to the BIOTA/FAPESP Program demands.

## 5.2. Study of material

Material intended for the production of the “**Algal Flora of the State of São Paulo**” is still being sorted out and all exsiccatae and/or sampling units sent to the proposed collaborators for study of their respective taxonomical group(s) aiming at preparation of the monographs.

This is the crucial-most phase of the project as well as the most time demanding and shall be extended until the end of 2002 or mid of 2003.

## 5.3. Preparation of monographs

Volume 5 of the “**Algal Flora of the State of São Paulo**” is already ready for publication. It is the result of the analysis of 258 sampling units collected throughout the state of São Paulo. They were identified two genera (*Chara* and *Nitella*), five species of *Chara* and one variety that is not the typical for its respective species, and 11 species of *Nitella*, four subspecies, three varieties that are not the typical for their respective species, and seven taxonomical forms that are also not typical for their respective varieties, totaling 27 taxa. All taxa were identified on the basis of populations and were described in detail as to include all diacritic, meristic, and metrical characteristics detected in the whole set of populations studied. There is abundant illustration (445 trace drawings) of identified material and an artificial, dichotomous key for identification of the 27 taxa studied.

We are waiting for FAPESP’s decision on the sum of money asked for the publication of the volume above.

Next year, first part of volume 3 (Zygnemaphyceae) including genera *Bambusina*, *Bourrellyodesmus*, *Closterium*, *Desmidium*, *Groenbladia*, *Haplotaenium*, *Hyalotheca*, *Micrasterias*, *Octacanthium*, *Onychonema*, *Phymatodocis*, *Pleurotaenium*, *Spinoclosterium*, *Spondylosium*, *Teilingia*, *Tetmemorus*, *Triploceras*, and *Xanthidium* will be formatted for publication.

Coordination’s idea is to publish volumes as they get finished, independent of their numerical sequence. Tentative edition size will be 400 copies per volume.

**6 - Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways of solving this lacunae problem.**

**7 – Indicate geographical gaps in knowledge within the taxonomic(s) groups(s) you are working with, and suggest ways of solving this problem.**

**6/7** - Regarding the freshwater algal forms, two foreign specialists could be invited to visit São Paulo and give Brazilian students and specialists a first glance at the knowledge of the very special techniques and taxonomic problems involving algal flagellates that have a siliceous cell wall. Here resides the present Achilles heel of Brazilian phycology. Siliceous walled flagellates is a heterogeneous group of organisms that includes representatives of Chrysophyceae, Prymnesiophyceae, and Prasinophyceae. The group demands highly specialized techniques for preparation of material for study, and recently went through a somewhat deep modification in their taxonomy due to the application of scanning and transmission electron microscopy observation. Both specialists (suggested: Dr. Daniel F. Wujek from the U.S.A. and Dr. J. Kristiansen from Denmark) would substantially contribute to the construction of a reference collection in the group for the state of São Paulo as well as to the training of Brazilian students and improving of Brazilian specialists.

The marine algae group in the project recommends two specialists (Dr. Max Hommersand and Dr. Suzanne Fredericq, both from U.S.A.). Dr. Hommersand is a specialist in the taxonomy of Ceramiales and Gigartinales (Rhodophyceae) and would give the marine forms a biogeographical approach, whereas Dr. Fredericq would give the same flora a modern approach through the integration of molecular phylogeny with morphological data. Both specialists would also be of interest to the freshwater group of specialists.

**1 - Project Title** - BENTHIC MARINE BIODIVERSITY OF THE STATE OF SÃO PAULO

**2 – Coordinator** - Antonia Cecília Zacagnini Amaral – IB/UNICAMP

**3 – HOMEPAGE** – <http://www.unicamp.br/ib/zoologia/biota/biomarinha>

**4 - Number of records added to the SINBIOTA databank: 0**

**Obs. If no file has been added, please justify**

Field campaigns are well underway, and the resulting collections have mostly been sorted to the level of major taxa. However, identifications to species level have not yet been accomplished for most groups.

**5 – Summary of activities carried out between October/00 and October/01**

The main goal of the Benthic Marine Biodiversity Project is to investigate the biological diversity of coastal ecosystems, especially the benthic fauna including beach, phytal, and sublittoral animals, down to about 45 m depth. The three areas sampled (the north coast of Ubatuba, southern São Sebastião Channel, and Caraguatatuba Bight) are located on the northern coast of the state of São Paulo, between 23 – 24° S and 44 – 46° W. Certain previously established localities were re-sampled, and other localities were added, in order to attain the specific aims of each subproject.

In this first stage, the following activities were carried out in each subproject, Rocky Shores and Associated Algae Fauna (Phytal), Sandy Beaches, Non-Consolidated Sublittoral Bottoms, and Meiofauna:

**- Rocky Shores and Associated Algae Fauna (Phytal):** Fosca P.P. Leite (Coordinator), Cláudio G. Tiago, Alvaro E. Migotto, Luiz Francisco L. Duarte.

Sampling was undertaken in the intertidal zone of the rocky shores at the four previously selected sites (Praia de Martim de Sá and Ponta do Cambirí at Caraguatatuba, Praia da Baleia and Toque-Toque Grande at São Sebastião, and Pinguaba at Ubatuba) in March, April, and May 2001. At each site, three transects were randomly established for analysis of the abundance of animals. The transects were inspected visually with the aid of a 0.25 m<sup>2</sup> quadrat with 100 intersections. In each quadrat, the percentage cover of sessile organisms and the numbers of vagile organisms were recorded, and the secondary substrata were removed and fixed for study of the associated fauna. Individual plants, representative of the most common macroalgae present in the vicinity, were also collected for analysis of the phytal community. The geographic coordinates of each transect were recorded using a GPS, and the profile of each transect was determined. During this period, 14 transects were sampled, 173 quadrats had their secondary substrata removed, and 47 individual macroalgae plants were collected. The dominance of macroalgae, and the beds of mussels and barnacles define the prevailing physiognomy of the rocky shores studied. The most abundant taxa present in the phytal samples analyzed to date were Gammaridae and other Peracarida, Gastropoda, and Polychaeta.

- **Sandy Beaches – Macrofauna:** A. Cecília Z. Amaral (Coordinator), Eloisa H.M. Amaral.

Sampling was carried out in the intertidal zones of Enseada de Caraguatatuba, Fazenda, Barra do Sahy, Baleia, and Toque-Toque Grande beaches in March, April, and May 2001. On each beach, one or more study sectors, varying in size according to the width of the intertidal zone, were established and divided into levels (lower, middle, and upper). The geographic coordinates of each level were recorded using a GPS, and the sector profiles were determined. From each level, 15 (0.01 m<sup>2</sup> corer) and 9 (0.16 m<sup>2</sup>) samples were taken for macro- and 9 (0.01m<sup>2</sup>) samples of 5 cm depth for macro- and meiofauna. Granulometry, calcium and organic matter contents, salinity, and temperature were also measured. A total of 418 samples were identified to the level of major taxa, with Bryozoa, Gastropoda, Bivalvia, Brachiopoda, Polychaeta, and Nematoda dominating. Of these, the polychaetes and bivalves are presently being identified to species level.

- **Non-consolidated Infralittoral Bottoms – Macrofauna** - Adilson Fransozo (Coordinator), Valéria F. Hadel, Maria Lúcia N. Fransozo.

Sampling was begun in January 2001, and is being carried out at Picinguaba, Massaguaçu, and the southern São Sebastião Canal to the Toque-Toque Grande region. At each site, 5 stations were selected according to depth (5, 15, 25, 35, and 45 m). For each site, 5 additional stations were selected near islands and/or rocky shores. Biotic and abiotic samples are being taken using trawls (area sampled per transect parallel to the shore = 18,000 m<sup>2</sup>), dredges (area sampled per point = 200 m<sup>2</sup>), and a van Veen grab (area sampled per point = 0.250 m<sup>2</sup>) for each season of the year. Up to the present, 75 samples have been taken, resulting in the collection of all major groups of invertebrates: Porifera, Cnidaria, Platyhelminthes, Nematoda, Mollusca, Annelida, Sipuncula, Brachiopoda, Bryozoa, Echiura, and Crustacea. Of these, species of Cnidaria, Annelida (Polychaeta), Crustacea (Decapoda), Mollusca (Bivalvia), and Echinodermata (Asteroidea and Echinoidea) have been identified, because the research group includes taxonomists familiar with these invertebrate groups. Of the identified material, decapod crustaceans were the most abundant taxonomic group collected by trawling, whereas polychaetes predominated in the samples taken by dredge and van Veen grab. Other taxonomic groups not yet identified have been forwarded to specialists, and identifications are awaited.

- **Meiofauna** – Carlos Eduardo F. Rocha (Coordinator), Liliana R.A. Medeiros.

According to the initial project, meiofauna sampling was also carried out as part of the Rocky Shore and Associated Algae Fauna, Sandy Beach, and Non-consolidated Sublittoral Bottoms subprojects. Each subproject used appropriate sampling and sorting methods for the meiofauna. Apart from these samples, specific samples were taken by this subproject team from March 2001 on. Thirty-four samples were analyzed prior to fixation, in search of groups which require observation of live animals or special fixation techniques for their study. Apart from the beaches, which are being sampled through the sandy-beaches subproject which is examining mostly beaches composed of fine and very fine sand, samples were taken from São Francisco Beach. Up to the present, the highest diversity has been found at São Francisco Beach. The samples, fixed in 4% formalin or 70% ethanol, were sorted to the level of major groups. The most numerous major taxa have been

Nematoda and Copepoda. Of the Copepoda, the Harpacticoida have been more diverse and abundant than the Cyclopoida.

**- Visits to Museums and Institutions:**

**Université de La Réunion** (Reunion Islands, France); the researcher Álvaro E. Migotto studied Hydrozoa during the period June 25 to July 26, 2001.

**Zoologisk Museum, University of Copenhagen** (Denmark); the researchers Antonia Cecilia Z. Amaral and Tatiana M. Steiner examined type specimens of species of Polychaeta on June 28 and 29, 2001.

**- Participation in scientific meetings:**

**7th International Polychaete Conference**, Reykjavik, Iceland, July 2-6, 2001. – Amaral, A.C.Z.; Nogueira, J.M.M.; Steiner, T.M. & Rizzo, A.E. Polychaete: benthic marine biodiversity in the State of São Paulo – BIOTA/FAPESP Program, p. 80.

**Fifth International Crustacean Congress and Summer 2001 Meeting of The Crustacean Society**, Melbourne, Australia, July 9-13, 2001.– Fransozo, A.; Costa, R.C. & Mantelatto, F.L.M. Biodiversity of marine shrimps (Penaeidea and Caridea) at the northern coast of São Paulo state, Brazil, p. 69. – Negreiros-Fransozo, M.L.; Fransozo, A.; Melo, G.A.S. & Bertini, G. Assessment of brachyuran crabs diversity from non-consolidated sublittoral bottom at São Paulo northern coast, Brazil, South America, p. 110. – Rocha, C.E.F. & Lotufo, G.R. Diversity of psammic harpacticoids (Copepoda) of the intertidal zone of beaches of the state of São Paulo, Brazil, p. 126.

**Eleventh International Meiofauna Conference**, Boston, July 15-20, 2001. – Rocha, C.E.F. & Lotufo, G.R. Diversity of psammic harpacticoids (Copepoda) of the intertidal zone of beaches of the state of São Paulo, Brazil, p. 126.

**36th European Marine Biology Symposium – A Marine Science Odyssey into the 21st Century**, Barcelona, Spain, September 17-23, 2001. – Negreiros-Fransozo, M.L.; Fransozo, A. & Hebling, N.J. Paguroidea from shallow waters at São Paulo northern littoral, Brazil, South America, p. 190. – Corbi, E. & Fransozo, A. Size at morphologic sexual maturity of *Portunus spinicarpus* (Crustacea, Decapoda, Portunidae) in Ubatuba region (SP) Brazil, p. 104. – Costa, R.C.; Fransozo, A.; Braga, A.C.A. & Freire, F.A.M. Abundance and ecological distribution of the shrimp *Rimapenaeus constrictus* (Stimpson, 1874) (Crustacea: Penaeidae) in northern littoral of the São Paulo State, Brazil, p. 106. – Fransozo, A.; Fransozo, V.N. & Noronha, B. Ecological distribution of the spine-shrimp *Exhippolysmata oplophoroides* (Holthuis, 1948) (Crustacea, Cridea, Hippolytidae) in the Ubatuba Bay, São Paulo, Brazil, p. 133. – Bertini, G. & Fransozo, A. Biodiversity of Brachyuran crabs (Crustacea: Decapoda) from non-consolidated sublittoral bottom in the northern coast of São Paulo State, Brazil, p. 75.

**VI Workshop do PiraCena "Biogeoquímica, meio aquático e a paisagem"**, Águas de São Pedro, Brazil, August 27-31, 2001 - Tiago, C.G. was present in all discussions.

**- Paper Submitted:**

Amaral, A.C.Z.; Nogueira, J.M.M.; Steiner, T.M. & Rizzo, A.E. Investigation on the benthic polychaete of the southeastern coast of Brazil (State of São Paulo) – BIOTA/FAPESP Program. Bulletin of Marine Science.

**- Seminar:**

"The BIOTA-FAPESP Program and the study of the crustacean diversity of the state of São Paulo, Brazil". April 6, 2001, The National Museum of Natural History, Smithsonian Institution, United States; Carlos E.F. Rocha.

**6 - Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways of solving this lacunae problem.**

A large part of the material collected for the subprojects has already been sorted to level of major taxon (phylum, class, and/or order). This material either is being identified by specialists who integrate their own project team (Cnidaria, Polychaeta, Copepoda, Decapoda, Bivalvia, Asteroidea, and Echinoidea), or is being sent to systematists in Brazil or abroad. Some specialists are being invited to participate directly in the collections, in order to examine live material or perform certain kinds of analyses that require specific techniques. In this regard, during this period, the researcher Vasily Radashevsky (Institute of Marine Biology, Vladivostok, Russia), a specialist on the family Spionidae (Polychaeta), participated.

**7 – Indicate geographical gaps in knowledge within the taxonomic(s) groups(s) you are working with, and suggest ways of solving this problem.**

A detailed evaluation of other geographical gaps in the state is in process.

**1 - Project Title** – BIODIVERSITY OF FRESHWATER ZOOPLANKTON OF SÃO PAULO STATE AND ITS RELATION TO THE PRESERVED AND NON PRESERVED AREAS

**2 – Coordinator(s)** – Takako Matsumura-Tundisi – IEE/São Carlos

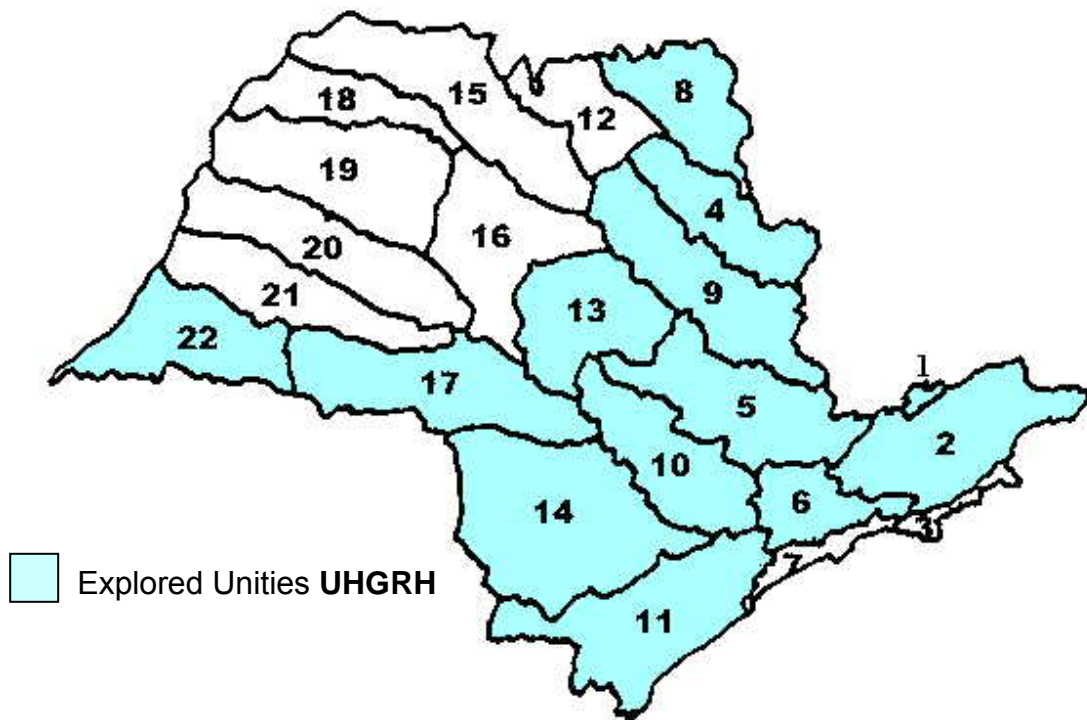
**3 – HOMEPAGE** – [www.iie.com.br/biota.htm](http://www.iie.com.br/biota.htm)

**4 – Number of records added to the SINBIOTA databank: 0**

No file has been added after the problem that occurred in the SINBIOTA databank. We had difficulty to insert the environmental data with the list of species of different groups. The software does not accept the addition of new list of species in the same file of the environmental data. It is necessary to solve this problem because it is impossible to insert all the environmental data for each new list of species to be inserted.

**5 – Summary of activities carried out between October/00 and October/01**

5.1. Field work - The map shows the Hydrographic Management Units of Hydric Resources (UHGRH) explored until the present data and the table I shows the number of water bodies studied both in zooplankton biodiversity and water quality.



**Table 1. Number of water bodies explored in each UHGRH**

<b>UHGRH</b>	<b>Number of water bodies</b>
<b>04- Pardo</b>	<b>7</b>
<b>05- Piracicaba/Capivari/Jundiaí</b>	<b>8</b>
<b>08- Sapucaí</b>	<b>4</b>
<b>09- Mogi-Guaçu</b>	<b>28</b>
<b>10- Tietê/Sorocaba</b>	<b>3</b>
<b>13 – Tietê Jacaré</b>	<b>21</b>
<b>14- Alto Paranapanema</b>	<b>2</b>
<b>17- Médio Paranapanema</b>	<b>4</b>
<b>22 – Pontal de Paranapanema</b>	<b>2</b>
<b>02- Paraíba do Sul</b>	<b>8</b>
<b>11- Ribeira do Iguaçu</b>	<b>12</b>

Until the present data 71 water bodies were explored where 280 samplings were carried out. For each water body, reservoir, small lakes or ponds two or three samplings were carried out at the limnetic and the litoral region obtaining 280 samples. Limnological variables such as temperature, dissolved oxygen, pH, conductivity, potential redox, nutrients ( nitrate, nitrite, amonium, silicate, phosphate) suspended matter, Carbon biomass, Chlorophyll were measured to know the trophic state and the water quality of the aquatic systems studied.

### 5.3 Laboratory analysis

Chemical analysis are in progress and the data obtained will be utilized to compare the water quality and the state of contamination or preservation of the water body with the zooplankton composition and the diversity. A data bank collating all the available data is in progress and comparison with previous information is also being developed.

### 5.4 Zooplankton Data

#### Class Copepoda: Order Calanoida

This Order is represented by filter feeder species of copepods. The number of species occurring for each water body considered is not so high. The maximum number of species, (four species) co-occurring in each system was observed in the two reservoirs of Alto Tiete watershed: Paiva Castro and Aguas Claras.

Until the present they were analysed 213 samples originating from the following watersheds: Alto Tiete, Mantiqueira, Mogi Guaçu, Paranapanema, Pardo, Tiete Jacare and Sapucaí Grande.

The following species were identified in the water bodies of Alto Tiete:1- *Argyrodiaptomus furcatus*, 2-*Argyrodiaptomus azevedoi*, 3- *Notodiaptomus iheringi*, 4- *Notodiaptomus cearensis*, 5- *Odontodiaptomus paulistanus*, 6-*Scolodiaptomus corderoi*. More 3 species were registered in this watershed that are probably new species. The description of these specie are going on. The presence of *Odontodiaptomus paulistanus* is characteristic of this watershed.

The Mantiqueira watershed is composed of water bodies shallower than 3.0 meters, therefore most of them do not have a well developed limnetic zone. From 34 samplings analysed the occurrence of Calanoida was limited to one small pond and one species (*Scolodiaptomus corderoi*).

In the MogiGuaçu watershed from 65 samples analyzed Calanoida was present only in 7 samples with the following species: *Notodiaptomus cearensis*, *Notodiaptomus iheringi* and *Argyrodiaptomus furcatus*. Some water bodies present the co-occurrence of 2 species but most of them showed only 1 species. In the other unities such as Paranapanema, Tietê/Jacaré and Pardo were found three other species do not identified yet.

#### Classe Copepoda – Order Cyclopoida

Order Cyclopoida: This order represented by raptorial copepods omnivorous and carnivorous there are much more higher number of species than order Calanoida.

It was analyzed 252 samples from 11 watersheds: Alto Tietê, Mantiqueira, Mogi Guaçu, Sorocaba/Tietê. Tietê/Jacaré, Pardo, Paranapanema (Alto, Médio, Pontal), Sapucaí/Grande, Piracicaba/Jundiá/Capivari. There were registered 25 species: *Acanthocyclops robustus*, *Ectocyclops rubecens*, *Ectocyclops herbstii*, *Ectocyclops sp1*, *Ectocyclops sp.2*, *Eucyclops ensifer*, *Eucyclops serrulatus*, *Mesocyclops ogunnus*, *Mesocyclops aspenicornis*, *Mesocyclops ellipticus*, *Mesocyclops brasiliensis* cf., *Mesocyclops meridanus*, *Metacyclops mendocinus*, *Microcyclops sp.*, *Mesocyclops longisetus*, *Metacyclops mendocinus*, *Microcyclops sp.*, *Microcyclops finitimus*, *Microcyclops anceps*, *Microcyclops ceibaensis*, *Thermocyclops decipiens*, *Paracyclops sp.*, *Thermocyclops minutus*, *Tropocyclops prasinus prasinus*, e *Thermocyclops inversus*.

The highest number of species was registered in Tietê/Jacaré and Mogi-Guaçu watersheds with 19 and 17 species respectively and the lowest number was found in Paranapanema (6 species) and Mantiqueira (7 species) watersheds. *Thermocyclops decipiens*, *Thermocyclops minutus*, *Mesocyclops meridianus* and *Tropocyclops prasinus meridionalis* were the most frequent species found in the almost water bodies analyzed.

Five species showed as a new occurrence in Sao Paulo State: *Acanthocyclops robustus*, *Mesocyclops brasiliensis* cf., *Mesocyclops ogunnus* and *Microcyclops sp.*

#### Class Cladocera

For this group of zooplankton in this period all the samples obtained from the following watersheds were analysed: Mogi Guaçu, Tietê/Jacaré, Tietê/Sorocaba, Pardo and Paraiba do Sul. Among cladocerans two groups were considered: 1- The group inhabitant of the littoral region of the lake: Chydoridae, Ilyocryptidae and Macrothricidae 2- Group inhabitant of limnetic region of the lake: Daphnidae, Sididae, Moinidae and Bosminidae.

For the littoral group until the present data were registered 38 species of Chydoridae from which *Alona setigera*, *Alona eximia* and *Leydigia australis* constitute a new occurrence in the aquatic systems of Brazil. To the family Macrothricidae 5 species were registered from which two of them *Macrothrix flabelligera* and

*Streblocerus serricaudatus* are new occurrence in Brazil and the first one a new record in South America.

Among the limnetic cladocerans until the present analysis were registered 23 species from which three are new occurrences in São Paulo State: *Bosmina huaronensis* in the Tiete/Jacaré basin, *Pseudosida ramosa* in the Mogi Guaçu watershed and *Ceriodaphnia dubia* in Alto Tiete watershed.

#### Phyllum Rotifera

The composition of the Rotifera of the Alto Tietê watershed in 12 water bodies with a total of 27 samples, showed a total of 57 táxons, 31 of which identified at species level ( 57%). For the Mantiqueira watershed there were sampled 12 water bodies with a total of 24 samples. 62 táxons were registered with 36 confirmed species (58%). 1 species of *Lecane*, 7 *Trichocerca* and 5 of *Keratella* were identified.

From July 2000 there were initiated the studies of 20 water bodies from Tietê/Jacare watershed: 15 were analysed showing high richness of species with more than 100 táxons and 60 species identified.

In September the analysis of the MogiGuaçu watershed were initiated showing 20 species with great richness of *Lecane* species ( 10 species were identified) and *Brachionus* ( 4 species).

#### Protozooplankton

For the protozooplankton community there were developed taxonomic analyses of the filtered material with a net of 25µm of size mesh. The recognizable characteristics of the live material ( movement, pigment, vacuoli, symbiotic algae etc.) were used. Some attempts to cultivate Protozoa were made but only one species (*Spirostromum minus*) was successfully cultivated. The population developed in culture was followed. The preserved material obtained is used for further studies and for completing information.

#### Bacterioplankton and Denitrification

Concerning to the activities of this sub-project in the period between October 2000 and October 2001, most part of samples collected in the Mantiqueira, Alto Tietê and Mogi Guaçu basins were already analysed. Alpha Proteobacteria was the group which showed higher proportion o cells, followed by Beta Proteobacteria and Cytophaga/Flavobacterium group.

For phylogenetic characterization of bacterioplankton from the samples collected in the UHGRH 4 (Pardo), UHGRH 5 (Piracicaba/Capivari/Jundiaí), UHGRH 8 (Sapucaí/Grande), UHGRH 9 (Mogi-Guaçú), UHGRH 10 (Tietê/Sorocaba), UHGRH 13 (Tietê/Jacaré) and partially in the UHGRH 17 (Médio Paranapanema and UHGRH 22 (Pontal do Paranapanema) the analysis are processing.

#### 5.5. Biodiversity and Water Quality

A comparative analysis of physical and chemical composition of lakes and reservoirs and its relationship with biodiversity is being carried out.

A principal component analysis was developed for the studied watersheds. This analysis showed three main groups of freshwater ecosystems in São Paulo State:

- a) Those dependent on the biogeographical characteristics of watersheds, and in natural conditions.
- b) Those subjected to anthropogenic impacts but with potential for part recovery after ecotechnological inputs towards restoration
- c) Those heavily impacted which need a heavy technological and ecotechnological investment for recovery.

Each one of these groups of freshwater ecosystems is characterized by a different assemblage of zooplanktonic organisms and we are organizing a chart to integrate impacts and biodiversity. Some Calanoida species are good indicators of pristine or polluted conditions and their presence can identify potential systems for preservation and recovery.

## 5.5. Papers in publication

1. Distribution and abundance of Cyclopoida populations in a cascade of reservoirs of the Middle Tietê River (São Paulo State, Brazil) SILVA, W.M. & MATSUMURA-TUNDISI, T. ( accepted in *Internat. Verh. Verein. Limnol.*)
2. Zooplankton diversity in eutrophic systems and its relation with occurrence of Cyanophyta blooms. T. Matsumura-Tundisi & J.G. Tundisi ( accepted in *Internat. Verh. Verein. Limnol.*)
3. Community analysis of the bacterioplankton by fluorescent in situ hybridization in different water bodies of the São Paulo State, south-east Brazil. Abe, D.S. & Matsumura-Tundisi, T. ( in preparation)
4. Nitrification and denitrification in the hypolimnion of a series of reservoirs in the middle Tietê River, south-east Brazil. Abe, D.S. Tundisi, J.G. , Matsumura-Tundisi, T. & Rocha, O. ( accepted in *Internat. Verh. Verein Limnol.*)
5. The application of Wedderburn and lake numbers to reservoirs in São Paulo State and its relationship with planktonic diversity. Tundisi, J.G., J.A. Durval & Matsumura-Tundisi, T. ( accepted in *Internat. Verh Verein. In Limnol.*)
6. Litoral Cladocera (Macrothricidae and Ilyocryptidae) of two units of water management in São Paulo State: Serra da Mantiqueira and Alto Tietê. Guntzel, A. M., Rocha, O., Santos-Wisniewski, M. J. & Matsumura-Tundisi, T. (accepted in *Internat. Verh. Verein Limnol.*)
7. Cladocera Chydoridae of two units of water management of São Paulo State: Serra da Mantiqueira and Alto Tietê. Santos-Wisniewski, M. J., Rocha, O., Guntzel, A. M. & Matsumura-Tundisi, T. ( accepted in *Internat. Verh. Verein Limnol.*)
8. Hot spots of zooplankton diversity in São Paulo State. Rocha, O., Matsumura-Tundisi, T. & Tundisi, J.T. ( accepted in *Internat. Verh. Verein Limnol.*)

9. First record of *Alona setigera* Brhem, ( Cladocera, Chydoridae) in the Neotropical region. Santos-Wisniewski, M. J., Rocha, O., & Matsumura-Tundisi, T. ( accepted in *Braz. J. Biol.*)
10. Life cycle of *Macrothrix flabelligera* (Smirnov, 1992) recently reported in the Neotropical region. Guntzel, A.,M., Rocha, O. & Matsumura-Tundisi, T. ( submitted to *Hydrobiologia*).
11. New occurrences of Cladocera species in São Paulo State Rocha, O., Matsumura-Tundisi, T., Santos-Wisniewski & Guntzel, A.,M ( in preparation)
12. Generic and infrageneric táxons and free living Sarcodinas from freshwater ecosystems of Mantiqueira Unit. Regalli, M.H.S., Godinho, M.L. & Matsumura-Tundisi, T. ( in preparation)
13. The water quality of lakes, ponds and reservoirs in São Paulo State: a comparative study between two watersheds: Alto Tietê and Mantiqueira. Tundisi, J.G. & Matsumura-Tundisi, T. ( in preparation)
14. The freshwater zooplankton and its relationships with water quality and the state of degradation and conservation of ponds, lakes, reservoirs, in São Paulo State. Matsumura-Tundisi, J.G. Tundisi, O. Rocha, E.L.G. Espindola, M.J.L. Godinho, D.S. Abe, I.H. Moreno, M.J.S. Wisniewski, A. Guntzel. W.M. Silva and M.H.R. Selegim. ( in preparation)
15. Biodiversity of planktonic Cladocera in lakes and streams of the Serra da Mantiqueira region. Rocha, O., Santos-Wisniewski, M. J., Guntzel, A. M. & Matsumura-Tundisi, T. ( in preparation)
16. Similarity between Cyclopoida copepods *Mesocyclops kieferi* Van der Velde and *Mesocyclops ogunnus* Onabimiro, occurring in the water bodies os São Paulo State Matsumura-Tundisi , T. & Silva, W.M. ( submitted in *Braz. J. Biol.*)
17. Species composition, spatial distribution and abundance of planktonic Cladocera in the Alto Tietê watersheds, São Paulo State. Rocha, O., Guntzel, A. M., Santos-Wisniewski, M. J. & Matsumura- Tundisi, T. ( in preparation)

**6- Indicate knowledge gaps within the taxonomic groups you are working with and suggest ways of solving this lacunae problem.**

Among the taxonomic groups of zooplankton that we have been proposed to study in this Thematic Project, Classe Copepoda and Classe Cladocera are going very well, due to the participation of specialists and 2 Post Doctor researchers ( with FAPESP fellowship) and 1 Pos Graduate student ( FAPESP doctorate fellowship). For these groups the knowledge gaps that we have detected in the Serra Negra Symposium will be solved for all directions. However for Phylum Protozoa and Rotifera we are facing up to a serious problems to train a team with participation of post graduate students. Because most of the principal researchers of the Project can not accept more students in a post graduate course (due to the limited number

of students allowed) until the present there are no students to be trained. To solve this lacunae problem we have to give to the students that concluded the graduate course the opportunity to start in the research without going to the formal post graduate course. External specialists are being invited but most of the people has not time to stay out for a long period.

**7 - Indicate geographical gaps knowledge within the taxonomics groups you are working with and suggest ways of solving this problem.**

For the groups of Rotifera and Protozoa we will have again difficulties to solve the problem of geographical distribution due to the fact that hundreds samples have to be analyzed and there is a shortage of qualified specialists and students. We suggest that special fellowships should be implemented for recently graduated students ( BSc) to prepare them as specialists without any link to post graduate programs because there are not many programs that deal with the field of taxonomy of zooplankton.

**1 - Project Title** – SURVEY AND BIOLOGY OF FRESHWATER BENTHIC CRUSTACEA, INSECTA AND MOLLUSCA FROM THE STATE OF SÃO PAULO

**2 – Coordinator(s)** – Claudio G. Froehlich. Chief researchers: Alaíde A. Fonseca Gessner, Carlos Eduardo F. Rocha, Sérgio Luiz de Siqueira Bueno, Susana Trivinho-Strixino, Wagner E. P. Avelar and Roberto da Gama Alves.

**3 – HOMEPAGE** – <http://ffclrp-usp.rvx.net>

**4 – Number of records added to the SINBIOTA databank:** >250

**5 – Summary of activities carried out between October/00 and October/01**

Several subprojects related to the crustaceans, insects and molluscs are being carried on. All collections are georeferenced. The larger crustaceans and the molluscs present, on the whole, a smaller species diversity than the benthic microcrustaceans and the insects, and most of the species are known. Within the last two groups, species diversity is much larger and taxonomic knowledge, especially in some of their subgroups, is very incomplete.

**Oligochaeta.** In Jan./2001 a fourth group of freshwater benthic macroinvertebrates has been included in the project, the Oligochaeta, under the responsibility of Dr. Roberto da Gama Alves (UNIARA, Araraquara). Collections have been made in the municipalities of Araraquara, São Carlos, Brotas, Itirapina and in the Intervales State Park. Individuals identified belonged to 5 families: Tubificidae, Naididae, Alluroididae, Opistocystidae and Enchytraeidae. The most common tubificid was *Limnodrilus hoffmeisteri*, 72,8 % of the individuals of this family; other species were *L. udekemianus*, *Tubifex tubifex*, *Branchiura sowerbyi*, *Bothrioneurum* sp. and *Aulodrilus pigueti*. Within the naidids, the commonest species were *Allonais inaequalis* and *Pristina americana*; other species collected were *Nais communis*, *N. variabilis*, *Pristina synclites*, *P. aequiseta*, *Dero costatus*, *D. sawayai*, *D. digitata*, *D. multibranchiata* and *Slavina* sp. The alluroidids were represented by *Brinkhurstia americanus* and the opistocystids by *Opistocysta* sp. The enchytraeids, fragmented, were not identified.

**Crustacea.** Samplings of macrocrustaceans were no longer restricted to State-protected areas such as State Parks, biological stations and ecological sanctuaries. Private lands were included as well and were investigated upon previous consent of the land owners. Most of these private properties have recently been transformed into RPPN units (Reserva Particular do Patrimônio Natural). Also, each field trip that was planned in the past year was performed and concentrated in one or more specific river basins within the State of São Paulo. From October 2000 to October 2001, the following river basins were investigated: Sapucaí Grande, Mogi-Guaçu, Tietê-Sorocaba, Tietê-Jacaré, Alto Paranapanema, Ribeira do Iguape, Litoral Norte, Paraíba do Sul and Mantiqueira. The bulk of data already gathered from these river basins is being complemented by some additional data from sporadic samplings from other river basins (Médio Paranapanema, Pontal do Paranapanema, Pardo, Baixo Pardo and Baixo Tietê) investigated in the same period. These areas altogether represent approximately 60% of the river basins of the State of São Paulo.

Our investigation has yielded substantial amount of information on the species composition and patterns of distribution of freshwater decapods in the investigated areas. Furthermore, it also provided some important information concerning the strong endemism of some hypogean aeglid anomurans (*Aegla cavernicola*; *Aegla leptochela*), the introduction and/or the establishment of non-indigenous crabs (*Dilocarcinus pagei*), prawns (*Macrobrachium jelskii* and *M. amazonicum*) and crayfish (*Procambarus clarkii*) and possible cases of synonyms yet to be further investigated (*Macrobrachium holthuisi* and *M. birai* as probable synonyms of *M. olfersi*; *M. petronioi* as probable synonym of *M. potiuna*).

Gaps. The definitive identification of specimens from several populations of the atyid shrimp (*Potimirim* sp.) has not been fully solved so far. The paucity of published information on *Potimirim* has become a serious obstacle to understand the taxonomic controversies regarding the Brazilian species. Furthermore, the genus *Potimirim* has been poorly studied, many species have been poorly described and some species have been dubiously assigned as synonym of other species. We suspect that the *Potimirim* specimens sampled in São Paulo belong perhaps to at least three different species. We are already taking some steps to get some understanding on this matter. A thorough morphological and DNA comparative study regarding these species is about to be initiated. This study will benefit from the assistance of specialist in caridean shrimp morphology (Dr. Célio Magalhães from INPA – AM, and Dr. Georgina Bond-Buckup from UFRGS – RS). Comparisons with holotypes (if still existing) deposited in the US and Mexico are also essential and is strongly recommended.

Samples containing benthic microcrustaceans were taken from first to third order streams (including streambed sediments, debris dams), moist and saturated leaf litter, terrestrial and arboreal mosses and bromeliads, roots of aquatic macrophytes and artificial reservoirs. Harpacticoid copepods were the most frequent and abundant; they were represented by 3 families: Canthocampidae (genera *Atteyella*, *Elaphoidella* and *Moraria*), Parastenocarididae (*Potamocaris* and *Parastenocaris*) and Phyllognathopodidae (*Phyllognathopus viguieri*, a cosmopolitan species). Within the cyclopoid copepods the Eucyclopinæ were dominant (genera *Eucyclops*, *Macrocyclops*, *Tropocyclops*, *Paracyclops* and *Ectocyclops*, the last two being the commonest). The Cyclopinæ had the genera *Muscocyclops*, *Bryocyclops* and *Metacyclops*, besides *Allocyclops silvaticus*, known from forested lowlands and now found at ca. 700 m a.s.l. in pools and wet organic soil in Miracatu. *Mesocyclops* and *Microcyclops* were found sporadically.

Darwinulid ostracods, apparently belonging to a single species, were common in semiterrestrial wet habitats. *Elpidium bromeliarum* (family Limnocytheridae) was found often in bromelia pools.

Cladocerans were less frequent and abundant. The Chydoridae comprised *Biapertura affinins*, *Alona* cf. *rectangula*, *A. guttata*, *A. rustica*, *A. cf. poppei*, *Alonella* sp., *Chidorus sphaericus* s.l., *C. sp.* and *Notoalona* sp. Also collected were *Simocephalus* cf. *vetulus* (Daphniidae) and *Ilyocryptus* sp. (Ilyocryptidae).

**Mollusca.** The survey of molluscs was completed along the Rio Grande, from Rifaina (20° 08' 53"S, 47° 17' 45"W) to Mesópolis (20° 02' 58"S, 50° 27' 24"W). The river is mostly dammed. Due to this year's draught, extensive marginal areas were left dry, with the consequent death of the molluscs. In places the water level was 9 m

below mean level. Species collected were, among the bivalves, *Anodontites trapesialis*, *Fossula fossiculifera*, *Diplodon* sp., *D. rotundus*, *Castalia undosa undosa* and the exotic *Corbicula fluminea*. The only gastropods collected were *Aylacostoma* spp., *Melanoides tuberculatus*, *Physa* sp. and *Biomphalaria* sp. In the Upper Paraná Basin, collections were made in the Paraná and lower Parnaíba Rivers, part of an extensive reservoir, extending from 20° 08' 48"S, 50° 59' 09"W to 20° 38' 12"S, 51° 32' 50"W. In this stretch, the only bivalve was *Corbicula fluminea* and the gastropods were *Melanoides* sp., *Aylacostoma* sp. and *Potamolithus* sp. The Tietê River was sampled from lower to middle portions, between coordinates 20° 41' 00"S, 51° 32' 50"W and 22° 31' 23"S, 48° 26' 39"W. These portions are also mostly dammed; the dominant fauna was composed by the exotic *Corbicula fluminea* and *Melanoides tuberculatus*. Native species were found in the Barra Bonita area, with the bivalves *Anodontites trapesialis*, *A. trapezus* and *Diplodon* sp. and the gastropods *Aylacostoma* sp., *Pomacea canaliculata* and *Biomphalaria* sp. The survey of the Pardo River, between coordinates 21° 26' 21"S, 47° 18' 38"W and 21° 32' 23"S, 47° 05' 23"W, was also completed. Bivalves found were *Anodontites trapesialis*, *A. tenebricosus*, *A. soleniformis*, *Monocondylaea* sp., *Fossula fossiculifera*, *Diplodon rotundus*, *D. fontaineanus*, *D. caipira*, *D. martensis*, *D.* sp., and *Castalia undosa undosa*. The gastropods were *Aylacostoma* sp., *Melanoides tuberculatus*, *Biomphalaria* sp., *Physa cubensis* and *Potamolithus* sp. *Corbicula fluminea* was found up to the Limoeiro Dam. As the species was registered for the first time in Ribeirão Preto in 1998, it should have dispersed upstream ca. 33 km/yr. As stated above, this year's draught had a significant impact on the populations of bivalves. The areas at the sides of the sampled rivers were used for various cultures, especially sugarcane but also pasture land. A gallery forest was found only in the upper Pardo River.

Besides molluscs, larger crustaceans and a number of insects were also collected and handed over to the respective researchers.

**Insecta.** Among the insects, the family Chironomidae, a large and well-diversified group of Diptera and very important in freshwaters, is being intensively studied by 4 PhD researchers – Drs. Susana Trivinho-Strixino, Alaíde A. Fonseca Gessner, Giovanni Strixino and Monica de Andrade Morraye, 5 graduate students and 3 undergraduate students. Collections have been made in areas around São Carlos and São Paulo, in Intervalos and Campos do Jordão State Parks and in some other localities in the State. Several habitat types are being sampled, including streams and rivers, oxbow lakes, reservoirs and phytotelmata; impacted habitats are also being sampled, so that a basis for the utilization of the group as bioindicators is being produced. The number of Chironomidae genera identified is now about 70 including a few new ones; the number of species identified is lower due to the time needed for processing and comparing with described species. A routine of rearing larvae to obtain pupae and adults is being kept, as all these life stages are needed for a complete species description. A preliminary listing of genera by habitat is found in the first report.

Two new graduate projects have been started. In one the Odonata fauna of the Jataí Ecological Station and of the Vassununga Ecological Reserve is being studied. The aim is to make an inventory of the order in these stations and also to correlate the distribution of larvae with ecological factors. The second one comprises the study of the habitat preferences of immatures of Simuliidae (blackflies) in streams

of several areas: Picinguaba in the northern coast; Cananéia in the southern coast, the metropolitan area of São Paulo, in Campos do Jordão (higher altitude), in the central part of the State (Araraquara and São Carlos municipalities) and in the Intervales State Park.

Two PhD programs include the study of the diversity and the spatial and seasonal variations of genera of the orders Ephemeroptera, Plecoptera and Trichoptera in streams of Intervales State Park. Collections were made in riffles and pools and an experiment on the colonization of leaf packs and stones was made. In the project being carried on by Pitágoras C. Bispo, the sorting of the caddisflies have been completed and that of the mayflies mostly so. A few preliminary results were presented in the first report; now, the analysis of the seasonal variation in larvae densities has shown that on the whole they are more numerous during the drier months. The project including the colonization of substrata (Vera L. Crisci) has shown that, for stones, species richness increases for the first 4-5 weeks and then tend to decline. A third program, carried on by Adriano S. Melo, mainly in Intervales State Park but including also collections in a forest in Pindamonhangaba and in the Serra do Japi Reserve studies the species richness of individual stones in riffles in different order streams, during a period of 5 years, in order to answer questions such as 1) How many species occur in a stream site? 2) Is there a pattern of richness along a stream size gradient? 3) Are there distinct patterns of assemblage structure during the wet and rainy seasons? 4) Is this pattern consistent along the years? 5) Are dominant species in one year dominant in the following years? Additionally, the large data set is being used to evaluate different methods of richness estimation and also to indicate the minimum sample size to estimate diversity in species-rich streams. The analysis is progressig well and two papers have been published. Adriano spent 5 months during the first semester of this year in the laboratory of Prof. Colin Townsend, in Dunedin, New Zealand doing studies on the stability of the stream bed facing spates.

#### Connections.

This project has more affinities with two others, the one on “Zooplanktonic biodiversity”, coordinated by Dr. Takako Matsumura Tundisi, and “Structure and functioning of hydrographic basins of São Paulo State”, coordinated by Drs. Luiz. A. Martinelli and Epaminondas S. Ferraz. Contacts were made with the latter. This project has a certain degree of overlap as regards the microcrustaceans, with the “Zooplanktonic biodiversity”, for the distinction between littoral and benthic ones is not sharp. An agreement is necessary to avoid overlap in publications, faunistic lists, and the possible description of new taxa.

#### Conservation and Sustainability

The considerable advance that this project is bringing in the knowledge of many freshwater invertebrates surely will bring about more solid data to delimit conservation areas and to evaluate impacts on the environment. There are indications that some copepods are associated with the Atlantic Forest and also with coastal sand bars, and their occurrence should help in delimiting areas to be preserved. The insects, particularly the Ephemeroptera, Plecoptera, Trichoptera and Chironomidae, are widely employed in the Northern Hemisphere as indicator organisms for evaluating water quality. Their use is also beginning to be made in Brazil, for example by CETESB in the State, and a firmer taxonomic knowledge will

allow their wider use as indicators as well as the development of more reliable indices.

**6 - Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways of solving this lacunae problem.**

**7 – Indicate geographical gaps knowledge within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem.**

**1 - Project Title** - DIVERSITY OF MITES OF AGRICULTURA IMPORTANCE AND OTHER ASSOCIATED ARTHROPODS IN THE STATE OF SÃO PAULO.

**2 – Coordinator(s)** – Gilberto José de Moraes – ESALQ/USP

**3 – HOMEPAGE** – [www.ibilce.unesp.br/enspesext/pesquisa/biota/index.html](http://www.ibilce.unesp.br/enspesext/pesquisa/biota/index.html)

**4 - Number of records added to the SINBIOTA databank: 51**

**5 – Summary of Activities carried out between October/00 and October/01**

Reference Collections:

The preparation of data bases was continued and the image base was finished for the available types (except the types of Oribatida, which are not in adequate conditions to be photographed). Information introduced to the data bases refer to specimens collected in the period covered by this report (Rio Preto) and to ca. 2000 non-type slides (Piracicaba). Types of 150 species of the Piracicaba collection were photographed. Work toward the establishment of 3 data bases on the predatory mites Phytoseiidae and Ascidae should be finalized in next December. In Botucatu, the spider collection was re-organized, data and image bases were initiated and information concerning about 10% of the collection was incorporated into the data base.

Field Sampling:

The following samplings were conducted in the period covered by this report: northwestern part of São Paulo (Rio Preto area): Jan 22, Apr 20, May 22, Jul 2, Aug 27 and Oct 26 (programmed); Cerrado (São Carlos, Pirassununga and Luis Antonio areas): Jan 17-18, April 16-18, Jul 16-18, Sep 20, Oct 23-25 (programmed); Mata Atlântica (Piracicaba area): July 11; Mata Atlântica (Jundiaí area): Jan 12; Mata Atlântica (Cotia area): Feb 28; Mata Atlântica (Pariquera-Açu/ Cananéia area): Feb 13-14, Mar 18-21, Apr 19-21, Jun 14-16, Jul 20-26, Oct 8-11. At each site, mites and associated arthropods were collected from leaves, bark, soil and litter; flowers and fruits were sampled whenever available; shoots of Arecaceae were also sampled.

All mites from Euphorbiaceae in Rio Preto area were processed. A total of 15000 mites was mounted. Ca. 50% of those were identified to genus and 40% to species. Thirty three species of 26 genera in 10 families collected on rubber trees (the pivot plant in that region) have been determined. The most abundant species were *Calacarus heveae* and *Lorryia* spp.. Thirty one species of 25 genera in 10 families were collected on other Euphorbiaceae in or around rubber tree plantations. All 519 spiders so far collected in this area were identified to 21 families. The most frequent in the canopy were Anyphaenidae, Salticidae and Theridiidae, while the most frequent in the litter were Corinnidae, Pholcidae and Theridiidae. The most frequent spider species in the canopy were *Italaman santamaria* and *Teudis* sp. (Anyphaenidae), *Chira spinipes* (Salticidae), *Chira spinipes* and *Rudra* sp. (Salticidae); the most frequent in the litter were *Ibotyporanga naideae* (Pholcidae); *Falconina gracilis*, *Castianeira* sp. (Corinnidae) and *Coleosoma floridanum* (Theridiidae).

All mites (ca. 1800) of the last sampling of 2000 and the first 3 samplings of 2001 on Myrtaceae in the Cerrado were processed. Ca. 90% of those mites were identified to families. Phytoseiidae, Ascidae, Tydeidae and Stigmaeidae were the

dominant of the 12 families found. Besides Myrtaceae, ca. 700 mites were collected on several other plant species. All Eriophyoidea collected on Arecaceae were identified to species; 1 new genus and 4 new species were determined. Ca. 80% of the phytoseiids were identified to genus; 13 species have been identified. Identification of other families have started. Almost all spiders collected in the 4 samplings of 2000 (ca. 1500 specimens) were identified to 19 families. Anyphaenidae, Salticidae, Theridiidae and Thomisidae were the dominant families. *Cryso pulcherrima* (Theridiidae), *Tmarus* sp. (Thomisidae), *Trachelopachys* sp. (Corinnidae), *Berlandiella robertae* (Philodromidae), *Sphecozone* sp. (Linyphiidae) and *Thiodina vaccula* (Salticidae) were some of the dominant species.

All mites collected in 2000/2001 on Arecaceae in Mata Atlântica were mounted (ca.3850 specimens). Ca. 70% of the mites of the superfamily Eriophyoidea were determined to species; 25 species were found; 2 new genera and 8 new species were found. Twenty two other mite families were found, the most diverse of which was Phytoseiidae. All phytoseiids were identified to genus. In addition to Arecaceae, samples have also been taken from several other plant species, from which ca. 1200 were collected. All phytoseiids from those plants were identified to genus; 2 new genera were determined and are now being described with a visiting scientist. Identification of other families have started. All ca. 1700 spiders collected in 2000 were identified to 22 families. Theridiidae, Anyphaenidae, Salticidae and Araneidae were the dominant families. *Aysha borgmeyeri* and *Patrera cita* (Anyphaenidae); *Achaearaneae triguttata* and *Spintarus gracilis* (Theridiidae), *Leucauge* sp (Tetragnathidae) were some of the dominant species.

In relation to edaphic mites, all specimens collected until last July were processed. The number of Oribatida reached 5200 in the Cerrado and 25500 in the Mata Atlântica. The proportion of oribatids on the aerial parts of the plants corresponded to ca. 4% of the total collected in the Cerrado and 7% in the Mata Atlântica. Ca. 143 morphospecies of 72 genera in 40 families have been determined. The total number of mites of other suborders reached 1400 in the Cerrado and 8500 in the Mata Atlântica. Ca. 35% of those mites were identified to families. Samplings to determine the variability of the composition of the mite fauna at different soil depths was initiated in 2001, consisting of the MSc thesis program of a new member of the project (E. S. Silva). Mites collected in the first sampling date of this study were mounted.

The last of the 3 extra activities referred to in the former report, related to the study of mites on Euphorbiaceae in the Mata Atlantica was finalized. A total of 105 species of 74 genera in 16 families were determined. Twenty five new species and 8 new genera were found in the families Tydeidae and Phytoseiidae. The genus *Galendromimus* (Phytoseiidae) is being redescribed as a result of this study.

Search for pathogens infecting mites in Mata Atlantica was conducted in collaboration with a visiting scientist. Several species of Eriophyoidea were found infected by *Hirsutella* fungi. Resting spores of Entomophthorales were observed in species of Ascidae, Phytoseiidae, Stigmaeidae, Tetranychidae and Tydeidae. A *Cladosporium* infection was noted in the eriophyid *Retracus johnstoni*, a pest of the palm tree *Syagrus romanzoffiana*. The fungus has been isolated and cultured on an artificial medium

### **Publications in the period**

- Feres, R.J.F. 2001. Primeiro registro de ácaros eriofídeos (Acari, Eriophyidae) em seringueiras (*Hevea brasiliensis* Muell. Arg., Euphorbiaceae) da Floresta Amazônica, Brasil. *Ver. bras. Zool.*, 18(Supl. 1): 343-345.
- Gondim Jr., M.G.C. & G.J. de Moraes. 2001. Phytoseiid mites (Acari: Phytoseiidae) associated with palm trees (Arecaceae) in Brazil. *Syst. & Appl. Acarol.*, 6: 65-94.
- Moraes, G.J.de, M.S. Zacarias, M.G.C. Gondin Jr & R.J.F. Feres. 2001. Papel da vegetação natural como reservatório de ácaros predadores. In: VII Simpósio de Controle Biológico (SICONBIOL), Poços de Caldas, MG (03 a 07 de junho), CD-Rom Microservice-Tecnologia Digital SA, São Paulo. p. 492-497.
- Zacarias, M. S. & G.J. de Moraes. 2001. Two new species of phytoseiid mites (Acari: Phytoseiidae) from the State of São Paulo, Brazil. *Syst. & Appl. Acarol.*, 6: 95-100.

### **Manuscripts submitted for publication**

- Feres, R.J.F. & M.A. Nunes. Ácaros (Acari, Arachnida) associados a euforbiáceas nativas em áreas de cultivo de seringueiras (*Hevea brasiliensis* Muell. Arg., Euphorbiaceae) na região noroeste do Estado de São Paulo. *Rev. bras. Zool.* (*In press*).
- Feres, R.J.F., D. De C. Rossa-Feres, R.D. Daud & R.S. Santos. Diversidade de ácaros (Acari, Arachnida) em seringueiras (*Hevea brasiliensis* Muell. Arg., Euphorbiaceae) na região noroeste do Estado de São Paulo, Brasil. *Revista Brasileira de Zoologia* (*In press*).
- Flechtmann, C.H.W. *Esalquia centennaria*, a new genus and new species of Eriophyidae (Acari) from ferns in Brazil. *Int. J. Acarol.* (under evaluation).
- Mineiro, J.L. de C. & G.J. de Moraes. Gamasida (Arachnida: Acari) edáficos de Piracicaba, Estado de São Paulo. *Neotropical Entomology* (*In press*)
- Mineiro, J.L. de C. & G.J. de Moraes. Actinedida e Acaridida (Arachnida: Acari) edáficos de Piracicaba, Estado de São Paulo. *Neotropical Entomology* (under evaluation).
- Moraes G.J. de, E.E. Lindquist & A.C. Lofego. A new genus and species of tarsonemid mite (Acari: Tarsonemidae) associated with a neotropical curculionid beetle (Coleoptera). *Invertebrate Taxonomy* (under evaluation).
- van der Geest, L.P.S., G. J. de Moraes, D. Navia & M.R. Tanzini. New records of pathogenic fungi in mites (Arachnida: Acari) from Brazil. *Neotropical Entomology* (under evaluation).
- Zacarias, M.S. & G.J. de Moraes. Phytoseiid mites (Acari: Phytoseiidae) associated with rubber trees and other euphorbiaceous plants in southeastern Brazil. *Neotropical Entomology* (*In press*).

### **6 - Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways of solving this lacunae problem.**

The work conducted under the present project refers to a restrict number of plant species, within 3 families. Much more waits to be discovered on other plant groups. Considering that few people work on mite taxonomy in Brazil, we suggest those other groups be studied by ourselves when the present project is finished.

**7 – Indicate geographical gaps knowledge within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem.**

The present project has been conducted in places representative of the main types of habitats in the State of São Paulo. The main gap, however, seems to be in the forest remnants in southern part of the State, along the Paranapanema River.

1 - **Project Title** - BIODIVERSITY OF ARACHNIDA AND MYRIAPODA OF THE STATE OF SÃO PAULO.

2 - **Coordinator** - Antonio Domingos Brescovit - Instituto Butantan/SP

3 - **HOME PAGE** – **does not have**

4 - **Number of records added to the SINBIOTA databank: 0**

**Obs. If no file has been added, please justify**

The preliminary data has not yet been included in the SINBIOTA. Our internet connection was installed only in June 2001, our collections are still being digitalized, and most samples are still being separated and identified.

5 - **Summary of activities since June/2000.**

5a. - **Objectives:**

- Inventory and study of the biodiversity of arachnids and myriapods of the State of São Paulo;
- Estimate the species richness of arachnids and myriapods of the State of São Paulo;
- Compare the arachnid and myriapod fauna from different regions of the State of São Paulo, according to richness and composition;
- Evaluate the impact of urbanization on the arachnid and myriapod fauna;
- Enlarge the collections of the research institutes of the State of São Paulo;
- Divulge the results obtained from the study through publications in periodicals, books, CDs, films and web page.
- Improve and expand the teaching and divulgation of information on arachnids and myriapods to researchers of these groups and to the public in general, by means of lectures, courses and scientific meetings.
- Investigate chromosomes from several Mygalomorphae (Araneae) genera to determine the chromosome number and the mode of chromosome sex determination.

5b - **Preliminary results**

As stated in the project, this first year was dedicated mainly to the reorganization and digitalization of the Arachnida and Myriapoda collections at the Butantan Institute as well as the maintenance of these collections at the Museu de Zoologia da USP.

**Collections:** Since the IBSP collections were in a critical state and no information had been digitalized, its reorganization was given full priority. Improvements were made in the collection room and the old metal cupboards were replaced by modern sliding units. Investments were made towards the acquisition of glass vials and labels. Technical grants enabled the inclusion of a large quantity of accumulated material that had been set aside due to the lack of glassware and space. Approximately 5000 spider, 160 scorpion, 600 opilionid, 226 pseudoscorpion, 80 mite and 50 myriapod lots were included in the collection.

**Digitalization:** The digitalization of the reference books of the three largest collections, Araneae, Scorpiones and Acari (mainly ticks), was initiated. To date we have digitalized:

Total of lots

Total of digitalized information

Araneae	44.400	21.950
Scorpiones	2.747	2.747
Acari (mites)	7.350	1.300

Together with the digitalization of the information of the collection reference books we began the implementation of a Database of Neotropical spiders and scorpions emphasizing the Brazilian species. We created a database using the Excell program, and included all species described for Neotropical countries. The first stage involves copying the records from the Araneae and Scorpiones catalogues and bibliography. The second stage will involve collection records, mainly from the IBSP and MZSP.

Special emphasis is given to Brazil, and the data is included in the following manner: **(1) Family, (2) Genera, (3) Species, (4) author (5) year, (5) synonymy, (6) sex, (7) country, (8) state, (9) municipal district, (10) other records, (11) Institution where the types are deposited, and (12) bibliography.** This database will allow us to recover data according to the necessities of the Biota-Fapesp project. For example:

- The Excell allows the listing of species, in the Neotropical region, by country;
- It also allows a listing of species inside the Brazilian territory according to state; municipal district, specially in the state of São Paulo.

Up to now approximately 25.000 records have been compiled for the Araneae database and 1900 for the scorpion database.

**Collecting expeditions:** This was the main activity during the year 2001, despite the car been acquired only in May. During this initial stage a total of 16 expeditions, 11 in Atlantic forest areas and 5 in cerrado areas, were made. The Atlantic forest areas include (1) Estação Biológica de Boracéia, Salesópolis, SP; (2) Núcleo Cabuçu, Parque Estadual da Cantareira, Guarulhos, SP; (3) Parque Estadual da Ilha Anchieta, Ubatuba, SP; (4) Serra do Japi, Jundiá, SP; (5) Parque Estadual de Ilhabela, Ilhabela, SP; (6) Fazenda Itereí, Miracatu, SP; (7) Parque Nacional de Itatiaia, Resende, RJ; (8) Floresta da Cicuta, Volta Redonda, RJ; (9) Parque Nacional da Serra dos Órgãos, Teresópolis, RJ; (10) Fazenda Maravilha, Paraíba do Sul, RJ and (11) Horto Dois Irmãos, Recife, PE. The cerrado areas include (1) Estação Ecológica de Itirapina, Itirapina, SP (2 trips); (2) Porto Nacional, TO; (3) Pimenta Bueno, RO, (4) Guajará Mirim, RO e (5) Parque Nacional dos Lençóis Maranhenses, Barreirinhas, MA.

In all areas the collecting protocol was used. This protocol includes 4 sampling methods: beating tray, night transects, pitfall-traps and Winkler extractors. These samples are going through a preliminary triage. However, priority is being given to the soil samplings, since the average number of samples is 150-200/expedition.

In addition to the protocol samplings, several individual projects are being carried out by undergraduate students and IBSP researchers. These projects were developed in such a way as to enable a comparison of their samples and those of the Biota collections.

## **Individual projects:**

### **1. Soil sampling using pitfall traps:**

1.1. Levantamento e comparação da araneofauna de solo (Araneae) da Ilha dos Eucaliptos com o continente do Reservatório do Guarapiranga. (undergraduate student: Rafael Prezzi Indicatti, UNISA);

1.2. Levantamento e comparação da araneofauna (Araneae) de solo de três áreas urbanas da cidade de São Paulo utilizando armadilhas de solo do tipo "pitfall-trap" (undergraduate student: David Figueiredo Candiani, UNISA);

1.3. Diversidade de aranhas de solo do Parque Estadual da Serra da Cantareira, São Paulo, Brasil. (post-graduate student: Carlos Leandro Firmo, UNIBAN);

1.4. Biodiversidade de aranhas (Araneae) de solo no Parque do Estado, São Paulo, São Paulo, Brasil. (undergraduate student: Jaqueline Ribeiro Valvassori, UnG);

1.5. Bioecologia de carrapatos (Acari; Ixodida; Ixodidae) vetores de espiroquetas semelhantes a *Borrelia* numa área com casos de Doença de Lyme no Estado de São Paulo. (Dra. Darci M. Barros Battesti, IBSP);

### **2. Urban areas:**

2.1. Synanthropic spiders of the city of São Paulo, São Paulo, Brasil (Araneae).

(Dr. Hilton F. Japyassú and Dr. Antonio D. Brescovit, IBSP)

### **3. Genetics**

3.2. Sistemática e Diversidade genética de Mygalomorphae (Araneae). (Sylvia Lucas and Dr. Denise Peccinini-Seale).

## **4 – Student training**

Since the beginning of the project we obtained five FAPESP Technical Training grants (TT) in order to enable the development of curatorial technical activities and for the digitalization of the collection information. In addition, two “iniciação científica” grants were obtained: one for the organization of the Araneae database of the Butantan Institute and the other for curatorial work in the collection of the Museu de Zoologia/USP. Nine post-graduate students collaborate in this project, 6 masters and 3 doctorates, from USP, UNICAMP, UFRRJ, UFRJ and UNIBAN.

Our project is related to other Biota/Fapesp projects such as:

- Richness and diversity of Hymenoptera and Isoptera along a latitudinal gradient in the Mata Atlântica - the eastern Brazilian rain forest (Dr. Carlos R. Brandão). Specimens collected in soil samplings such as pitfall traps and Winkler extractors are separated and exchanged.

- Biodiversity conservation in fragmented landscapes at the Atlantic plateau of São Paulo (Brazil) (Jean Paul W. Metzner) – Our team will be carrying out protocol collecting expeditions in the fragmented areas included in this project.

The possibly successful results are the enlargement and enrichment of São Paulo collections; an estimate of the composition and species richness of the various phytogeographic areas of the state of São Paulo, in comparison to neighboring states; the creation of a data bank for the Arachnid species of the state and the training of professionals in a needy area within national zoology.

**6 – Indicate knowledge gaps within the taxonomic(s) group(s) you are working with and suggest ways of solving this lacunae problem.**

Two groups amongst Arachnida and Myriapoda, despite being well sampled in the state of São Paulo, lack specialists in Brazil: Diplopoda (Myriapoda) and Actinedida (Acari). The latter are commonly known as vegetation mites and comprise several distinct groups. I suggest the formation of new specialists by contact and stage, sine in the exterior, where exist specialists that are working with these two groups.

**7 – Indicate geographical gaps knowledge within the taxonomic(s) group(s) you are working with and suggest ways of solving this problem.**

The eastern region of the state of São Paulo is the least known. However, the project has selected several areas in that part of the state and collections will be carried out in order to redeem this lack of knowledge

**1 - Project Title** - RICHNESS AND DIVERSITY OF HYMENOPTERA AND ISOPTERA ALONG A LATITUDINAL GRADIENT IN THE MATA ATLÂNTICA - THE EASTERN BRAZILIAN RAIN FOREST

**2 – Coordinator(s)** – C. Roberto F. Brandão MZ/USP

**3 – HOMEPAGE** - <http://www.mz.usp.br/biota2.htm>

**4 - Number of records added to the SINBIOTA databank: 0**

**Obs. If no file has been added, please justify**

The localities from which we have species lists are outside the State of São Paulo, and so out of the SINBIOTA scope.

**5 – Summary of Activities carried out between October/00 and October/01**

Following our plans, we intensified the collectings in the period, that corresponds to the second year of this project, ending in February 1st, 2002. The three teams (studying ants, wasps and termites) will have visited at the end of this period, respectively, 15, 8, and 12 localities, which is about half of the projected collecting effort (out of respectively 26, 17, and 16). We believe we will be able to complete the collecting trips in the third year, leaving the whole fourth year to identification, databasing and analysis of the results. As the samples require processing in the laboratory, we adopted a protocol to process them uniformly at the different involved labs. Moreover, in special in the case of wasps, each team has to sort out the specimens in families and circulate the subsamples among the several specialists, keeping track on how many specimens have been sent, and database the returned information. This database will be used for the analysis aiming to answer the two general questions of the project: use the new quantitative data to investigate the biogeographic division of the Atlantic forest, and to determine how hymenopteran and isopteran diversity patterns vary with latitude.

An initial evaluation indicates that our collecting protocols and results are more than satisfactory. For instance, the number of specimens collected at each collecting event matches what our previous experience foresees. Also we have identified till now, for instance, four species of Embolemidae occurring in one of our field stations. Embolemidae parasitoid aculeate wasps were previously known in the Neotropical region by a doubtful record in Rio de Janeiro only, published in 1997.

As we already knew, the present project, because of its nature, will not produce results in terms of the general questions of the project in the first three years. So we have also intensified the production of related manuscripts on taxonomy and other aspects of the insect groups we are dealing with, that is descriptions of new taxa, revisions and so forth. There are several ongoing subprojects involving researchers listed in the projects as well as other collaborators in Brazil and abroad.

The project we submitted to NASA and that has been mentioned in our year 2000 report, has not been funded, but we resubmitted it to the DEZA, the Swiss agency for supporting Science, and are awaiting a final word.

**6 - Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways of solving this lacunae problem.**

This is one of the main “secondary” objectives of our project, to identify important gaps in our taxonomic knowledge in the groups we are focusing on, and work towards resolving at least the most significant ones, based on a significant improvement of the representation of the taxa to be studied in Brazilian collections. As we also know that our project will provide meaningful results, in relation to the main objectives only when we have collected, processed, and analysed most samples, that is, at the end of the four projected years, we intensified taxonomic works that could be done meanwhile we are collecting. So this year work resulted in several descriptive and revisionary manuscripts by the team. We consider that comparable data on hymenopteran and isopteran diversity and biotic similarity along the Atlantic forest latitudinal gradient are interesting and publishable.

**7 – Indicate geographical gaps knowledge within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem.**

Our project aims three basic objectives: to produce comparable inventories of Atlantic forest Hymenoptera and Isoptera, to use the new quantitative data to investigate the biogeographic division of the Atlantic forest, and to determine how hymenopteran and isopteran diversity patterns vary with latitude, considering the urgent need of biodiversity studies in the Atlantic forest, due to anthropic pressure, and that the Atlantic forest, with a south-north extension of 15-20° of latitude, is particularly suited to this type of investigation.

The project originally submitted to NASA aims to generate a wall-to-wall coverage of the Atlantic coastal forest of Brazil by employing a fusion of data sets such as the 250 m MODIS, 25 m JERS-1 radar, 30 m (or 90 m) SRTM orthorectified radar and DEM data, and available 30 m Landsat TM imagery. Also, we intend to generate a map of the landscape fragmentation with the goal of identifying the most intact patches of forests along the coast and separating them from anthropogenic forests such as shaded coffee and cacao plantations. Finally we would like to integrate the digital forest fragmentation map with exiting biodiversity data, land use patterns, and other landscape parameters in a mathematical model to examine connectivity variables and scenarios in developing a biological corridor in the region.

The primary data has been awarded to us with no cost by the Japanese Space Agency (NASDA), all the algorithms needed are already available and successfully applied in related projects in the Amazon and Congo basins, and the computing facilities of the Jet Propulsion Laboratory could be used free of charge. The dissemination of data will be accomplished through the collaboration with the Brazilian Space Agency (INPE) and Fundação SOS Mata Atlântica. We were also awarded another set of remote sensing data, being released in 2004, for the same area, and thus allowing us to compare the change of forest cover within the last 10 years.

**1 - Project Title - LEPIDOPTERA OF ESTADO DE SÃO PAULO**

**2 – Coordinator(s) – Dr. Keith S. Brown Jr. – IB/UNICAMP**

**3 – HOMEPAGE - <http://www.unisantos.com.br/biotasp/>**

**4 - Number of records added to the SINBIOTA databank: 6**

**5 – Summary of Activities carried out between October/00 and October/01**

Field trips with Inventory in São Paulo State (156 days) (\* region mentioned in the original project as being important to visit; † site in the Rio Mogi-Guaçu basin, # includes moths):

- 1 – #Santa Genebra Municipal Reserve, Campinas – 46 days
- 2 – #Ribeirão Cachoeira Forest Reserve, Campinas – 11 days
- 3 – Condomínio Shangrilá Forest Reserve, Campinas – 3 days
- 4 – \*#Morro Grande Forest Reserve, Cotia – 7 days
- 5 – \*Fragments in Caucaia Region – 5 days
- 6 – \*#Núcleo Picinguaba, Ubatuba – 10 days
- 7 – \*#Núcleo Santa Virgínia, Serra do Mar State Park – 5 days
- 8 – Grota Funda Municipal Reserve, Atibaia – 6 days
- 9 – †#Campinhonha Ranch, State Park, Mogi Guaçu – 1 day
- 10 – #Pico do Itapeva, Campos do Jordão – 5 days
- 11 – #Campos do Jordão State Park – 6 days
- 12 – Voturuá Municipal Reserve, São Vicente – 3 days
- 13 – \*Itapetinga Ecological Station – 4 days
- 14 – \*Assis Ecological Station – 3 days
- 15 – #Morro do Diabo State Park – 4 days
- 16 – \*Furnas do Bom Jesus State Park, Pedregulho – 2 days
- 17 – \*Santa Cecília Forest, Patrocínio Paulista – 1 day
- 18 – Caitetus State Park, Galia – 1 day
- 19 – \*†#Reserva Ecológica de Jataí – 3 days
- 20 – \*#Fragments of Forest and Cerrado in Ilha Solteira – 5 days
- 21 – Itirapina, Ecological Station and other fragments – 3 days
- 22 – #Serra do Japi Municipal Reserve – 4 days
- 23 – †Amparo-Itapira Highway (Km 150) – 1 day
- 24 – \*Former Santa Carlota Ranch, Cajuru – 1 day
- 25 – Itapety Municipal Reserve, Mogi das Cruzes – 2 days
- 26 – Slopes of Mantiqueira Mountains north of Pindamonhangaba – 2 days
- 27 – †Águas da Prata region – 1 day
- 28 – Intervalles State Park – 4 days
- 29 – Joanópolis – São Francisco Xavier Road – 1 day
- 30 – Boracéia Biological Station, Salesópolis – 4 days
- 31 – Hilltop and forests south of Pedreira – 2 days

**Visits to Museums and Institutions:**

1 – Museu de Zoologia da USP, São Paulo, SP – 4 visits (K. S. Brown Jr., A. V. L. Freitas); 4 visits (M. M. Dias); 1 visit (Vitor O. Becker).

- 2 – Allyn Museum of Entomology, Sarasota, Florida, USA – 1 visit (5 days) (A. V. L. Freitas).
- 3 – Universidade del Valle, Santiago de Cali, Colombia – 2 visits (15 days) (A. V. L. Freitas); 1 visit (8 days) (K. S. Brown Jr.)
- 4 – British Museum of Natural History, London, UK – 1 visit (15 days) (M. M. Dias).
- 5 – Collection of Unesp – Ilha Solteira, SP – 1 visit (3 days) (K. S. Brown Jr., V. O. Becker).

**Papers published and submitted (related to the project):**

- 1 – Brown Jr., K. S. & A. V. L. Freitas, 2000a. Diversidade de Lepidoptera em Santa Teresa, ES. Boletim do Museu de Biologia Mello Leitão, Nova Série, 11/12: 71–116. Including quantitative comparative analyses with several sites in São Paulo State, using the basic methodology of the project.
- 2 – Brown Jr., K. S. & A. V. L. Freitas, 2000b. Atlantic Forest Butterflies: Indicators for Landscape Conservation. Paper validating the methodology used in the inventories. Biotropica, 32 (4b): 934–956
- 3 – Freitas, A. V. L., R. B. Francini & K. S. Brown Jr. Insetos como indicadores ambientais. In Cullen, L, R. Rudran & C. Valladares-Pádua (eds.). Manual Brasileiro em Biologia da Conservação. Smithsonian Institution Press, in press. In Portuguese (with the objective to be accessible to Brazilian students).
- 4 – Brown Jr., K. S. Geological, evolutionary, and ecological contributions to biological diversity in Neotropical forests: indications for conservation. In C. Moritz, E. Bermingham, & C. Dick (Eds.), Tropical Rainforests: Past and Future. University of Chicago Press, in press.
- 5 – Brown Jr., K. S. Lepidoptera in the Cerrado Landscape as indicators for the conservation of vegetation, soil, and topographical mosaics. In P. S. Oliveira & R. J. Marquis (Eds.), The Cerrados of Brazil: Ecology and Natural History of a Neotropical Savanna. Columbia University Press, NY, in press.
- 6 – Freitas, A. V. L. Immatures and systematic position of *Bia actorion* (Nymphalidae). Submitted to the Journal of the Lepidopterists' Society.
- 7 - Braga, S.M.P.; M.M.Dias & A.M. Penteado-Dias. Aspectos bionômicos de *Eois tegularia* (Guenée) e *Eois glauculata* (Walker) (Lepidoptera, Geometridae, Larentiinae) e seus parasitóides. Revta. Bras. Biol. (in press).
- 8 - Dias, M.M. Descrição de uma nova espécie do gênero *Cundinamarca* Rindge (Lepidoptera, Geometridae). Revta. Bras. Biol. (in press).

**Participation in scientific meetings:**

- 1 - Brown, K. S. Jr., A. V. L. Freitas & M. Uehara-Prado. Atlantic Forest “Islands” classified through butterflies, area, habitat, and population instability. 52nd Annual Meeting of the Lepidopterists Society. Oregon State University, Corvallis, OR, USA, July 26–29, 2001. Poster.
- 2 - Freitas, A. V. L. & D. W. Jenkins. Phylogeny of the Biblidinae (=Eurytelinae auctt.) (Nymphalidae). 52nd Annual Meeting of the Lepidopterists Society. Oregon State University, Corvallis, OR, USA, July 26–29, 2001. Poster.
- 3 - Brown, K. S. Jr., A. V. L. Freitas & M. Uehara-Prado. Lepidoptera of the state of São Paulo: Diversity, distribution, resources, and use for environmental analyses and monitoring. 52nd Annual Meeting of the Lepidopterists Society. Oregon State University, Corvallis, OR, USA, July 26–29, 2001. Poster.

- 4 - Brown, K. S. Jr. & A. V. L. Freitas. Comparison of the butterfly fauna in two equal-area, topographically different suburban Forest reserves in Campinas, São Paulo: census methods, list variation, overlap, turnover, migration, and environmental correlates. 52nd Annual Meeting of the Lepidopterists Society. Oregon State University, Corvallis, OR, USA, July 26–29, 2001. Oral presentation.
- 5 - Freitas, A. V. L. & K. S. Brown Jr. Systematics of the Satyrinae: contribution of characters from immature stages. 52nd Annual Meeting of the Lepidopterists Society. Oregon State University, Corvallis, OR, USA, July 26–29, 2001. Oral presentation.
- 6 - Brown, K. S. Jr., A. V. L. Freitas & M. Uehara-Prado. Atlantic Forest “Islands” classified through butterflies, área, habitat, and population instability. 15th Annual Meeting of the Society for Conservation Biology. University of Hawai’i, Hilo, USA, July 29 – August 1, 2001. Poster.
- 7 - Brown, K. S. Jr. & A. V. L. Freitas. “Programa Biota-Fapesp: em busca da Biodiversidade do Estado de São Paulo”. V Congresso Aberto aos Estudantes de Biologia. Unicamp, SP, October 12, 2001. Oral presentation in Round Table.

**Additional activities:**

- 1 – Advising activities: K. S. Brown – 1 Pos-Doctorate, 1 Masters Student; M. M. Dias – 2 Masters students, 1 Doctoral; A. V. L. Freitas – 2 Scientific Initiation and 1 Masters Student; R. B. Francini – 1 Scientific Initiation.
- 2 – Collection and/or preparation of 8100 moth specimens, mostly “Microlepidoptera”, in 12 localities (see list above), by Vitor O. Becker, also training two students in methods.
- 3 – Preparation of 14 synoptic collections in 30 x 40-cm glass frames for exposition in various conservation units visited, including for use in environmental education and recognition: ten of butterflies – Campos de Jordão, Atibaia, Itapetininga, Cajuru, Itirapina, Picinguaba (2), Santa Virginia, Shangri-la (2); and four of moths – Santa Virginia, Campos do Jordão, and Serra do Japi (2).
- 4 – Organization of the Geometridae collection in the “Departamento de Ecologia e Biologia Evolutiva da UFSCar”. (M. M. Dias).

**6 - Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways of solving this lacunae problem.**

The taxonomy of essentially all groups of moths and butterflies is reasonably well known, and even with the probability of undescribed species appearing in the lesser-known groups (micro-moths, Lycaenid and Hesperid butterflies), resources and specialists are available (including visiting scientist Vitor Becker) for their identification and description. The higher taxonomy of Lepidoptera is reasonably stable, and many important families and subfamilies have been recently revised or are presently being worked on, including Eurytelinae and Satyrinae (A.V.L. Freitas), Geometridae (Manoel M. Dias Filho), and Arctiidae (Viviane G. Ferro).

**7 - Indicate geographical gaps knowledge within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem.**

The northern, western, and extreme southern areas of São Paulo are less well known than the central and eastern sectors, but the number of localities visited in all these is rapidly increasing, with new inventories of both butterflies and all groups of moths being obtained weekly.

**1 - Project Title** - CONSOLIDATION OF THE INFRASTRUCTURE AND OF THE ELECTRONIC DATABASE OF THE FISH COLLECTION (DZSJRP) OF THE ZOOLOGY DEPARTMENT, INSTITUTO DE BIOCÊNCIAS, LETRAS E CIÊNCIAS EXATAS (IBILCE), UNESP, SÃO JOSÉ DO RIO PRETO, SP

**2 – Coordinator(s)** – Francisco Langeani Neto – IB-UNESP/S.J. Rio Preto

**3 – HOMEPAGE** -

<http://www.ibilce.unesp.br/deptos/zooologia/labictiologia/projbiota.htm>

**4 - Number of records added to the SINBIOTA databank: 148**

**5 – Summary of Activities carried out between October/99 and October/00**

Project will be concluded at the end of October 2001. During last year we have added more 662 lots to the DZSJRP Collection Database, totaling 4873 lots, 464 species, 392 localities, and 1114 collections; paratype specimens have been added. All samples from São Paulo state drainages are now analyzed and identified. The DZSJRP Fish Collection harbors, for the state, 193 species from 291 localities and 1094 collections. Specimen photos for most species were taken. Geographic coordinates were calculated or taken for 223 localities; all were included in database. Web pages listing the lots and with pictures for São Paulo State species will be accessible at the beginning of November 2001.

One student concluded his FAPESP scholarship grant during the period and had the final report approved. (Proc. FAPESP no. 00/06161-6, Fábio de Faria e Souza Campos, working with general São Paulo state fish species taxonomy). Another student will be finishing her grant at the beginning of November (Proc. FAPESP no. 00/03439-3, Vanessa Xavier Linhares de Andrade, working with the database).

Papers published or submitted:

Langeani, F.; Oyakawa, O.T. & Montoya-Burgos, J.I., 2001. New species of *Harttia* (Loricariidae, Loricariinae) from the rio São Francisco basin. *Copeia* 2001 (1): 136-142.

Casatti, L.; Langeani, F. & Castro, R.M.C., 2001. Stream fishes of the Morro do Diabo State Park, Upper Paraná River basin, SP. *Biota Neotropica* 1 (1/2). URL: <http://www.biotaneotropica.org.br>

Langeani Neto, F.. 2001. Hemiodontidae. *In*: Buckup, P.A. & Menezes, N.A. (eds.) *Catálogo dos Peixes Marinhos e de Água Doce do Brasil*. URL: <http://www.mnrj.ufrrj.br/catalogo/>

Langeani, F., submitted. Hemiodontidae *In* Kullander, S.O.; Ferraris-Jr., C.J. & Reis, R.E. *CLOFFSCA – Check List of the Freshwater Fishes of South and Central America*. FishBase, Manilla.

**6 - Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways of solving this lacunae problem.**

For fishes we have now, or will have in the near future, a pretty good survey for almost all fish groups in São Paulo State. There are some Vertebrate groups, however, that need some more attention inside Biota Program, like amphibians, reptiles and birds.

**7 – Indicate geographical gaps knowledge within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem.**

Rivers and streams from São Paulo State will be in the near future, with the conclusion of other fish Biota projects, relatively well sampled. Some parts of those basins in other states, however, are poorly sampled and should be explored in the near future complete the survey, e.g., portions of the Ribeira de Iguape in Paraná State, and portions of the Upper Paraná river basin in the states of Mato Grosso do Sul, Minas Gerais and Goiás. Projects aiming to do that should be stimulated and supported by the Biota Program.

**1 - Project Title** - FISH DIVERSITY OF THE HEADWATERS AND STREAMS OF THE UPPER PARANÁ RIVER SYSTEM IN STATE OF SÃO PAULO, BRAZIL

**2 – Coordinator(s)** - Ricardo Macedo Corrêa e Castro – FFCLRP/USP

**3 – HOMEPAGE** - [http://www.bdt.org.br/peixes\\_pr](http://www.bdt.org.br/peixes_pr)

**4 - Number of records added to the SINBIOTA databank: 53**

Fifty three (53) files, corresponding to all collected stream stretches until the present date (Fig. 1), were inserted in the SINBIOTA, with the exception of the six Baixo Pardo Grande basin stream stretches, that were collected early in October of 2001 and are still being processed

## **5 – Summary of Activities carried out between October/00 and October/01**

### **Project Summary**

The so called upper Paraná River system - a drainage basin with approximately 900.000 km<sup>2</sup> - includes the whole Paraná River drainage basin upriver from the former Sete Quedas falls (now drowned by the Itaipú Reservoir) and encompass large sized tributaries like the Rivers Grande, Paranaíba, Tietê and Paranapanema.

In the São Paulo State, according to our estimates, the upper Paraná system contains 22 families and approximately 170 described fish species, including the largest rivers of the State. These large rivers main channels are inhabited by medium to large size fish species. Associated to these large rivers there is a huge number of streams and headwaters, inhabited primarily by small size fish species, with restrict geographical distributions, with a small or inexistent commercial value and greatly dependent of the riparian vegetation for food, shelter and reproduction. Small size fish species like those are approximately 50% of the described freshwater fish species of South America and shown a high degree of geographical endemism. The study of the small freshwater fish species systematics, evolution and general biology is, without doubt, the great challenge and main frontier of the south American ichthyology in the end of this century. Unfortunately, these fish species are also the most threatened by harmful human activities like deforesting and extensive use of fertilizers and pesticides associated of intensive agricultural activities, since as a whole, they are heavily dependent on the allochthonous organic matter imported from the riparian vegetation to survive.

Our estimates indicate that of the 16 drainage basins composing the São Paulo upper Paraná system portion, in terms of ichthyofauna, six are poorly sampled, five are moderately sampled and five are well sampled, meaning that about 70% of the São Paulo upper Paraná drainage basins are not satisfactorily explored for fishes in scientific terms.

Thus, the main objective of this Thematic Project is the study of the headwaters and streams ichthyofaunas of the São Paulo portion of the upper Paraná River basin, through the application of an standardized methodology – electrofishing combined with the use of small manual seines and large metallic sieves – to 66 geographically separate 100 m long stream stretches, sampled during 11 ten days

field trips, distributed along the project first three years, capable to obtain the following information about each one of them: 1) precise geographical location; 2) taxonomic composition of the ichthyofauna and contribution, as number of individuals and biomass, of each species to whole fish community; 3) body size range of the individuals of each collected species; 4) main diet components of the four numerically dominant collected species, found through the analyses of the stomach contents of a fraction of the individuals; 5) photographic documentation of selected specimens of each collected species with their live coloration's; 6) a description of each collected environment, with photographic colored illustrations and its main biotic and biotic parameters (physiography; climate; physical dimensions; vegetation and bottom type and structure; temperature; current velocity; pH; dissolved oxygen; alkalinity and hardness); 7) representative collections (including tissue samples for nucleic acid extraction) that, together with the field data, allow the comparative analyses among the State different regions, aiming to perform a quick diagnostic of their degree of conservation and to recommend study and conservation priorities for each one of them; and also to be able to evaluated the success of the recommended conservation measures in the future.

## **Results**

As the main results of four field trips to the drainage basins of the Alto Paranapanema (April 2001), Piracicaba-Capivari-Jundiaí (May-June 2001), Turvo Grande (August 2001) and Baixo Pardo Grande (October 2001), during which six stream stretches for each drainage basin were sampled (vast majority of first, second or third orders), we produced at least 96 publication quality environment color slides and collected 3,775 fish specimens (20,814 kg total biomass), belonging to six orders, 16 families, 41 genera and 57 species (45.6% characiforms, 35.1% siluriforms, 5.3% gymnotiforms, 3.5% cyprinodontiforms, 8.8% perciforms and 1.7% synbranchiforms). We also took muscle and hepatic tissues samples (for RNA and DNA extraction) from 237 specimens, belonging to 21 species, and produced 199 publication quality slides illustrating the live coloration of all collected species.

Besides de regular collecting activities, two areas, the Parque Estadual Morro do Diabo, one of the few remaining large areas of original subtropical mesophytic forest of southern and southeastern Brazil, together with the Parque Estadual de Vaçununga (Gleba Pé degigante), containing one of the largest remaining patches of dry savanah-like "cerrado" vegetation in the State of São Paulo, had their streams sampled as "reference streams", to provide a basis to evaluate, in conservation terms, the results obtained in the other sampled areas, none of them free from past and present human deleterious interference. Finally, 13 new species are being described and one article, dealing with the Parque Estadual Morro do Diabo stream fishes, have already been published online in the BIOTA NEOTROPICA electronic scientific publication. In addition, another article, dealing with the diet analysis a very poorly known species of pike cichlid, has been already submitted for publication in BIOTA NEOTROPICA.

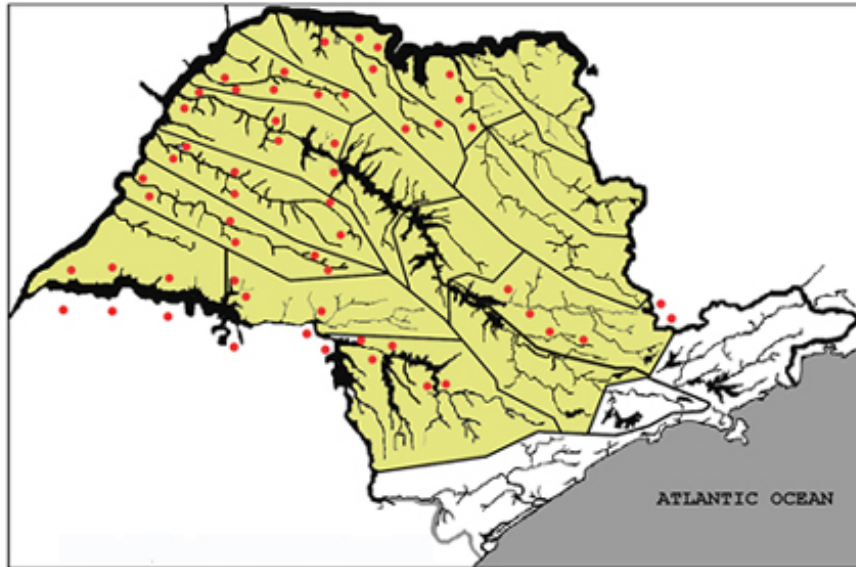


Figure 1. (•) Position inside the São Paulo State Upper Paraná River System portion of all sampled stream stretches since the Temathic Project beginning, with the exception of three collected stretches from the Baixo Pardo Grande, not included yet.

**6 - Indicate the knowledge gaps within the taxonomic(s) group(s) you are working with and suggest ways of solving this lacunae problem**

Considering the vertebrates as a whole, I think that three major groups - amphibians, reptiles and birds - are not being addressed in terms of the most basic and critical levels of the knowledge of their respective biodiversities, such as: survey of unsampled or critically important areas of the State of São Paulo; description of undescribed taxa (it is a well known fact that, specially so in the case of amphibians, there is a good number of them in existence in the State); updated survey, consolidation and synthesis of the already existent information contained in scientific collections and scientific literature; production of updated and well illustrated identification/field guides (specially so in the case of amphibians and reptiles other than snakes, and less so in the case of birds).

As the best way to solve the problems cited above, I would advise contacting directly the State available specialist in amphibians, reptiles and birds (listed in Vol. VI of the BIOTA biodiversity diagnosis series: Vertebrates) and asking them to suggest the best possible solutions to these problems.

**7 - Indicate geographical gaps knowledge within the taxonomic(s) group(s) you are working with and suggest ways of solving this problem**

The answer for this question is contained in the answer above.

**1 - Project Title** - SYSTEMATICS, EVOLUTION AND CONSERVATION OF EASTERN BRAZILIAN MAMMALS

**2 – Coordinator(s)** – Mario de Vivo – MZ/USP

**3 – HOMEPAGE** - [www.mz.usp/biota.htm](http://www.mz.usp/biota.htm)

**4 - Number of records added to the SINBIOTA databank: 0**  
**Obs. If no file has been added, please justify**

**5 – Summary of activities carried out between October/00 and October/01**  
Report not delivered in time to enter the Annual Report.

**1 – Project Title - SPECIES AND INTERACTION DIVERSITY IN PLANTS AND PHYTOPHAGOUS INSECTS**

**2 – Coordinator(s) – Thomas M. Lewinsohn – IB/UNICAMP**

**3 – HOMEPAGE - <http://www.unicamp.br/ib/biota/inseto-planta/>**

**4 - Number of records added to the SINBIOTA databank: 0**

**Obs. If no file has been added, please justify**

We initiated record entry in late 2000. However, since all early records have to be re-entered into SINBIOTA, we have taken the opportunity to re-discuss record and/or specimen linkage (plants–herbivores–parasitoids) with the database programmers, Ricardo Scachetti Pereira and Rafael Luís Fonseca. Until now this feature seems to be restricted to our project within the BIOTA program; however, it should be easily applicable to other projects and data types (for instance, plant records + secondary chemicals). We intend to be able to enter linkage information and hope that this information be retrievable as a future regular option in consulting SINBIOTA.

We plan on batch entry in 2002 of all our plant and insect records from cerrados in São Paulo obtained to date.

**5 – Summary of Activities carried out between October 2000 and October 2001**

*a) Team organisation*

Both ecology postdoctoral researchers we had recruited in mid '99 obtained permanent academic positions in October 2000 outside of the state of São Paulo. This unexpected loss represented a substantial setback, from which we nonetheless recovered by reassigning one subproject and suspending another for the time being. Recently, FAPESP granted a postdoctoral position to Adriana Almeida, who completed her PhD within the project in July and therefore has extensive experience in the study system. Our genetics postdoc, Maria Tereza Guaratini, is currently on maternity leave.

The project currently comprises four senior researchers, two postdocs, two doctoral and five MSc students, four undergraduate interns and two graduate research assistants. Two MSc and one PhD thesis were presented during the last year.

*b) Asteraceae and flowerhead-feeding insects in Cerrado in São Paulo*

We completed the initial project on Asteraceae and flowerhead endophages in 8 localities of São Paulo, in each of which we sampled one cerrado sens. str. and one “cerradão” area. Soil samples from all sites were analysed in the Soils Section of the Campinas Agronomic Institute. Insects were mounted and sorted to morphospecies in five of six main endophage families. First results were shown at the 2000 Biota/Fapesp meeting, and a fuller version was submitted to the IV Brazilian Ecology Congress.

A second study was designed to compare asteraceous floras and their flowerhead-feeding assemblages among landscape units. Five replicates each of a cerrado area and nearby old pastures and eucalyptus plantations were sampled to ascertain whether the modified areas are nested subsets of the cerrado (presumed

to be the original) biota, or incorporate extraneous components. This is being carried out by Soraia Fonseca for her PhD thesis. Fieldwork is to be completed in 2002.

Three further MSc studies address cerrado insect-plant assemblages in various ways. Umberto Kubota's project concerns the local dynamics of a cerrado asteraceous assemblage, especially the influence of spatial and temporal availability of hosts on the size and structure of their associated insect assemblages; field work will extend from mid-2001 to the end of 2002. Mario Almeida has conducted a detailed study of intra and interindividual reproductive synchronisation in *Chromolaena maximiliani* and the response of endophagous insects and parasitoids to these fine-grained temporal and spatial patterns, which also include information on neighbouring congeneric plants. The data are currently being tabulated and analysed. André Dias has started an experimental study on the effect of nutrient and water limitation on host quality and ensuing responses of herbivorous insects and, if possible, of their parasitoids as well.

#### c) *Genetics*

Genetics studies by Vera Solferini and collaborators focused on the two main genera of tephritid flowerhead-feeders, *Tomoplagia* and *Xanthaciura*. Karla Yotoko (PhD) and Aluana Abreu (MSc) are completing molecular studies of *Tomoplagia* species from different hosts. Ricardo Tibúrcio's MSc study on the midgut bacterial flora of *Tomoplagia* associated to various host species are also nearly complete.

Tereza Guaratini completed field studies of the *Bidens pilosa* complex in which she investigated genetic, life-cycle and morphological characters of different populations and also their flower visitors; these are now being readied for publication. Flávia Fuchs presented her MSc dissertation on genetic variation and differentiation in two endemic genera in montane areas. The study on *Proteopsis* was published in *Plant Systematics and Evolution* and the one on *Minasia* is now being written up.

#### d) *Plant chemistry*

A study of pyrrolizidine alkaloid (PA) variation in the genus *Senecio* by J.R. Trigo, T.M. Lewinsohn and collaborators was submitted to *Phytochemistry*. Further studies are being conducted on *Senecio* species and on PAs in selected genera and species of Eupatorieae.

#### e) *Geographical variation of Eupatorieae and their flowerhead feeders in south-east Brazilian mountain ranges*

This study concerned the Eupatorieae of the Mantiqueira range in eastern São Paulo and adjoining areas in Rio de Janeiro and Minas Gerais. Floristic and faunistic similarity among sites and with other mountain ranges (Espinhaço and southern ranges) were analysed in the doctoral thesis of Adriana Almeida, presented in 2001; this study included innovative analyses of local food webs as well as of elevational distributions in various localities according to Colwell and Lees' "mid-domain" hypothesis.

#### f) *Theoretical development of diversity partitioning*

We have further developed our conceptual and statistical models for diversity partitioning, with important input from visiting researchers and at presentations in Denmark (XI Symposium on Insect-Plant Relationships) and in the UK. We hope to complete and write these up in 2002.

**6 - Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem.**

The project involves plants (Asteraceae) and insects (various orders/families). These will be commented in turn.

The Brazilian Asteraceae are fairly well known; several Brazilian botanists who collaborate in our project can handle most groups. Nonetheless, we need access to expertise and/or to specimens, including types, in overseas collections. Key reference collections are USNM (Washington) and Kew. Interchange and consultations have been considerably delayed by current federal legislation on biological specimen exchange.

There is no Brazilian specialist capable of full identification of some major genera, e.g. *Baccharis*, *Mikania*. We would like to encourage interest in these groups but obviously cannot undertake this botanical study within our project. Other taxa would benefit from identification of Brazilian specimen holdings by direct comparison to types or in reference collections.

Federal regulations also hamper further work on the main insect groups. Diptera – Tephritidae and Agromyzidae depend on extensive and continued interchange and collaboration with the USNM and USDA. The first is well-established; for the Agromyzidae we intend to start a three-way collaboration involving Dr. Sonja Scheffer (USDA) and Dr. Graciela Valladares (Univ. Cordoba, Argentina) for molecular and morphological studies, but these need continuous loans and specimen sharing with overseas institutions.

As far as we know, there is currently no Brazilian expert on Agromyzidae and only limited work on the Cecidomyiidae. We are willing to participate in an eventual joint effort to bring experts (e.g. Scheffer, Agromyzidae; Gagné, Cecidomyiidae) from overseas and/or sending prospective trainees for internship in their home institutions. We suggest a broadly based (and funded!) program for such interchanges rather than handling them individually and ad hoc.

In the Microlepidoptera, the main family we are concerned with, Tortricidae, have previously been identified by Victor Becker, currently a collaborating researcher in the BIOTA/FAPESP project on Lepidoptera. In this case, a trainee in pinning microlepidoptera and preparing genitalia slides would be a strategic asset for both projects. Other families we are concerned with (Pyralidae, Pterophoridae) would benefit from this as well, but still depend on overseas experts for identification.

**7 – Indicate gaps in geographical knowledge within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem.**

Insect-plant associations of our study system are badly covered in several areas in the State of São Paulo: (a) the Serra da Mantiqueira, with high diversity and local differentiation, has been sampled in very few localities; (b) the Serra do Mar is even less studied; (c) disturbed and intensively habitats and landscapes are also little known.

Within our limitations, we intend to improve on (a) by sampling in the direction of the Serra da Canastra in 2002-2003, and (c) which is being addressed by current subprojects; as for (b), if we can afford the time and lab space, we would like to sample the Serra da Bocaina in early 2003. If not, this region would be left to a future project.

We suggest a mapping effort from records in the São Paulo Flora database to further pinpoint existing and needed geographical coverage of plants. Insect distributions will be much sparser and there is little point in a major effort of extensive sampling coverage of the taxa we are studying (contrary to ants and butterflies, for instance); however, our insect taxa are good candidates for future modelling exercises, in which we could predict occurrences from topographical, climate, habitat and floristic information and then validate them from intensive point samples.

**1 - Project Title** - BIODIVERSITY OF INTERACTIONS BETWEEN FRUGIVOROUS VERTEBRATES AND PLANTS IN THE ATLANTIC FOREST OF SOUTHEASTERN BRAZIL.

**2 – Coordinator(s)** - Wesley Rodrigues Silva – IB/UNICAMP

**3 – HOMEPAGE** – <http://www.unicamp.br/ib/biota/frugivoria>

**4 - Number of records added to the SINBIOTA databank:**

**Obs. If no file has been added, please justify**

A separate databank has been prepared by the project team and the Centro de Referência de Informação Ambiental (CRIA) at Campinas, as the current databank used by other BIOTA projects is somewhat inadequate to deal with the biological data generated in our project, which comprise mainly behavioral data. The structure and management of the new databank is currently under test and it is designed to make information on plants and frugivores of the Atlantic Forest available to the general public through the Internet.

**5 – Summary of Activities carried out between October/00 and October/01**

The main goal of this project is to record interactions between frugivorous vertebrates and their food plants in order to evaluate the importance of this mutualism in the maintenance of the biodiversity levels of the endangered Atlantic Forest of southeastern Brazil. Different from other projects in this program, the focus of this one is oriented toward functional rather than taxonomical groups of organisms (frugivores and fruit plants). This scope imposes some difficulties in complying with some of the general purposes of the BIOTA Program, which expects a broader taxonomical covering of the biodiversity in the São Paulo state. In this particular perspective, only animals and plants comprising a particular subset of their respective communities are considered, what can give an inaccurate view of the whole system in terms of taxonomical treatment. However, we believe that this procedure is compatible with the BIOTA profile, since the analysis of this mutual dependency (frugivory) will lead to a better understanding on how different organisms coexist in nature, what can ultimately contribute to the assessment of the biodiversity levels in the studied areas.

Our field site is Intervales State Park (ISP), a 50,000 ha preserved area in southeast São Paulo state ranging from 60 to 1100 m a.s.l., covered mostly by pristine and old secondary Atlantic Forest. Different areas in this park are being visited monthly since January 1999. In each visit we record the interactions between frugivorous vertebrates and their food plants through direct (observation of feeding behavior) and indirect (presence of seeds in feces of captured animals) evidences. Most of the feeding records come from birds and bats because they can be easily seen in action (birds) or are easily caught in mist nets (both). Non volant mammals, such as primates, canids, marsupials, deer and tapir contribute with a minor proportion of the feeding records due to a combination of discrete behavior, low population density and uneasy capture. Fruit plants are identified as they become included in some frugivores diet. A reference seed collection has been made to allow a more precise identification. The fruiting phenology of these plants is also recorded

and for some species the nutrient content of the fruit has been analyzed. The feeding records were arranged in a matrix of interactions, which allows calculations on different aspects of the frugivory pattern for the whole area.

From October 2000 to October 2001 we continued to survey the Carmo region at ISP, an area between 500-800 m characterized by a mosaic of pristine and second growth vegetation. We decided to stay in this area for a second year in order to analyze the effect of a severe frost occurred in July 2000 on the local pattern of interaction between plants and frugivores. This frost was reported by local people as one of the most intense in the last 25 years. Many plants were completely dried up after five consecutive days of below zero temperatures before sunrise. Frugivores are particularly susceptible to these climatic phenomena because their food sources consist of a variety of fleshy fruits, with a high water content, that can be heavily affected by frozen temperatures. Our observations from January 2000 to September 2001 revealed that the number of interactions was directly affected by the frost. Comparing the first (before frost) and second (after frost) semesters of 2000 we noticed that the number of interactions was significantly smaller after the frost (108 and 60 respectively;  $\chi^2 = 13.14$ ,  $df = 1$ ,  $P = 0.01$ ). As the fruiting season at ISP comprises most of the first semester of the year, one could argue that this difference is due mainly to regular seasonal variation in fruit phenology in the area. Surprisingly, the number of interactions recorded in the first semester of 2001 was practically the same (59) of the second one in 2000 for the same sampling effort, suggesting that the effects of such a climatic hazard can extend well beyond its occurrence. From July to September 2001 we recorded 60 interactions so far, indicating that the final number will be much larger by the end of this year, which will represent the normal level of frugivory for that community.

Although there was no significant difference in the number of plant species fruiting before (26) and after (36) frost, the treelets and shrubs of the family Melastomataceae (15 species) and *Cecropia glaziovii* (Cecropiaceae) were the most affected. These two groups accounted together for 66 interactions before frost (January to June 2000) and 22 in the year that followed (July 2000 to June 2001).

The frugivore community was equally affected. Many species of birds became very infrequent in the area during the months following the frost and at least one group, the Thraupinae, appeared to be very dependent on the tiny and juicy Melastomataceae fruits. These birds totaled 41 interactions before the frost (January-June 2000) but only 9 in July-December 2000 and 18 in January-June 2001. On the other hand, large- to mid-size bodied frugivores were apparently less affected, especially those that are able to exploit larger and more nutritious fruits, e.g. some toucans, trogons and cotingas, which relied heavily on the fruits of the palmito *Euterpe edulis*, one of the only plant species bearing fruits in the first months after the frost.

Long-term effects in the activity of frugivores caused by the July 2000 frost was also detected in bats and, in a minor scale, in frugivorous marsupials (this group has been regularly investigated since November 2000). As many of these animals feed also on animal items, like insects, and given that insects are also strongly affected by these climatic events, the overall impact of the low winter temperatures in the whole community is probably much larger than suggested by this frugivory perspective only.

However, our data point out that there is a dynamic balance in the pattern of interactions between angiosperms and fruit-eating vertebrates in the Atlantic Forest.

Determining how fruit-frugivore food webs are built is an important step to understand the factors that create and maintain the biodiversity of the Atlantic Forest biome.

Another step in the quantitative analysis of our data is the determining of trends of mutualism between particular plant and frugivore species. We took a species with a good sample size for a test, the Swallow-tailed manakin *Chiroxiphia caudata* (Aves, Pipridae), and analyzed the frequency of distribution of its interactions in both wet and dry seasons. There is a lack of specialization toward a small set of fruit plants in this manakin, as expected for a system shaped by diffuse coevolution, although it exploits a large proportion of fleshy berries and drupes. Melastomes fruits are significantly more eaten during the dry season ( $\chi^2 = 4.722$ ; gl = 1,  $p = 0.030$ ). The analysis of the diet width of this manakin by resampling techniques (jackknife) shows that its diet is broader in the wet season, both at the plant species and family levels. These same procedures will be applied to other plant and frugivore species in the matrix, as sample size increases.

#### **6/7 - Gaps in knowledge and/or geographical distribution within taxonomic groups studied:**

As explained earlier, the focus of this project is functional/ecological rather than taxonomical. Frugivores comprise an important subset of vertebrates in tropical forests belonging to different taxonomical groups of organisms with particular morphological and ecological requirements. Our goal is to compare our dataset with those of different areas within the realm of the Atlantic Forest and assess their biodiversity level through the structure and dynamics of plant-frugivores interactions. On a broader scale, other ecosystems in the São Paulo state, threatened or not, would be included in this comparison. Unfortunately, there is no other dataset available for similar comparisons so far, what urges the need of more studies based on this particular perspective

**1 - Project Title** - CONSERVATION AND SUSTAINABLE USE OF THE PLANT DIVERSITY FROM CERRADO AND ATLANTIC FOREST: CHEMICAL DIVERSITY AND PROSPECTING FOR POTENTIAL DRUGS

**2. Coordinator** - Vanderlan da Silva Bolzani –IQ/UNESP, Araraquara

**3. Home page** – [www.iq.nubbe.unesp.br](http://www.iq.nubbe.unesp.br)

**4. Number of records added to the SINBIOTA databank: 0**

**Obs. If no file has been added, please justify**

The chemical work on species from Cerrado and Atlantic Forest has led to the isolation and structure elucidation of several new natural products, which shall be submitted to biological evaluation prior to publication, meeting our interests of adding value to biodiversity products and, in fact, to contribute for sustainable use of our biodiversity.

#### **5 – Summary of Activities carried out between October/00 and October/01**

During this year 211 plant species from 40 different families occurring in the Cerrado and Atlantic Forest were collected. The amount of plant material collected for bioprospection during this year was under of our expectation due to problems regarding weather conditions and field trips program. From 211 plant species collected ca. 230 extracts were prepared and submitted to a mechanism-based bioassay, using mutant strains of *Saccharomyces cerevisiae* for detection of DNA-damaging activity; and bioautography, using spore suspensions of fungi *Cladosporium cladosporioides* and *C. sphaerospermum*, for detection of potential antifungal extracts. Until now all extracts were screened and only 12 extracts showed selective inhibition of mutant yeasts, indicating the presence of potential antitumoral agents; and 24 extracts showed antifungal properties. These extracts have not been tested for antioxidants yet through the  $\beta$ -carotene assay on TLC. This time-consuming test (several elutions on TLC should be performed for each extract) shall be replaced by an automated system currently under development and adjustment to our experimental conditions, which uses an electrochemical detector coupled to the liquid chromatograph (HPLC-ECD) in order to optimize and to rapidly increase the number of extracts tested for antioxidant molecules.

A FAPESP postdoctoral fellow Dr. Ian Castro-Gamboa, from Costa Rica, has performed this work. Our intention with this analytical methodology is to achieve the antioxidant assays results concomitant to other bioassays results. The natural antioxidant molecules represent a product, which has commercial interest for cosmetic and functional food industry.

In last report we described the following species that are currently under phytochemical study: *Aspidosperma polyneuron*, *A. cylindrocarpon*, *A. olivaceum* and *Rauwolfia sellowii* (Apocynaceae); *Piper crassinervium*, *P. tuberculatum* and *P. arboreum* (Piperaceae); *Calycophyllum spruceanum*, *Chimarrhis turbinata*, *Coussarea hydrangeaefolia*, *Tocoyena formosa* and *T. brasiliensis* (Rubiaceae); *Stemodia foliosa* (Scrophulariaceae); *Arrabidaea samydoides*, (Bignoniaceae); *Cryptocaria moschata*, *C. ashersoniana* and *Nectandra grandiflora* (Lauraceae); *Casearia sylvestris* (Flacourtiaceae), *Alchornea grandiflora* and *A. sisifolia* (Euphorbiaceae) and *Maytenus aquifolium* (Celastraceae).

During this period we have isolated ca. of 100 compounds, most of which belong to alkaloid, iridoid, flavonoid, lignoid, diterpene and amide natural products classes. From these, only a few compounds showed cytotoxic, antioxidant and/or antifungal activities, which might indicate they are possible lead compounds.

Since the last report, the biosynthetic study of Piperaceae was divided in two major focuses: analysis of extracts from species and also study of dynamic aspects such as circadian variations of enzyme activities and biosynthetic studies. Part of this last topic was carried out in Washington State University under supervision of Dr. Norman Lewis. The results revealed high enantioselectivity in the conversion of monolignols to tetrahydrofuran lignans similarly to that previously obtained by Prof. M. J. Kato graduates with *Piper regnellii* (Kato et al., in press), in which the biosynthesis of dihydrobenzofuran neolignans was investigated. From *Aspidosperma olivaceum* and *A. cylindrocarpon*, collected in Campininha Farm (Cerrado region) the indole alkaloid aspidospermine was isolated and experiments of *in vitro* germination and suspension cell culture are under investigation.

*Tocoyena formosa*, *T. brasiliensis* (Rubiaceae), *Cryptocaria moschata* (Lauraceae), *Piper aduncum* (Piperaceae) and *Casearia sylvestris* (Flacourtiaceae) are still under investigation for population, environmental, seasonal and circadian variations. During this time, a collaboration with Dr. Pedro Mores (CENA, Piracicaba, SP) and with a project in the Biota-FAPESP, resulted in relevant genetic data on *Cryptocaria moschata*, which was partly the subject of a Ph.D. thesis of one student of Prof. A. J. Cavalheiro, responsible for the population and seasonal variation of secondary metabolites studies in our group.

## Scientific Production (2001)

### Published and in press articles in paper viewed journals:

1. Benevides, P. J. C., Young, M. C. M., Giesbrecht, A. M., Roque, N. F., Bolzani, V. da S. (2001) Antifungal polysulphides from *Petiveria alliacea* L. *Phytochemistry* **57**, 743-748.
  2. Cavalcanti, S. B. T., Teles, H. L., Silva, D. H. S., Furlan, M., Young, M. C. M., Bolzani, V. da S. (2001) New Tetra-acetylated Oligosaccharide Diterpene from *Cupania vernalis*. *J. Braz. Chem. Soc.* **12**, 413-416.
  3. Bolzani, V. da S., Young, M. C. M., Furlan, M., Cavalheiro, <sup>a</sup> J., Araújo, <sup>a</sup> R., Silva, D. H. S., Lopes, M. N. (2001) Secondary Metabolites from Brazilian Rubiaceae Plant Species: Chemo taxonomical and biological Significance. *Recent. Devel. Phytochem.* 19-31, ISBN: 81-7736-048-5.
  4. Silva, R. V., Navickiene, H. D., Kato, M. J., Bolzani, V. da S., Meda, C. I., Young, M. C. M., Furlan, M. (2001) Antifungal Amides from *Piper arboreum* and *Piper tuberculatum*. *Phytochemistry* 00, 000.
  5. Filho, W. B., Corsino, J., Bolzani, v. da S., Furlan, M. (2001) Quantitative Determination of Cytotoxic *Friedo-nor*-oleanane Derivatives from 5 Morphological Types of *Maytenus illicifolia* (Celastraceae) by Reverse Phase High Performance Liquid Chromatography. *Phytochemical Analysis* 00, 000.
  6. Nihei, K., Kato, M. J., Yamane, T., Palma, M. S & Konno, K. (2001) 2-nitro-and 2,4-dinitrobenzenesulfonamides as protecting groups for primary amines. *SYNLETT* (7) 1167-1169.
  7. Kato, M.J. (2001) Global Phytochemistry – the Brazilian approach. *Phytochemistry* **57**, 621-623.
- Sartorelli, P., Benevides, P. J. C., and Kato, M. J. (2001) Biosynthesis of benzofuran neolignans in *Piper regnellii*. *Plant Science* 00, 000 (in press).

8. Castro, A.H. F.; Young, M.C.M.; Alvarenga, A.A. de & Alves, J.D. (2001) Influence of Photoperiod on the Accumulation of Allantoin in Comfrey Plants. R. *Bras Fisiol. Veg.*, **13** (1): 49-54.
9. Barbo, F. E; Meda, C.I. Young, M.C.M.; Cordeiro, I. & Blatt, C.T.T. (2001) Pentatrolol from *Alchornea sidifolia*. ( Euphorbiaceae). *Biochem. Syst. Ecol* 00, 000 (in press).
10. Alcerito, T.; Barbo, F.E.; Negri, G.; Santos, D.Y.A.C.; Meda, C.I.; Young, M.C.M.; Chávez, D. & Blatt, C.T.T. (2001) Foliar Epicuticular Wax of *Arrabidaea brachypoda*: flavonoids and antifungal activity. *Biochem. Syst. Ecol* 00, 000 (in press).
11. Silva, D. H. S., Pereira, F. C. P., Zanoni, M. V. B., Yoshida, M. (2001) Lipophyllic Antioxidants from *Irianthera juruensis* fruits. *Phytochemistry* **57**, 437-442.
12. Nehme, C. J.; Moraes, P. L. R. and Cavalheiro, A. J. (2001) Intrapopulational Variability of Styrylpyrones in Leaves of *Cryptocarya moschata* Nees (Lauraceae) from Carlos Botelho State Park. *Bioch. Syst. Ecol.* 00, 000.

#### Submitted articles:

1. Lopes, L. T., Hemerly, J. P., Araújo, A. R., Valentini, S. R., Young, Bolzani, V. da S., Silva, D. H. S. (2001) Cytotoxic Lignans from Stemas of *Styrax camporum* (Styracaceae). *Nat. Prod. Letters*.
2. Corsino, J., Silva, D. H. S., Zanoni, M. V. B., Silva, V. da S., França, S. C. F., Pereira, A. M. S. P., Furlan, M. (2001) Antioxidant Flavan-3-ols and Flavanol Glycosides from *Maytenus aquifolium*. *Planta Med.*
3. Gamboa-Castro, I., Cardoso, C. L., Silva, D. H. S., Cavalheiro, A. J., Furan, M., Bolzani, V. da S. (2001) HPLC-ECD: An Useful Tool on the Pursue of Novel Analytical Strategies for the Detection of Antioxidant Secondary Metabolites. *J. Chromatography*.

#### Artigos 2001

4. Lopes, N. P.; Kato, M. J.; Yoshida, M. and Cavalheiro, A. J. (2001) Secondary metabolites from seeds of *Virola surinamensis* during germination and seedling development. *J. Bras. Chem. Soc.*
5. Nehme, C. J., Bastos, W. L.; Araújo, A. J and Cavalheiro, A. J. (2001) High Performance Liquid Chromatography of flavonoids glycosides and styrylpyrones from leaves of *Cryptocarya moschata* (Lauraceae). *J. Chromatograf.*
- 6 Santos, L. de A. and Cavalheiro, A. J. (2001) Acetylenic compounds of seeds oil from *Porcelia macrocarpa* (Annonaceae). *Phytochemistry*.

#### Master concluded

1. LUCIANA DE ÁVILA SANTOS, Isolamento e caracterização de ácidos graxos e triglicerídeos acetilênicos de *Porcelia macrocarpa* (Annonaceae), com potencial atividade inibidora de lipoxigenases (FAPESP 98/01735-2), concluded at 03/27/2001.
2. INARA CRISTINA DE PASCOLI, Estudo fitoquímico dos frutos de *Cryptocarya moschata* (Lauraceae) (FAPESP 97/12377-7), concluded at 16/02/2001.
3. ELDER LOPES TELES, Estudo fitoquímico e busca de substâncias bioativas de *Styrax camporum*. Pohn. (FAPESP 99/01664-0), concluded at 06/08/2001.
4. WALDEMAR BUFFA FILHO, Determinação de triterpenos quinonametídeos e derivados friedelanos em tecidos diferenciados e não diferenciados de sete genótipos de *Maytenus aquifolium* (FAPESP 99/02258-6), concluded at 06/29/2001.

**Ph.D. concluded**

1. ANA PAULA DANELUTTE , Estudo das vias metabólicas em *Piper crassinervium*. (CNPq, 141825/1996-0), concluded at 03/29/2001.
2. CLÁUDIA JOSEPH NEHME, Estudo da variabilidade sazonal e populacional de metabólitos secundários polares em folhas de *Cryptocarya moschata* (Lauraceae) (FAPESP 98/03012), concluded at 10/08/2001.
3. JOAQUIM CORSINO, Estudo biossintético em *Maytenus aquifolium*, (CAPES), concluded at 08/28/2001.

**Future Perspectives:**

One of the most important accomplishments concerning our project in the Biota-FAPESP, during this period, was the discussion regarding possible closed agreement collaboration with a national pharmaceutical company, Eurofarma. This company is interested in some antibiotic and antifungal compounds isolated in our laboratory from *Petiveria alliacea*, *Casearia sylvestris*, *Tocoyena Formosa* and *Stemodia foliosa*. This partnership is quite unique and if achieved, will be an excellent opportunity to aggregate values for the bioactive compounds isolated from plants of Cerrado and Atlantic Forest, and in fact, to contribute for sustainable use of the São Paulo State biodiversity.

**6/7 - The results of this project do not deal with these questions**

**1 - Project Title** - CONSERVATION AND SUSTAINABLE USE OF THE PLANT BIODIVERSITY FROM THE CERRADO AND ATLANTIC FOREST: THE STORAGE CARBOHYDRATES AND THEIR ROLE ON THE ADAPTATION AND MAINTAINANCE OF PLANTS IN THEIR NATURAL ENVIRONMENT

**2 – Coordinator(s)** – Marcos S. Buckeridge – IBt/SMA

**3 – HOMEPAGE** – <http://200.144.77.10>

**4 - Number of records added to the SINBIOTA databank: 0**

**Obs. If no file has been added, please justify**

Up to now, we have not deposited any record in the databank, because we collect samples consistently at the same sites (Cerrado at Campininha Farm in Mogi Guaçu and forest preserved at the Instituto de Botânica, São Paulo). This is also because we mostly perform our experiments in the laboratory instead of the field.

**5 – Summary of Activities carried out between October/00 and October/01**

We have performed scientific research in basic and applied science and supervision of students at higher education levels (PhDs, MSc and Scientific Initiation), all concerning the theme of the project as will be reported below. Besides, some tools for education at high school and university levels have been prepared such as computer animations that help teachers to explain why it is important to study plant adaptation to the environment under the circumstances of climate change the planet is going through at the moment.

- The continuity of the screening of native species for the presence of different types of carbohydrates resulted in the finding of the alcohol sugar pinitol in grasses from cerrado. This sugar was detected in this group of plants for the first time and as it has been related to water stress in other groups of plants. This finding suggests that the presence of pinitol in grasses from cerrado may be related to their adaptation to dry conditions found in this biome at certain periods of the year.
- Fungitoxic compounds were purified from seeds of *Sesbania marginata* and we are now trying to determine its chemical structure. This compound seems to be of great importance during germination since apparently no microorganism can grow on or near the seed after it germinates. We also believe that this compound may be of commercial value in the future, therefore being a candidate for sustainable use of forest biodiversity.
- The pectins of leaves of the forest species *Rudgea jasminoides* have been studied in detail from biochemical and ultrastructural and cytochemical viewpoints. These findings suggest that fine details of the chemical structure of these polymers determine whether or not the plant will be capable to respond to attack of micro-organisms.
- Studies on the mobilisation of fructan in underground organ of the herbaceous cerrado species *Vernonia herbacea* revealed the presence of two polymer hydrolases, one being constitutive and another apparently induced by loss of aerial parts of the plant. This suggests that mobilisation is somehow controlled by aerial parts of the plant, since it is lost during dormancy period. Thus, integrating it in the seasonal variations found in the cerrado environment.

- An integrated study on the early growth of the climax tree *Hymenaea courbaril*, to which several theses are related, already produced a set of data that permit generalisations about how the storage polysaccharide (xyloglucan) determines the vigour of the plantlet. Storage mobilisation is controlled by growth of aerial parts, which produce and transport the plant hormone auxin. It was shown that this hormone determines the pace of mobilisation, which follows circadian rhythm. Thus, the storage polymer is mobilised tonight whereas photosynthesis occurs during the light period. This apparently provides a system that is capable to use two carbon sources (photosynthesis and storage) in a co-ordinated fashion and as a result producing a more vigorous plantlet. Some aspects of the relationship between the two carbon sources are currently under investigation. Several scientific publications are now under preparation to report these discoveries.
- Using the knowledge produced by our experiments with the tree species *Hymenaea courbaril*, we performed one experiment in which seeds germinated and plantlets grew under two atmospheric concentrations of CO<sub>2</sub>: 350ppm and 750ppm, the later being the one expected to be present by the year 2050 according to recent forecasts. We found that i) photosynthesis increased up to 3 fold in the higher 750ppm in intact plantlets whereas the absence of the storage polysaccharide strongly interfered with development resulting in up to 7 times more CO<sub>2</sub> assimilation. This and other aspects of the plantlets grown are now under investigation, but the initial results suggest that this important tree species of the rain forest will probably a candidate to survive the effects expected from the current climate changes due to global warming.

As a result of the items described above, several publications were prepared in the form of scientific papers, book chapters and reports in national and international scientific meetings.

**6 - Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways of solving this lacunae problem.**

Although a considerable amount of data has been obtained by our group regarding the occurrence of storage polysaccharides in Leguminosae, Vochysiaceae, Poaceae, Orchydaceae and Asteraceae, these are just a parcel of a enormous amount of studied groups within the Angiosperms. Thus, groups like gymnosperms and ferns for example have not been assessed yet. Some suggestions of ways to fill these gaps are to increase collaboration with researchers interested in plant adaptation. We have some proposals of foreigner scientists interested in a post-doctoral position in our laboratory. Another important way has been the possibility of collaboration of our group with the research groups such as the ones led by Prof. Ricardo Rodrigues (ESALQ USP) and Prof. Welington Delitti (Dept of Ecology USP), who are working on the biomes of Atlantic forest and Cerrado with ecological approaches.

**7 – Indicate geographical gaps knowledge within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem.**

The same statements of item 6 are applicable to this item, but substituting the term occurrence by distribution. Due to the fact that data banks are building up at the moment and integration among groups are just starting, it is difficult to perform at the moment, distribution maps with the occurrence of types of reserves. One interesting approach would be to integrate the data we have on the occurrence of polysaccharides in different species with the their distribution maps.

**1 - Project Title - GENETIC STRUCTURE OF NATURAL POPULATIONS OF CRYPTOCARYA SPP. (LAURACEAE) THROUGH ISOZYME AND DNA MARKERS**

**2 – Coordinator(s) –** Maria Teresa V.C. Derbyshire & Pedro Luís Rodrigues de Moraes – CENA/USP

**3 – HOMEPAGE -** <http://www.cena.usp.br/Biota/Cryptocarya/index.htm>

**4 - Number of records added to the SINBIOTA databank: 140**

**5 – Summary of Activities carried out between October/00 and October/01**

Until the present date, we have located with GPS, marked with aluminum tags, measured the DBH and collected samples of individuals of *Cryptocarya* species: these samples were subjected to isozyme analyses and DNA extraction for phylogeography study, as well as for vouchers for a taxonomic monograph that is in course (table 1).

Table 1: Sites of population sampling of *Cryptocarya* species, together with the number of adult trees collected for the analyses of isozymes and DNA.

Site	<i>C. aschersoniana</i>	<i>C. micrantha</i>	<i>C. minima</i>	<i>C. moschata</i>	<i>C. saligna</i>	<i>Cryptocarya sp.</i>
Parque Estadual Carlos Botelho <sup>1</sup>				122		8
Parque Estadual Intervalos-Núcleo Saibadela	5			36		
PESM-Núcleo Santa Virgínia				22		4
PESM-Núcleo Picinguaba				21	6	
E.E. José Cione (IAC, Pariqüera-Açu)				34	8	
Estação Ecológica Juréia-Itatins <sup>2</sup>	1			45	27	3
Parque Estadual da Cantareira <sup>3</sup>				43	16	
Parque Estadual de Campos do Jordão	18					
Base Ecológica da Serra do Japi	22					
Fazenda Campininha (Mogi Guaçu)	32					
Fazenda Barreiro Rico (Anhembí)	30					
Fazenda São José (Rio Claro)	11					
Estação Experimental de Tupi (Piracicaba)	1					
Alto da Serra de São Pedro (S. Pedro)	17					
Ibaté	51					
Mata de Santa Genebra (Campinas)	20					

Fazenda Santa Elisa (IAC-Campinas)	2					
Bosque dos Alemães (Campinas)	30					
Bosque dos Italianos (Campinas)	20					
Bosque dos Jequitibás (Campinas)	10					
Bosque São José (Campinas)	2					
Mogi Mirim, Amparo, Sto. Antonio de Posse <sup>4</sup>	16					
Floresta Nacional de Ipanema (Iperó)	2					
São João da Boa Vista (SP), Caldas e Ouro Fino (MG)	7					
São Sebastião do Paraíso (MG) <sup>5</sup>	30					
Serra da Estrela (Magé-Petrópolis, RJ) <sup>6</sup>		11	12	12	3	
Bocaiuva do Sul (PR)	3					
Parque Botânico do Morro do Baú (Ilhotas, SC)				10		
<b>TOTAL</b>	<b>330</b>	<b>11</b>	<b>12</b>	<b>345</b>	<b>60</b>	<b>15</b>

<sup>1</sup> Individuals sampled in four different sites: 800 m, 700 m, 200 m and 40 m above sea level; <sup>2</sup> Two Nuclei sampled: Arpoador and Rio Verde; <sup>3</sup> Two Nuclei sampled: Pedra Grande and Águas Claras; <sup>4</sup> Principal sampled area: Fazenda Palmital, in Santo Antonio de Posse; <sup>5</sup> Sampling of the principal remnant vegetation fragments of the region; <sup>6</sup> Sampling from the original area of Baron Langsdorff's Fazenda Mandiocca.

For the location and collection of samples, both for taxonomic study and molecular analyses, 76 field trips were carried out, covering circa of 36,370 km by car and spending 105 days in fieldwork.

To achieve the first objective proposed from our original manuscript, i.e. collecting fertile material of all *Cryptocarya* species from the populations that were sampled in this project, we have collected 400 individuals of many species, with 222 of them from sampled populations of *Cryptocarya*. All collections were registered and housed at Herbarium ESA, Piracicaba, SP, with duplicates being sent to several Brazilian herbaria and some foreign ones.

For isozyme analyses, 19 systems were chosen (below) due to good resolution of bands and detection of polymorphism, from protocols of 31 systems tested:  $\alpha$ -Esterase (E.C.3.1.1.1),  $\beta$ -Esterase (E.C.3.1.1.1), Catalase (E.C.1.11.1.6; two different methods of coloration), Diaphorase (E.C.1.8.1.4), Acid Phosphatase (E.C.3.1.3.2), Alkaline Phosphatase (E.C.3.1.3.1), 6-Phosphogluconic Dehydrogenase (E.C.1.1.1.44), Phosphoglucose Isomerase (E.C.5.3.1.9), Glutamic Dehydrogenase (E.C.1.4.1.3), Glutamic-Oxalacetic Transaminase (E.C.2.6.1.1), Isocitrate Dehydrogenase (E.C.1.1.1.41; NAD<sup>+</sup>), Malic Dehydrogenase (E.C.1.1.1.37), Nicotinamide Adenine Dinucleotide Dehydrogenase (E.C.1.6.99.3),

Nicotinamide Adenine Dinucleotide Phosphate Dehydrogenase (E.C.1.6.99.1), Peroxidase (E.C.1.11.1.7), Polyphenoloxidase (E.C.1.10.3.1), Superoxide Dismutase (E.C.1.15.1.1), and Shikimate Dehydrogenase (E.C.1.1.1.25). From the interpretation of zymograms, we found 41 polymorphic loci, which were evaluated through the analyses of adult populations, plus some progeny. All *Cryptocarya* populations, which were previously planned to be sampled, were analyzed through these isozyme systems.

Populations of Serra do Japi and P.E. Campos do Jordão presented different morphological pattern in comparison to the other sampled populations of *C. aschersoniana* Mez, from “Planalto” of São Paulo and south of Minas Gerais. In a similar way, the few individuals found at PEI- Saibadela showed a morphological pattern that is found in individuals of populations from south of Brazil, which is also distinctive from the others. For isozymes, these populations presented also divergent patterns for some loci from the characteristic ones found for *C. aschersoniana* and *C. moschata* populations. Being so, populations of Serra do Japi, Campos do Jordão and Saibadela were neither included in the analyses for *C. aschersoniana* populations nor in those for *C. moschata* populations.

From Nei's  $G$  statistics for the 12 populations of *C. aschersoniana* analyzed, the results showed that the overall gene diversity ( $H_T'$ ) was 0.552, while the gene differentiation coefficient ( $G_{ST}'$ ) was 0.340. The within sample gene diversity ( $H_S = 0.365$ ) was responsible for 66.12% of the overall gene diversity, indicating a higher variability occurring within populations than among them. In the same way, from average estimation of  $\theta_p$  ( $F_{ST}$ ) for the same populations of *C. aschersoniana*, we found that 39 loci presented values positively significant, indicating a highly significant divergence among the analyzed populations, what could take place and to be explained by Wahlund's effect. Another way to visualize the high level of divergence among these populations can be observed from the UPGMA dendrogram using Nei's unbiased genetic distance (Figure 1). However, since Nei's genetic distance assumes that populations must be in a mutation-drift equilibrium, and the population from Ibaté was the only one found at this equilibrium, results from this dendrogram should be cautiously considered.

Until the present date, we have not finished yet all the analyses we've planned to obtain from several parameters of the genetic structure of *Cryptocarya* populations, such as: number of migrants per generation, neighborhood size and effective population size, which will allow us to know if these populations are establishing gene flow in a level that avoids populational differentiation due to genetic drift. For the analyzed populations of *C. aschersoniana*, the estimation of the number of migrants per generation, from  $F_{ST}$ , was 0.496, indicating that gene flow is not sufficient to avoid populational differentiation due to drift. The same analyses that we are partially presenting here are going to be finished and concluded as well for the populations of *C. moschata* and *C. saligna*.

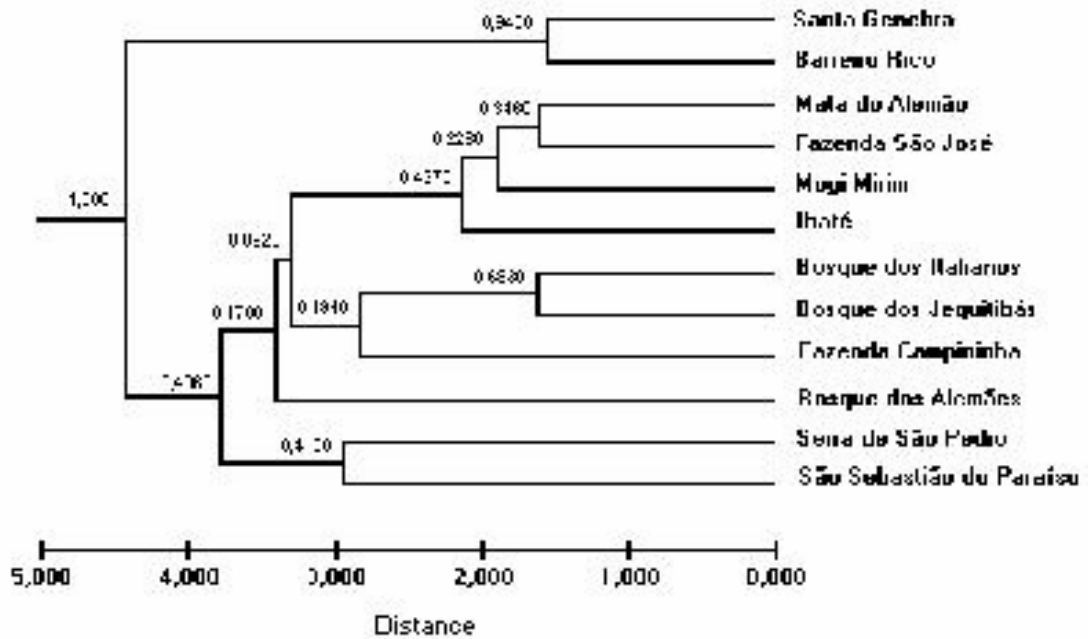


Figure 1: Cluster analysis (UPGMA) from Nei's unbiased genetic distance for populations of *Cryptocarya aschersoniana* Mez. Numbers near nodes indicate the proportion of similar replicates from 1,000 bootstraps.

Protocols for DNA extraction from leaves of *Cryptocarya* spp. were tested and were successful, producing DNA of good quality and sufficient quantity for the analyses. Extractions of total-DNA were conducted on 251 collections from representatives of all Brazilian *Cryptocarya* species, involving their morpho-ecological variants along their respective geographical distributions. Additionally, tests for amplification of ITS1 and ITS2, *rbcL* and *matK* were carried out, and shown to be adequate for the analyses. Tests for cloning and sequencing those genes have been conducted, as well.

**6 - Indicate knowledge gaps within the taxonomic(s) group(s) you are working with and suggest ways of solving this lacunae problem.**

In our point of view, the main "problem" concerning Brazilian *Cryptocarya* species is to establish their taxonomical status (identification) in such a way avoiding doubts and confusion among their overlapping specimens. This scenario still remains because the last taxonomic revision from 1937 did not adequately evaluate the specimens and analyzed just a few vouchers that did not represent all the variability found within their geographical range.

Trying to solve it, we are doing the taxonomic revision of this group. We have requested the loan of voucher specimens of *Cryptocarya* from 81 Brazilian herbaria. Until now, the following herbaria have sent material: BHCN, BHMH, BOTU, CEPEC, CESJ, CH, COR, CPAP, CRI, CVRD, EM, ESAL, FUEL, GFJP, GUA, HAS, HB, HBR, HEPH, HRB, HRCB, HUFU, HURG, IAC, IAN, IBGE, INPA, IPA, MBM, MBML, MG, OUPR, PACA, PEL, PMSP, R, RB, SJRP, SMDB, SP, SPFR, UB, UFMT, USU, VIC, VIES, and Jarcel Celulose, totalling approximately 1,000 exsiccates of *Cryptocarya* and/or unidentified Lauraceae. Additionally, we have received collections of type and historical specimens, or at least their digital images and/or negatives, from the following herbaria: B, BM, BR, C, F, G, K, KIEL, L, LE, MO, M, NY, FHO, P, S, U, and W.

**7 – Indicate geographical gaps knowledge within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem.**

We are going to collect material at Visconde do Rio Branco (prior São João Batista do Presídio, type-locality of *C. moschata* Nees), Lagoa Santa and Rio Novo, MG, and at Nova Friburgo and Cantagalo, RJ (types from Glaziou and Peckolt), in order to acquire the best possible understanding of morpho-ecological patterns to solve problems related to synonyms of *C. aschersoniana*, *C. minima* and *C. moschata*. Collections from some scarcely collected regions, like state of Espírito Santo and states of northeast, would be extremely important and desirable. For state of São Paulo, collections from Mantiqueira Mountains would be of great relevance.

**1 - Project Title** - BIOSPHERE-ATMOSPHERE INTERACTION IN NATURAL ECOSYSTEMS AND AGROSYSTEMS: A MONITORING EXPERIMENT ON SUGAR CANE AND CERRADO

**2 – Coordinator(s)** – Humberto Ribeiro da Rocha – IAG/USP

**3 – HOMEPAGE**

[http://www.iag.usp.br/meteo/biota\\_fapesp/pro\\_cerrado\\_cana.htm](http://www.iag.usp.br/meteo/biota_fapesp/pro_cerrado_cana.htm)

**4 - Number of records added to the SINBIOTA databank: 0**

**Obs. If no file has been added, please justify**

No data has been added so far. This project has very particular objectives, relevant to the overall context of Biota Fapesp Program, although a little different from the majority of projects on what concerns the sampling approach. Most of the collected data results from ecophysiological vegetation-atmosphere fluxes, which integrate the response of an 1 km<sup>2</sup> horizontal surface. Those data does not fit in SINBIOTA input format as it is at the moment. It doesn't prevent the data set to be available soon. Litterfall has been collected, is currently under analysis, may fit in the SINBIOTA databank and should be added.

**5 - Summary of Activities between October/00 and October/01**

The project is supposed to be developed in two years and finishes by December/01. Field installation took place in October/00 at two field sites: the Cerrado area (Gleba Pé de Gigante, Santa Rita do Passa Quatro, SP, 21° 37' 9" S, 47° 37' 58" W) and the sugar cane area (Sertãozinho, SP, 21° 06' S, 48° 04' W). (see Fig. 1 for a site view). The following data has been collected at the two sites:

Variable (description)	Unities	Sensor / Device	Sensor positioning
Air temperature	(°C)	Psychrometer CSI HMP45C	20 m
Air humidity	(g kg <sup>-1</sup> )	Psychrometer CSI HMP45C	20 m
Precipitation	(mm)	Texas 500	20 m
Wind direction	Degrees	RM Young	20 m
Wind speed	(m s <sup>-1</sup> )	RM Young	20 m
Global solar radiation	(W m <sup>-2</sup> )	LiCor 200X	incident, reflected 20 m
PAR radiation	(W m <sup>-2</sup> )	Licor Quantum	incident, reflected 20 m
Net radiation	(W m <sup>-2</sup> )	REBS	20 m
Soil moisture	(m <sup>3</sup> m <sup>-3</sup> )	FDR CS615	05,10,40,60,100, 150,200,250 cm depth
Soil temperature	(°C)	CSI T108	05,10 cm depth
Soil CO <sub>2</sub> efflux	(gCO <sub>2</sub> m <sup>-2</sup> s <sup>-1</sup> )	IRGA EGM-2 PPsystems	Ground level
Latent heat flux	(W m <sup>-2</sup> )	Eddy correlation	20 m
Sensible heat flux	(W m <sup>-2</sup> )	Eddy correlation	20 m
Ground heat flux	(W m <sup>-2</sup> )	REBS HFT3	01 cm
Air total CO <sub>2</sub> flux	(gCO <sub>2</sub> m <sup>-2</sup> s <sup>-1</sup> )	Eddy correlation	20 m
Litterfall	-	Set of trays (monthly basis)	surface
Soil Carbon	%C	20 samples / site	5, 10 cm

Table 2: Collected variables at the observational sites

A summary of the information we're up to report is observed in Fig. 2, where it's shown the average diurnal cycle of energy, water and CO<sub>2</sub> fluxes in two different months (March and July), that is, in the wet and dry season, respectively. Substantial changes appear in evapotranspiration (reduction in dry season), sensible heat flux

(increase in dry season) and CO<sub>2</sub> (reduction of both nighttime soil and plant respiration, and also a strong reduction in daytime net assimilation). We are currently quantifying and integrating the day to day fluxes to achieve the question of the annual balances of Carbon and water at the two sites. We would like to request the Fapesp Scientific Directory for the project to last for one more year, and therefore have enough time to investigate the interannual climate variability in the fluxes, as well as confirm the findings of the seasonal variability in the first year.

\* Papers published or submitted:

Surface fluxes and biophysical parameters for the Southeast Brazil: results of a biosphere-atmosphere mesoscale model (SiB2-RAMS) and field observations. Rocha, H., Silva Dias, MA, J. Collatz, L. Bounoua, O Cabral, C. von Randow (submitted to the Journal of Hydrometeorology).

**6 - Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways of solving this lacunae problem.**

We believe this question should be more relevant for the benefit of the science we investigate if we concern the physiognomic groups of ecosystems which we find gaps. We would like to see other types of Cerrado vegetation (e.g. Cerradão, Campo Cerrado, Campo Sujo) and Mata Atlantica forest also monitored for productivity and water balances. This information simply does not exist within the time resolution we're currently working at Cerrado Sensu Strictu.

**7 – Indicate geographical gaps knowledge within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem.**

We'd like to answer this question also as a sequence of the response of question 6. The coast strips of São Paulo, the typical domain of Mata Atlantica, resembles a major gap. Also, the southwest portion of the state appears as a potential region with natural vegetation not ever monitored.



Figure 1: Implemented tower with eddy correlation and meteorological instrumentation at sugar cane (left) and Cerrado (center, right) sites.

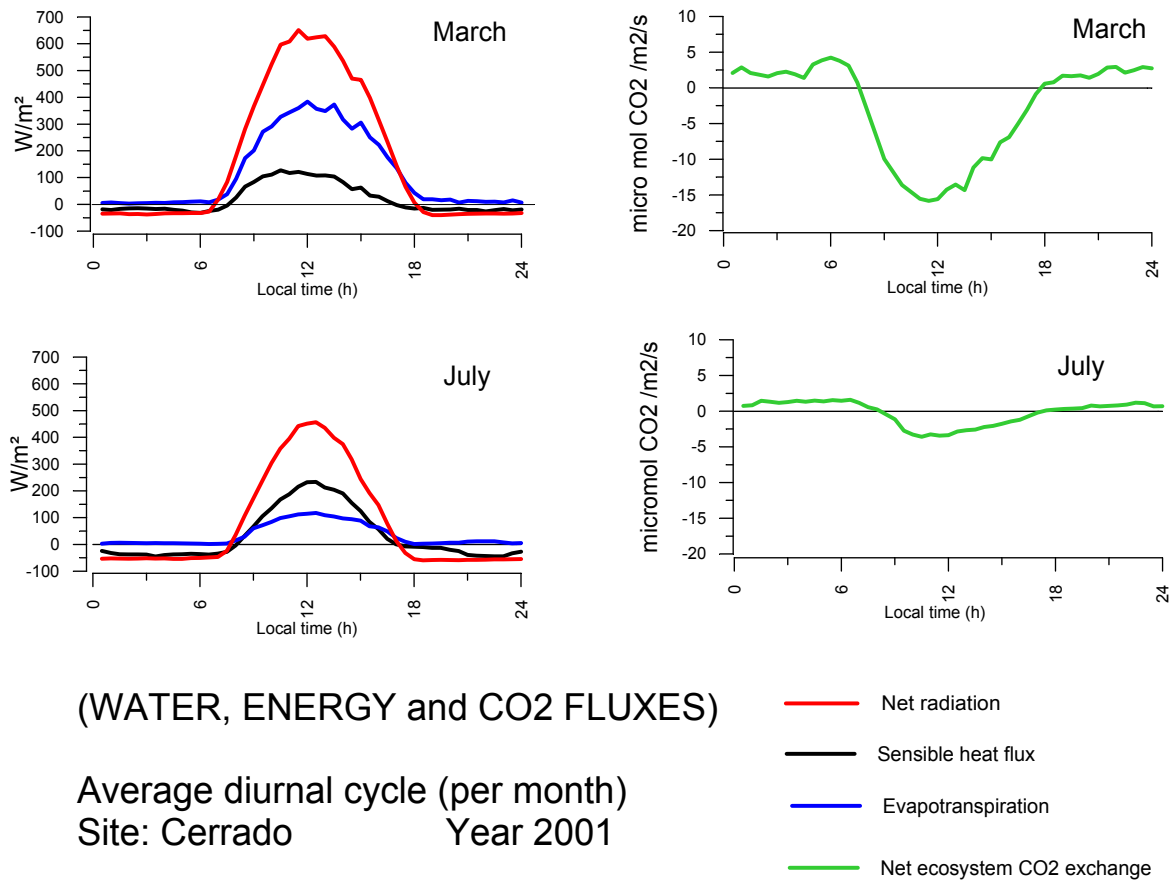


Figure 2: Average diurnal cycles in March and July/2001, respectively, of the Net radiation (red), sensible heat flux (black), evapotranspiration (blue) and net ecosystem CO<sub>2</sub> exchange fluxes (green) at the Cerrado site.

**1 - Project Title** - THE CONSERVATION FEASIBILITY OF THE CERRADO REMNANTS IN SÃO PAULO STATE.

**2 – Coordinator(s)** - Dr. Marisa Dantas Bitencourt – IB/USP

**3 – HOMEPAGE** - <http://eco.ib.usp.br/lepac/biota-cerrado>

**4 - Number of records added to the SINBIOTA databank: 58**

**5 – Summary of Activities carried out between October/00 and October/01**

Three doctors and two master students are developing their thesis and dissertations in remnants located in some FPZ (first priority zones for conservation). One of them is developing a model to minimize cerrado misclassification when satellite image is used. Other one is calibrating field biomass measurements with vegetation indices. The third doctor student is evaluating the level of pressure of each land use type over cerrado remnants. One of the master student is evaluating the recreational carrying capacity. The other one is studying the effects of a sustainable development project over a human settlement located in cerrado area.

Next step will be the application of some landscape ecology indices over the visited remnants, and conclude the conservation stage of each remnant, together with the Botany team.

So far, the team visited 23 FPZ from A to V, plus 3 extra areas, 116 remnants were studied in detail, 558 cerrado species were identified. There still are some species to identified which may give an increase in that number later on.

Dr. Giselda Durigan went to Edimburgh to stay 3 month, at the Royal Botanic Garden of Edimburgh, to improve a conservation value index, which will be applied to our remnants.

That team went to the field between October and November/2000 to raise the landowners profiles. They are studying in detail the FPZ A, B, C, D and G. Right now they are raising data from governmental offices to produce their first full report.

That step depends on the activities of the previous teams and is expected to be more active next year. By now the team is only participating in field trips of the economic team and attending meetings.

So far, we correct the area and the physiognomy of al 116 cerrado remnants. With that analyses, the team registered a **lost of 34%** of the cerrado area studied, in the state of São Paulo, from Kronka *et al.* 1993 to now-a-days.

**Seven** FPZ (F, I, J, K, L, N, and O) and **five** remnants of the S FPZ were confirmed not to be cerrado physiognomies but Semidecidual Seasonal Forest. **One** remnant, in A FPZ, is strictly Gallery Forest, although that physiognomy is commonly mixed with cerrado, in several remnants. **Two** FPZ (U and V) are strictly ecotone with cerrado and semidecidual seasonal forest.

Some conservation (C) and degradation (D) indicators were registered in the field in order to get a hint of the conservation stage. The partial result is:

- **13** remnants present C and not D indicator;
- **18** remnants present D but not any C indicator; and
- **the remaining** remnants present both C and D indicators.

***Events attended during that period:***

- "I Simpósio do Programa BIOTA/FAPESP" – December 2000 – with four abstracts accepted.
- "52º Congresso Nacional de Botânica", in João Pessoa-PB, on July/2001 – with one participation.
- "X Simpósio Brasileiro de Sensoriamento Remoto", in Foz do Iguaçu-PR, Abril/2001 – with four participations, two posters and two oral presentations.
- "V Congresso de Ecologia do Brasil", in Porto Alegre-RS, next November/2001 – with four abstracts accepted.
- "II Simpósio do Programa BIOTA/FAPESP" – next December 2001 – with five abstracts accepted.

**6 - Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways of solving this lacunae problem.**

It has been quite difficult to find, in Brazil, botanical descriptions of the species, to correctly identifying the specimens. The way to solve: publishing, as soon as possible, the "Flora fanerogâmica do Estado de São Paulo". It has been difficult, also, to find specimens at herbaria of São Paulo state, to compare and identify some plant materials we collected. The way to solve: repatriation of images, at least, or information about plant species occurring in São Paulo state, and which types are deposited in herbaria in other countries.

**7 – Indicate geographical gaps knowledge within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem.**

Considering cerrado vegetation in São Paulo state, there are some regions where few or none botanical collections were made before, including: Vale do Paraíba, Baixo Paranapanema, Bacia do Rio Grande (border with Minas Gerais). The way to solve: priority to survey projects in those regions, to improve herbaria collections.

**1 - Project Title** - BIODIVERSITY CONSERVATION IN FRAGMENTED LANDSCAPES AT THE ATLANTIC PLATEAU OF SÃO PAULO (BRAZIL)

**2 – Coordinator(s)** – Jean Paul Metzger – IB/USP

**3 – HOMEPAGE** - <http://eco.ib.usp.br/lepac/biota-caucaia/>  
<http://cotianet.com.br/rmg/>

**4 - Number of records added to the SINBIOTA databank: 0**

**Obs. If no file has been added, please justify**

Identifications are still incomplete.

## **5 – Summary of Activities carried out between October/00 and October/01**

### **Project Aims**

The main objective of this project is to verify what spatial arrangement and which landscape elements are needed to maintain the biological diversity in fragmented landscapes from the Atlantic Plateau of São Paulo (23°35'S, 23°50'S; and 46°45'W, 47°15'W), by: i) describing the history of fragmentation and regeneration of the landscape; ii) relating fragment size and connectivity to species richness and diversity of some vertebrate groups, including reptiles, birds and small mammals; iii) relating the landscape structure with the presence/abundance of forest (meta)populations and modeling the survival chances of (meta)populations in fragmented forests; iv) analyzing the genetic variability of fragmented populations; v) investigating the ecological processes which determine the maintenance of populations in fragmented landscape, particularly those related with pollination, dispersion, use of corridors and matrix for inter-habitat movement; vi) developing a selection methodology for an efficient network reserve considering data on species richness, (meta)population extinction probabilities, genetic variability, habitat quality, fragment age, heterogeneity, size and connectivity; vii) diffusion of results in specialized journals and for non-specialists, particularly for children of public regional schools

### **Results**

- *Describing the history of fragmentation and regeneration of the landscape:* The interpretation of georeferenced aerial photographs (1/10.000) obtained in April 2000 is being carried out in order to determine the present land use and land cover pattern. With the final version of the map (December 2001), the quantitative analysis of landscape structure will be performed (before March 2002). Photographs from 1962 and 1981 were acquired in order to analyze the landscape dynamics. These photographs are being georeferenced and mosaicked. Seven successional forest classes will be considered in photointerpretation, in order to focus the analysis on the forest fragmentation and regeneration. In order to understand past and present landscape structure, relationships between the presence of forest with topographic/soil conditions and surveys with 39 landholders are being conducted.
- *Relating fragment size and connectivity to species richness:* Floristic surveys of trees with > 5cm DBH (Diameter at Breast Height) were accomplished in 6 areas inside the Morro Grande Forest Reserve (control area) and in 21 fragments: 5 large fragments (> 60 ha); 8 intermediate fragments (10-40 ha), 4 connected to

large fragments and 4 isolated; 8 small fragments (< 5 ha), 4 connected and 4 isolated. At the moment, identification problems are being solved. The effects of forest size and connectivity on seedlings density and composition were also considered in the case of large and intermediate fragments. First results showed that seedlings density was significantly greater in fragments than in continuous forest sites, but did not differ according fragment size and connectivity. Surveys for birds (with mist-nets and point counts), medium-large mammals (systematic transect censuses) and butterflies (with traps) are being carried out for large and intermediate fragments. Results obtained with mist-nets (600 hours/net per area) showed that fragmentation are leading to significant impoverishment in the understory bird community.

- *Relating the landscape structure with the presence/abundance of forest species:* For the moment, results were obtained mainly for birds. The play-back was tested as a method to detect the presence and absence of six birds species in fragments. Results showed that play-back surveys were more efficient for some species when used in the morning and midday (*Basileuterus leucoblepharus*, *Chiroxiphia caudata* and *Trogon surrucura*) and from July to October (*Batara cinerea*). A first survey with these species showed that they differed in their response to fragmentation. Two species were highly sensitive to fragmentation and were present only in the control area (*Carponis cucullatus* and *Triclaria malachitaea*), while others did not show any difference among areas (*Chiroxiphia caudata*, *Batara cinerea* and *Piriglena leucoptera*). *Trogon surrucura* showed significant differences in density with fragment size and *Basileuterus leucoblepharus* was more abundant in connected than in isolated fragments.
- *Analyzing the genetic variability of fragmented populations:* To understand the consequences of fragmentation on the genetic variability, blood or small tissue samples of birds and reptiles are being collected.
- *Investigating the ecological processes:* The influence of landscape connectivity on tree dispersal among fragments was tested in a pilot experiment. Seed traps of 0.50 m<sup>2</sup> were placed in two small (< 5 ha) fragments (one isolated and one connected), in a source fragment (250 ha) and in a corridor. First results showed significant differences in seed weight. Presently, seeds are being identified. The importance of fragment connectivity was also tested in the case of *Psychotria suterella* pollination. Field data was collected along the last raining season in the eight small fragments (< 5 ha) and in six areas of the Morro Grande Reserve. Data are being analysed.
- *Developing a selection methodology for an efficient network reserve:* A collaboration with the “Centre for Environmental Research” (UFZ) in Leipzig (Germany) is being established in order to test different methods of reserve selection.

*Diffusion of results:* In collaboration with a local NGO (“SELVA”) and with the municipality of Cotia, we prepared an educative booklet for local students with the first results of the project. The booklet presents a description of the local landscape, as well as the biological diversity of studied forests and the importance of its preservation.

## **6/7 - The results of this project do not deal with these questions**

**1 - Project Title** - STRUCTURE AND FUNCTIONING OF MESO AND MICROSCALE WATERSHEDS OF THE SÃO PAULO STATE: BASIS TO GENERATE AND SUSTAIN BIODIVERSITY

**2 – Coordinator(s)** - Luiz Antonio Martinelli & Epaminondas S. Ferraz – CENA/USP

**3 – HOMEPAGE** – <http://www.cena.usp.br/Biota/Bacias/Index.html>

**4 - Number of records added to the SINBIOTA databank: 0**

**Obs. If no file has been added, please justify**

No file has been added because our project does not deal with any organism

**5 – Summary of Activities carried out between October/00 and October/01**

Meso-scale:

- River biogeochemistry

We started field campaigns in October/00 and we are scheduled to finish this phase in March/01. Up to now we have already carried 12 campaigns from a total of 18. We sampled 14 sites in 6 meso-scale watersheds of the São Paulo State (Fig. 1).

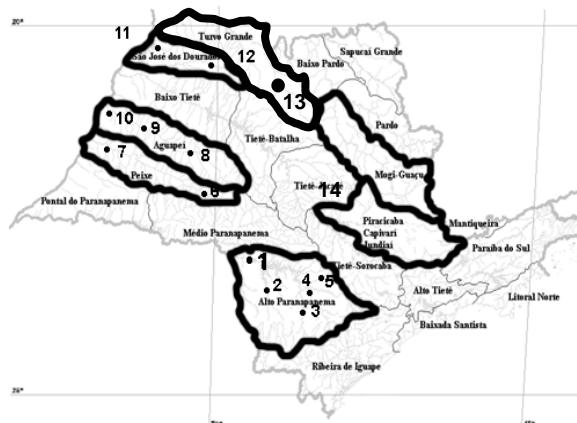


Figure 1. Sampling sites in meso-scale basins of the São Paulo State

- Geoprocessing

The Instituto Florestal do Estado de São Paulo made available for our project the georeferenced LandSat images of the following basins: Peixe, Aguaapé and São José dos Dourados. The Turvo and Alto Paranapanema images will be available in the end of this month (October). We expect to finish the land-use classification of these basins in the end of the next year (2002). It is important to mention that the land-use classification of the Piracicaba and Mogi-Guaçu basins were already done by other two Fapesp projects.

- Survey on heavy metal contamination in water, sediment, mollusks and fishes samples

We already conducted six water and sediment sampling to evaluate heavy metal concentrations (Hg, Cd, and Pb). We also collected approximately 200 mollusks and 100 fish's individuals in two periods (wet and dry season) in order to evaluate their heavy metal content. We expect to finish heavy metal analysis in the middle of the next year (2002).

### Micro-scale

- Stream biogeochemistry

We selected based on suggestion of other Biota projects 3 micro-scale basins in order to address effects of river functioning in aquatic biodiversity. The selected streams are located in parks and reserves of the São Paulo State (Table 1). We expect to start field campaigns in these basins in the beginning of the next year (2001)

Table 1. Selected micro-scale basins

Park	Area (ha)	Bacia Hidrográfica	Lat./Long.
Intervales	49.000	Alto Paranapanema	24°14'/48°27'
Morro do Diabo	33.845	Pontal do Paranapanema	22°22'/52°10'
Pé-de-Gigante	1.000	Mogi-Guaçu	

- Atmospheric composition

After a long waiting period, all equipments that we imported in order to sample rainwater and atmospheric aerosols finally arrived. We expect to install these equipments until the end of this year in the micro-scale basins listed in the Table 1.

### **6 - Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways of solving this lacunae problem.**

Not applicable to our project

### **7 – Indicate geographical gaps knowledge within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem.**

Not applicable to our project

**1 - Project Title** - STRENGTHENING OF THE BIOTASP INFORMATION SYSTEM AND STUDY OF THE DEVELOPMENT OF A GIS FOR THE PROGRAM

**2 – Coordinator(s)** – Dr. Carlos A. Joly – IB/UNICAMP & CRIA

**3 – HOMEPAGE** - <http://www.biota.org.br/sia>

**4 - Number of records added to the SINBIOTA databank:** 25 (historical data)

**5 – Summary of Activities carried out between October/00 and October/01**

### **Biota Information System (SinBiota)**

Several important changes were carried out in order to make SinBiota more portable and less dependent on commercial software. Major changes included:

- Changing the server Sun Ultra 10 (solaris) to an Intel/Linux server
- Changing the database server from Oracle 8.0 to PostgreSQL ([www.postgresql.org](http://www.postgresql.org))
- Changing the program website secondary databases to use XML and XSLT

The new database structure using PostgreSQL was developed based on the existing structure running on Oracle, including all 62 tables which were transferred. The system was thoroughly checked.

The Atlas/SP and the map server (developed with Visual Basic 6.0 and MapObjects) were modified in order to be able to work with the PostgreSQL database, forming an integrated system. The system was thoroughly checked.

Also, all the program website databases, such as collecting effort database, on-line version of Biota books, and others, were changed to use XML (eXtensible Markup Language) and XSLT (Extensible Stylesheet Language - Transformations) for information storage, management and presentation. They were originally developed using a proprietary word indexing system. The new implementation using XML technologies has reduced database maintenance cost and has added additional flexibility for data integration among internal and external systems.

The Intel/Linux servers were installed at Embrapa Informática Agropecuária ([www.cnptia.embrapa.br](http://www.cnptia.embrapa.br)) who is collaborating with the Reference Center on Environmental Information (CRIA), now responsible for developing and maintaining SinBiota's web site. Among the reasons involved in choosing Embrapa as host institution for the new SinBiota servers are: better computational infrastructure, faster and more stable connectivity to the Internet, and Embrapa's will to cooperate with CRIA on the project. The system is available at <http://www.biota.org.br/sia>.

### **Digital map base and Atlas Biota/SP**

The digital analysis of the orbital images taken from the *LANDSAT 1998-99* satellite has been completed based on the topographic maps of IBGE (Brazilian Institute of Geography and Statistics), with 416 sheets for the state of São Paulo at the scale of 1:50,000.

This procedure consists of photo interpretation, mapping, and quantification of the different phyto-physiognomy of the natural vegetation and reforestation. The phyto-physiognomies identified were: primary and secondary forests, 3 different kinds of savannah (“cerrado”, “cerradão” and “campo cerrado”), grassland, floodplain vegetation and mangrove. The reforestation was primarily identified by genus (*Pinus* and *Eucalyptus*) and then characterized by species.

The GIS system, at the 1:50.000 scale includes municipalities’ boundaries, urban perimeter, highway system, drainage, major contour curves and the data organized by municipality was grouped in accordance to the watersheds (22 in the state of São Paulo). For the Conservation Units the 1:10.000 scale has been used, with boundaries, highway system, contour curves, drainage and thematic layers (vegetation, geology, geomorphology, soils).

All the work has already been completed except for an analysis of digital color photos, at the scale of 1:20,000, taken between 2000 and 2001 in the Atlantic Forest region. These photos contain the most expressive vegetation remaining areas of Atlantic Forest. By the end of December this analysis will be ready and the on line maps up dated.

The BIOTA/SP Atlas has been organized in thematic layers so that any user can design his/her own maps with the data he/she considers necessary.

### **Historical data and the study of a “dictionary”**

Historical data, especially those related to the Mogi Guaçu Watershed, as recommended by the Scientific Advisory Committee (December, 2000), was included without altering the original names. According to the latest SAC report, the synonym update is an authors’ decision, who may agree or disagree with the new nomenclature. Thus, a nomenclatural update would ignore the authors’ authority on his/her own work. Furthermore, this procedure would imply in an endless updating routine in all species lists included in SinBiota, because taxonomic reviews are very common.

Taxonomic or nomenclatural update is a challenge not just to the BIOTA/FAPESP Program but to all information systems that work with species names as an information unit. One of the alternatives to diminish the problem of using non-reviewed taxonomic lists is the use of dictionaries based on scientifically recognized sources. Many initiatives are being developed such as Species 2000, GBIF (catalogue of life), ITIS, etc. The project staff at CRIA is studying the possibility of developing a tool for Angiospermae based on the species list of the Fapesp’s project “Fanerogamic Flora of São Paulo state”. The idea is to develop a tool that will check the lists submitted by the researchers indicating “names not found”, suggesting changes, etc. The dictionary would not change the original data automatically, it would recommend changes, something like a spell check which may or not be accepted by the user. Another use for the dictionary could be adding the valid name, the synonyms etc. to the typed name for searching purposes.

### **The BIOTA NEOTROPICA journal**

The BIOTA NEOTROPICA journal was totally developed in XML format and is available at the address: <http://www.biotaneotropica.org.br> Following what had been agreed upon in Intervalles, the journal accepts articles both in English and Portuguese but all papers, in all categories, must have a title, an abstract, and keywords in both languages. The journal has the following categories: editorial,

articles, inventories, thematic and taxonomic reviews, identification keys, short communications, points of view and thesis abstracts.

The BIOTA NEOTROPICA is a peer reviewed journal, using “ad hoc” referees in “double blind” system, and has been registered in the ISSN.

As far as implementation goes, the journal also uses XML and XSLT for information storage, management and presentation, allowing more flexibility and interoperability with other systems.

### **Publications database**

A database (developed on PostgreSQL) on publications resulting from the BIOTA/FAPESP program was structured following the suggestions of the Scientific Advisory Committee. Researchers may register the name of the articles or books, the name of the journals and the publication data of their research results in the BIOTA/FAPESP Program. Researchers may also register the abstracts of these publications and attach a copy of the full article if required.

### **Training**

Another suggestion of the Scientific Advisory Committee was to develop modeling tools. For this purpose, Ricardo Scachetti Pereira went to the University of Kansas for a training period of one year where he was able to learn and work with several different species’ modeling algorithms such as BIOCLIM (bioclimatic envelope), logistic regression and specially GARP (genetic algorithm for rule-set production). In cooperation with the University of Kansas, he reengineered GARP in order to make it more flexible and to allow its use on biodiversity research projects funded by United States National Science Foundation (NSF). The GARP toolkit, as well as other modeling packages, is now becoming ready for use by any interested collaborators participating on the BIOTA/FAPESP program.

**6 - Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways of solving this lacunae problem.**

Does not apply to our project

**7 - Indicate geographical gaps knowledge within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem.**

Does not apply to our project

**NEW PROJECTS  
STARTED AFTER OCTOBER/2000**

**1 - Project Title - BIODIVERSITY OF ENDOPHYTIC MICROORGANISMS AND THEIR BIOTECHNOLOGICAL POTENTIAL**

**2 – Coordinator(s) –** Itamar Soares de Melo – Embrapa Meio Ambiente  
João Lúcio de Azevedo – ESALQ/USP

**3 – HOMEPAGE -** [www.cnpma.embrapa.br/projetos/endofiticos/index.html](http://www.cnpma.embrapa.br/projetos/endofiticos/index.html)

**4 - Number of records added to the SINBIOTA databank: 0**

**Obs. If no file has been added, please justify**

The project has just started

**5 – Summary of Activities carried out between October/00 and October/01**

Endophytic bacteria and fungi are defined as organisms that live in association with plants for most if not all of their life cycles. They may confer benefits to the plant, and the benefits may be reciprocal, resulting in an enhanced symbiotic system for specific plant characteristics. Therefore, the use of endophytic bacteria, actinomycetes and fungi opens up new areas of biotechnological exploitations. Their biochemical versatility and diversity represent an enormous variety of genes that still unknown.

The project proposes to study the biological diversity of endophytic bacteria, actinomycetes and fungi ( considering both number of species and the partition of abundance ) from important species, such as: maize, soybeans, citrus, coffee, cassava, *Brachiaria* and *Dicksonia*; to study the molecular diversity based in comparative sequencing of the rDNA; to determine the chemical diversity, mainly of secondary metabolites ( antibiotics ); and to assess the potential of endophytes in the biological control of most important pests of the host plants.

**Summary of Activities**

The project was started early February of this year. During these last months it was done most of the collects in diferente geographic areas and isolation of microorganisms from most of plant species. So far, the species sampled were: 1) **coffee** (*Coffea arabica* and *C. robusta* ) with two collects, presenting 184 bacteria, 159 fungi and 9 actinomycetes.

2) **Corn** with three collects, presenting 370 bacteria, 70 fungi and 25 actinomycetes;

3) **Cassava** from four regions of São Paulo State; three Indian settlement comprising the high Amazon ( Rio Negro ) and low Amazon; and three Indian settlement of Patoxó, Bahia );

4) **Brachiaria** – four collects

5) **Citrus** – twenty three isolates of endophytic actinomycetes of *Citrus sinensis* and *Citrus reticulata*, based on 16S rDNA, indicating that the predominant community of endophytic actinomycetes of *Citrus* spp. is composed of *Nocardia nova*, *Nocardiopsis* sp. and *Streptomyces* spp.

6) **Soybeans** – One collect

7) **Dicksonia** - two collects

It was suggested to isolate microorganisms from ethnovarieties maintained in gardens for thousands of years by Brazilian Indians. Ethnovarieties represent a form of genetic resource, which must be preserved and conserved.

All bacteria and actinomycetes, isolated from maize ( *Zea mays* ) were assayed against the root pathogen *Phytophthora*, and screened for the production of antibiotics by bioautography. After that, the antibiotics will be tested against Gram-negative and Gram-positive bacteria.

The diversity of all bacteria associated is being investigated, using a bacterial 16S rDNA primer designed to amplify bacterial sequences.

At the end of the isolations all fungi will be identified by morphological characteristics and the diversity of species by RAPD ( Random Amplified Polymorphic DNA ).

The isolations were standardized for all plant species, recovering bacteria, actinomycetes and fungi from leaf, stem and root, having 3-6 plants per location.

One pos-doc ( André Lima ), supervised by Dr. João Lúcio Azevedo, got a scholarship from FAPESP to study the chitinase genes of endophytic bacteria and we had got three grants for Technical support ( one for Dr. Rosa Frighetto , one for Dr. Maria José Valarini and one another for Itamar Soares de Melo. Another student, Flávia Vieira Nunes, applied for a grant to study the biodiversity of endophytic bacteria of coffee.

**6 – Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways if solving this lacunae problem.**

It is believed the all aerobic bacteria isolated can be identified by gas chromatography of cellular fatty acids. We are acquiring the MIDI Microbial Identification System, with the databases of aerobes bacteria. It would be a good opportunity to acquire the library of Anaerobes and yeasts.

Other groups of endophytes deserve attention, within the Biota program such as yeasts and cyanobacteria.

**7 - Indicate geographical gaps knowledge within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem**

Actinomycetes and rhizobacteria hyperproducer of antibiotics growing in Cerrado soils also need more attention and should be stimulated.

**1 - Project Title** - DIVERSITY OF ARACHNIDS (EXCEPT ACARI) IN THE *PARQUE ESTADUAL DA CANTAREIRA*, SÃO PAULO - BRASIL (ARTHROPODA, ARACHNIDA)

**2 – Coordinator(s)** – Ricardo Pinto-da-Rocha

**3 – HOMEPAGE** - unavailable yet

**4 - Number of records added to the SINBIOTA databank: 217**

**Obs. If no file has been added, please justify**

**5 – Summary of Activities carried out between October/00 and October/01**

### **Project Summary**

The knowledgement of biodiversity has been acquire a great value in last years. However, this kind of studies are very scarce for arachnids, with a worst picture in the tropics were the highest diversity occurs. The arachnids are mainly generalized predators and play na important role in the food webs. They can be used as bioindicators of human interference in natural environmentals. Arachnids are very diversified, abundant and easy to found with simple methods. The aracnofauna has been searched intensively in the last 150 years. However, most of papers deals on descirption of new taxa. Only recently the biology of a few species began to be studied. A simple question on how many arachnid species living in a given area can not be answered with some confidence.

The taxonomists prioritized qualitative collectings without quantitative with standart methods. The sampling effort and methods used were explicitly in just a few papers. These avoid the comparision among studies. The recent protocol proposed by Coddington et al. (1991) claimed attention to the resolution of several questions on diversity.

The main objectives of this work are: estimate the richness of Cantareira and compare it with other areas; compare the diversity between three areas with different degrees of human interference; study the similarity between Cantareira fauna and other areas; compare the effiencie of short time with long time projects.

### **Material & methods**

The *Parque Estadual da Serra da Cantareira*, São Paulo State, Brazil is the largest urban forest in the world with 7,916.52 hectares. The region is covered by Atlantic Rain Forest and totally surrounded by urban development of São Paulo city and counties. In some areas, the forest was cut down 60-100 years ago and replaced by *Coffea arabica* and other plantations.

Sampling is being carried out every two months, since August 2000, in three areas with different degrees of environmental impact: a Central area, with 60 years of forest regeneration; *Pedra Grande*, with 40 years of forest regeneration; and *Pinheirinho*, where only mild impact has occurred (only some of the largest tree species were removed). The following collecting methods (see Table I for sampels analysed in this poster) are being used: pitfall traps made by cups of 500 ml (50 traps/area, 7 days every two months); Winkler extractor (1 m<sup>2</sup> x 20 samples, every two months); beating tray (16 samples/area every two months); nocturnal manual search (12 samples/area, every two months). Species richness estimatives will be

presented for ACE, ICE, Chao 1, Chao 2, Bootstrap, Jackknife 1 and Jackknife 2 methods (performed with EstimateS 5.01 computer program).

Tab. I. Number of arachnid samples, analysed samples, valid samples (with at least one adult), specimens and species of Araneae, collected during August- 2000 and June-2001, in the Parque Estadual da Cantareira.

	Samples/ total	Samples/ analysed	Valid samples	Adults	Species
Pitfall	900	300	43	103	30
Winckler	180	60	11	20	7
Nocturnal	216	74	74	536	120
Beating	288	88	88	669	106
Total	1676	522	216	1328	217

## References

- CODDINGTON, J.A.; C.E.GRISWOLD; D. SILVA-DÁVILA, E. PENÁRANDA & S.F. LARCHER. 1991. Designing and testing sampling protocols to estimate biodiversity in tropical ecosystems. in: Dudley, E.C. (ed.) *The unity of evolutionary biology: proceedings of the Fourth International Congress of Systematic and Evolutionary Biology*. Dioscorides Press, Portland, 44-60.
- PINTO-DA-ROCHA, R. 1999. Opiliones. In: Brandão, C.R.F. & E.M. Canello (eds). Volume V. Biodiversidade Terrestre. Síntese do Conhecimento ao final do século XX. (Joly, C.A. & C.E.M. Bicudo). São Paulo, FAPESP, 35-44 p.

## Results

Project will be concluded at the end of November 2002. During the first year I concluded my the collectings at the Parque Estadual da Cantareira. I obtained 1676 samples (900 from pitfall, 180 from winckler extractor, 216 h of noturnal collecting, 288 from beating). I analyzed only the material from first and second trips and found 217 species of spiders, 1 of scorpion and 14 of opilionids. The estimatives of spiders diversity are between 250 and 340 species. However, the addiction of identifications of four last trips will change this picture.

Web page on the project and presenting pictures of most representative arachnids of Cantareira will be accessible at December 2001.

One student, Carlos Leandro Firmo, will end his first year of FAPESP scholarship grant (Fapesp #00/11325-8) in January/2002 (project on soil spiders of Cantareira, M.Sc. degree). Another student, Cibele Braganolo (Fapesp # 01/03033-0), began her grant on IC in October/2001 on maintence of arachnid collection of the Museu de Zoologia da Universidade de São Paulo).

## Abstracts published:

1. PINTO-DA-ROCHA, R.; C.L. FIRMO; C.A RHEIMS & A D. BRESOVIT. 2001. Diversity of arachnids of Parque Estadual da Serra da Cantareira, São Paulo, Brazil. In: XV International Congress of Arachnology.
2. PINTO-DA-ROCHA, R. 2001. Brazilian cave Opiliones. In: XV<sup>th</sup> International Symposium of Biospeleology. Fazenda Intervales, São Paulo.

3. NIERI-BASTOS, F.A; R. PINTO-DA-ROCHA & S.E. FAVORITO. 2001. Estudo dos ectoparasitas de roedores (Mammalia) no Parque Estadual da Cantareira, São Paulo, Brasil. **In:** I Congresso Brasileiro de Mastozoologia, Porto Alegre.

Papers published or submitted:

1. ROCHA, L.F.S.; G. SESSEGOLO; & R. PINTO-DA-ROCHA. 2001. Análise dos impactos ambientais do Gasoduto Brasil/Bolívia na Gruta da Ermida, Almirante Tamandaré/PR. **In:** ROCHA, L.F.S.; K.L. OLIVEIRA & G.C. SESSEGOLO (eds.). Conservando Cavernas. Quinze anos de Espeleologia. GEEP-Açungui. Curitiba. p. 91-104.
2. PINTO-DA-ROCHA, R.; G. SESSEGOLO 2001. Estudo da fauna da Gruta de São Miguel I, Serra da Bodoquena (MS), como subsídio para o plano de manejo. **In:** ROCHA, L.F.S.; K.L. OLIVEIRA & G.C. SESSEGOLO (eds.). Conservando Cavernas. Quinze anos de Espeleologia. GEEP-Açungui. Curitiba. p.123-134.
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4. G. SESSEGOLO; V. THEULEN; L.F.S. ROCHA & R. PINTO-DA-ROCHA. 2001. Conservação e manejo da Gruta da Lancinha, Rio Branco do Sul/PR. **In:** ROCHA, L.F.S.; K.L. OLIVEIRA & G.C. SESSEGOLO (eds.). Conservando Cavernas. Quinze anos de Espeleologia. GEEP-Açungui. Curitiba. p.173-194.
5. PINTO-DA-ROCHA, R.; G. MACHADO & P. WEYGOLDT. 2001. Two new species of *Charinus* Simon, 1892 from Brazil with biological notes (Arachnida; Amblypygi; Charinidae). *Journal of Natural History*, 39 (12):

**6 - Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways of solving this lacunae problem.**

The most diversified families at P.E. Cantareira as Theridiidae and Salticidae have a very unsatisfactory. The BIOTA project on arachnids (coordinator A D Brescovit) will bring especialistas in these groups to study these families.

**7 – Indicate geographical gaps knowledge within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem.**

My project deals on a specific locality. The gaps on arachnid distribution will be mentioned by Biota-Arachnida program.

**1 - Project Title** - FISH DIVERSITY OF THE STREAMS AND HEADWATERS OF THE RIO RIBEIRA DE IGUAPE IN STATE OF SÃO PAULO

**2 – Coordinator(s)** – Osvaldo Takeshi Oyakawa – Museu de Zoologia - USP

**3 – HOMEPAGE** - [http://www.mz.usp.br/biota\\_fapesp\\_ribeira.htm](http://www.mz.usp.br/biota_fapesp_ribeira.htm)

**4 - Number of records added to the SINBIOTA databank: 0**

**Obs. If no file has been added, please justify**

No records have been added until now in order to check the names of many taxons that have been collected during the field expeditions. This will be done during the last 2 months (June and July) of the first semester of 2002, when the field expeditions are finished.

**5 – Summary of Activities carried out between October/00 and October/01**

### **Project Summary**

The Rio Ribeira de Iguape rises on the northeastern of Paraná State and flows into the ocean on the southeastern of the São Paulo State. Its main tributary are the rivers Juquiá, São Lourenço, Jacupiranga, Pardo and Una da Aldeia. The Rio Ribeira de Iguape Basin, situated at coordinates 23° 45'S / 46° 45'W e 25° 30'S / 49° 48'W, is inside the greater remnant of the Atlantic Forest of Southeastern Brazil. Ten Conservation Units among Parques Estaduais and Estações Ecológicas are found inside the area of Rio Ribeira de Iguape Basin

The Atlantic Forest, is restricted today of Southeastern and South Brazil along the coast mainly due to difficulties of access to the irregular terrain of the Serra do Mar mountain range more than for any other reason, taking in to account that this is the region with the greatest economic and population growth of the country.

One of the main characteristics of the fish fauna of the Ribeira de Iguape Basin, as well as of the other hydrographic basins in the Atlantic Rain Forest, is the high degree of endemism, as a result of both vicariance and dispersal events. Bizerril (1994) in a study of fish distribution of all the coastal drainage of Eastern and Southeastern Brazil, suggested that about 70% of the species of this area are endemic. The information about faunistic composition, distribution and ecology of fishes of this area are scattered and based on misidentified species, making difficult studies about distribution, diversity and endemism of species. The lack of this basic information give rise to another serious problem that is the difficulty to evaluate endangered species.

Deforestation and many other kinds of human activities cause the reduction of allochthonous food present in the riparian vegetation, increase of the sun light, and silting of the streams reducing the habitats for fishes.

The number of fish species in the Atlantic Forest is about 350, the great majority (around 250) inhabiting the South and Southeastern Brazil. This number is indeed underestimated, since many environments in these regions are poorly, or even not sampled at all for fishes. In this respect, the Ribeira de Iguape River Basin is not much different from the remaining hydrographic systems of South and Southeastern Brazil.

The area of the Ribeira de Iguape River Basin encloses 44 municipalities of the states of São Paulo and Paraná; and a preliminary inventory carried out in the

Fish Collection of the Museu de Zoologia – USP, showed that only 17 municipalities are sampled. Notwithstanding many areas are unsampled, we estimate that approximately 90 species of fishes, distributed in 13 families, occurs in this basin.

As in other Brazilian hydrographic systems, the fish fauna of the main river is relatively well known. There we can find, for example, the “trairões” (*Hoplias lacerdae*), “traíras” (*Hoplias sp.*), “bagres” (*Rhamdia sp.*), “cascudos” (*Hypostomus agna*, *H. interruptus*, and *Hypostomus sp.*). The great gap in the knowledge of the Ribeira, as well as in the other hydrographic systems in South America, is the streams and headwaters, which are inhabited by small size fish species (less than 12 cm in standard length).

The main goal of this project is to increase the knowledge of the ictiofaunistic composition of the Rio Ribeira de Iguape drainage, based on the study of the taxonomy and geographic distribution of the fishes. To perform this objective, during the first 18 months, 9 field trips will be made in all of the 10 Conservation Units established in the region and other places of the drainage which are poorly sampled or unsampled for fishes.

The immediate results of this project will be: a) ichthyological knowledge of one of the least known regions of the São Paulo State; b) production of scientific publications such as: new taxa description, revisionary monographs, catalogs; c) production of a handbook and field guides dedicated mostly to non scientific people; d) increment of the fish collection of the Museu de Zoologia – USP and other main scientific fish collections of the São Paulo State.

## Results

During this period we conducted 6 field expeditions to the following Conservation Units and other localities: Parque Estadual Turístico do Alto Ribeira (PETAR), Parque Estadual Carlos Botelho, Parque Estadual de Jacupiranga, Parque Estadual da Campina do Encantado, Parque Estadual de Intervalos, Parque Estadual da Serra do Mar (Nucleus of Pedro de Toledo and Itariri) and Ribeirão Poço Grande (municipality of Juquiá); 91 localities of 18 municipalities were sampled, 6 of which have never been sampled before.

We collected 8402 specimens belonging to about 71 species, distributed among Orders in percentages: Characiformes (45,93%), Siluriformes (42,72%), Cyprinodontiformes (9,40%), Perciformes (1,57%) and Synbranchiformes (0,06%). About 450 slides (photographic documentation) of the fishes and the environment were produced

## 6 - Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways of solving this lacunae problem.

The lack of knowledge of the fish fauna of the Ribeira Basin is mostly at the species level. A preliminary survey of the Fish Collection of the Museu de Zoologia – USP, and data from our field expeditions to the region revealed the presence of about 21 species probably new to Science. Many of these new species will be described soon. On the other hand, there are in the Ribeira Basin some problematic genera like *Rineloricaria*, a Loricariid fish with about 60 nominal species distributed throughout South America, two of which in the Ribeira region: *Rineloricaria lima* and *R. kronei*. Their taxonomic status will also be investigated.

**7 – Indicate geographical gaps knowledge within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem.**

Since the project is mostly concentrated in streams and headwaters areas of the Rio Ribeira Basin, the collecting activities should be extend to others parts to increase the knowledge of the entire basin.

**1 - Project Title** - FISHES AND FISHERIES IN ATLANTIC FOREST OF THE SOUTH OF SÃO PAULO STATE (BRAZIL)

**2 – Coordinator(s)** – Dr. Walter Barrella – Pontifícia Universidade de São Paulo/PUC

**3 – HOMEPAGE** - <http://www.biota.org.br/projeto/aprovados/pesca>

**4 - Number of records added to the SINBIOTA databank: 0**

**Obs. If no file has been added, please justify**

The project has just started field campaigns.

### **5 – Summary of Activities carried out between October/00 and October/01**

In the long one of the seasonal period, experimental fisheries, as well as field analysis of environmental conditions are accomplished in the studied area. The fish captures are carried through using two sets of 10 gillnets each, with standardized dimensions (10m of size for 1,5m of height) and different sizes of meshes that change of 3 the 12 cm of opposed knots. Circular fishing net, sieves and fishing rod also it was used with standardized efforts for the attainment of comparable qualitative and quantitative information between itself. A preliminary species diversity analysis was made based on the relative abundance of the species. Until the gift it had been captured 575 fishes of 63 species, being 40 sea species and 23 freshwater species. The index of diversity of Shannon gotten for total collection was of 3.4, which evenness is 0.82. The bagre-urutu (*Genidens genidens*) was the species most abundant with 68 captured individuals, followed for sagüiru (*Cyphcharax santacatarinae*), traíra (*Hoplias malabaricus*) and mandi-pintado (*Pimelodus maculatus*) with 53, 47 and 44 individuals respectively. Traíra was the biggest weight species of capture (32,7Kg), as well as that it presented greater average weight, size average standard (0,697kg and 31,46cm) and the biggest captured fish (45,5cm). The morphological analysis of eight species was possible to detected less active species as caborja (*Hoplosternum littorale*) and traíra (*Hoplias malabaricus*), and most active species as cará (*Geophagus brasiliensis*), saicanga (*Oligosarcus hepsetus*), piava (*Leoporinus copelandii*), sagüiru (*Cyphocarax santacatarinae*), tambiú (*Astyanax bimaculatus*) and lambari (*Deuterodon Iguape*). Another aspect observed was head and mouth form. The carnivorous fishes have large and frontal mouths such as traíra and saicanga. Small heads and mouths are typical of fishes that feed vegetables or organic substance as piava, caborja, tambiú, lambari and sagüiru. Tambiú and lambari possess bodies with very similar forms suggesting one high overlapping of its niches. The analysis of the stomach content of 66 individuals of 14 species detected its alimentary preferences. Sagüiru (*Cyphocharax santacatarinae*), a freshwater species, showed exclusive preference for the silt. Others six species had shown partial preferences for the silt, together with insects, crustaceans and vegetal material. In this as group it has 4 freshwater species (caborja - *Hoplosternum littorale*, mandi *Rhamdia quelen*, mandzinho *Pimellodella transitoria*, and piava *Leoporinus copelandii*) and 2 sea species (bagre-urutu - *Genidens genidens* and vento-leste - *Hemicaranx amblyrhynchus*). A third group formed for species with exclusive preference for vegetables is composite for two freshwater species (cascudo - *Hypostomus* and cascudo-viola – *Loricariichthys castaneus*) and a marine species (emborê *Dormitator maculatus*). In other group of

the fish eating fishes is formed by four freshwater species (traíra *Hoplias malabaricus*, trairão - *Hoplias lacerdae*, saicanga *Oligosarcus hepsetus* and mandi-pintado *Pimelodus maculatus*). It was possible to verify alimentary variation in the mandi-pintado collected in the different rivers. In Suamirim River the fishes presented fish (30%), vegetal material (30%) and insects (30%) in its digestive tubes, while in the other rivers such species was typically carnivorous.

Community similarity analysis showed that twelve sampled localities were divided in two great groups of environments, one in the freshwater and another one of brackish water. The freshwater environments are Juquiá, Peropava, Pariquera-Açu, Una-da-Aldeia rivers, with fish communities similar to that joined one in the Ribeira de Iguape River. Una-do-Prelado, Suamirim and Guarau are brackish rivers and owed fish communities similar to those sampled in Porto Cubatão and Ariri, located in the lagoon system of Cananéia. The influence of the tides with the input and mixture of salty water was the more important ambient factor for the division of these communities of fish. Water pH, temperature and the amount of total dissolved solids were others abiotic factors for the formation of these groups on this localities.

The fishery description is gotten through the accomplishment of interviews with local and sportive fishermen. Until the moment, 234 fishermen had been interviewed, where 99 artisan fishermen and 145 sportive ones. The main fishing areas are situated in the estuaries on Peruíbe and Iguape cities, as well as in the lagoon system of Cananéia. There are five thousand artisan fishermen and an increasing number of sportive fishermen originated of the great urban centers. The biggest concentration is located in the estuary of Ribeira de Iguape River. In some areas, the uninhabited local are leaving artisan fishery and changing their activities to capture live fishing bait or to give jobs as fishery guide to tourist fishermen. Summer (December the March) is the main time to robalo (*Centropomus* sp) fishery and while winter is better to tainha (*Mugil* sp) fishery. The sportive fishermen are men, with age between 40 and 60 years old, possess high social and economic level and of school degree. Despite this, they do not have fishery license neither respect the minimum sizes of fish capture determined by laws, carrying through predatory fisheries of young fishes. Robalo (*Centropomus* sp) is the searcher species, followed for the pescada-branca (*Cynoscion leiarchus*) and for badejo (*Mycteroperca bonaci*). In the inward of the basin, artisan fishery is in frank decay due the supplies reduction of manjuba (*Anchoviella lepidentostole*). On the other hand, it sportive fishery is increasing and it comes being carried through from intense form manly in Registro, Sete Barras and Juquiá cities, where other species are also captured, over all of the introduced ones for the escapes of the fish cultures, such as pacu (*Piaractus mesopotamicus*), piapara (*Leporinus* sp) and the carp-common (*Cyprinus carpio*), are also captured.

Peruíbe city presented the biggest tourist infrastructure with 686 habitation units, representing 38% of the total in the studied region, while that São Lourenço da Serra is city with the lesser number of habitation units (12hu = 0.66%). The infrastructure of bracket to sportive fishery understands the equipment and jobs that the inns offer better to take care of the fishing tourists. The equipment divides in: pier, fishery store, ice machine, fish market for storage and cleanness of the captured fish, as well as garage for tourist boats. The jobs offered are: live fishing bait supply, equipment lease, and boat maintenance and fishery guide. Despite the increasing demand, it has a small structure of bracket to the tourism fishing boat. However, the cities of Iguape, Cananéia, Ilha Comprida, Juquitiba and Juquiá had

presented equipment sportive fishery bracket. The localities of Porto Cubatão and Ariri in Cananéia and Barra do Ribeira in Iguape are distinguished due its specialized hotels and inns.

**6 - Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways of solving this lacunae problem.**

Fish farming is an increasing activity in the region. A preliminary stack with more than 200 fish farmers was congregated through information yielded for the state and federal agencies of ambient licensing, as well as for the two regional cooperatives of aquiculture. Forty-five fish farms had been visited, where it verified the use of 48 exotic fish species. Tilapia-do-Nilo (*Oreochromis* sp), pacu (*Piaractus mesopotamicus*), tambaqui (*Colossoma macropomum*) the common carp (*Cyprinus carpio*), the carpa-capim (*Ctenopharyngodon idella*), carp-head-great (*Aristichthys nobilis*) and some species of the genus *Brycon* sort as matrinxã, piracanjuba and piraputanga are principal species. The main objective of fish farming is the fattening, followed for the aperture of fish-pays. Escapes of fish had been told in 85% of the interviews. Some species had colonized the river environments successfully, but impacts still not evaluated.

**7 – Indicate geographical gaps knowledge within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem.**

The floodplain of Ribeira de Iguape River and the Iguape-Cananéia Estuarine-Lagoon Complex are ecosystems with high environmental heterogeneity translated by the presence of different types of habitats, such as estuaries, saline fens, rivers, fertile valleys, quagmires and swamp. The ecotone land-freshwater-sea shelters a high diversity fish community. Despite the intense artisan and sportive fisheries practiced, the relationships between biotic and environmental proprieties in these habitats still little known.

**1 - Project Title - DIVERSITY AND CONSERVATION OF THE REPTILE FAUNA IN THE SOUTHEASTERN ATLANTIC FOREST**

**2 – Coordinator(s) – Denise Maria Peccinini Seale – IB/USP**

**3 – HOMEPAGE - In preparation**

**4 - Number of records added to the SINBIOTA databank: 0**

**Obs. If no file has been added, please justify**

Our field trips have been almost every 15 days and our work in the laboratory has been intensive. As soon as possible, we will be including our records to the SINBIOTA databank

**5 – Summary of Activities carried out between March/01 and October/01**

Activities during the period March,15, 01/October,15,01:

- Several undergraduate and graduate students are being trained; some of them are engaged in work already in progress.
- Two specialized technicians are in training also.
- Field trips for collecting reptiles occurred in the Serra de Paranapiacaba, Serra do Mar and Restingas.
- Collections were made by active search through trails, looking under fallen logs and rocks, through pitfalls and with the help of the local population in these areas.
- Besides reptiles, we collected many species of amphibians during our day and night active search through the trails and through 10 pitfalls which were installed near a stream in the Parque Estadual Intervales, Serra de Paranapiacaba.
- Serra do Mar and Restingas showed a larger number of lizards, than snakes and several spiders and opilions.
- Reptiles collected between March 15,01 and October 15,01 – see Table I

**TABLE I.** Reptiles collected between March 15,01 and October 15,01. First field trip occurred March, 2001 to Parque Estadual Intervales, SP with no reptiles collected. Legends: N = number of collected animals; Locality = study areas.

TAXON	SPECIES	N	LOCALITY	PERIOD OF THE YEAR FIELD TRIPS
<b>SERPENTES</b>				
<b>Colubridae</b>				
	<i>Liophis miliaris</i>	2	Bertioga, SP	May / 2 <sup>a</sup>
	<i>Liophis poecilogyrus</i>	1	Parque Est. Intervales, SP	September / 6 <sup>a</sup>
		1	Parque Est. Intervales, SP	September / 8 <sup>a</sup>
	<i>Echivanthera bilineata</i>	2	Bertioga, SP	May / 3 <sup>a</sup>
<b>Viperidae</b>				
	<i>Bothrops jararaca</i>	1	Parque Est. Intervales, SP	August / 5 <sup>a</sup>
		1	Parque Est. Intervales, SP	September / 6 <sup>a</sup>
		1	Ubatuba, SP	September / 7 <sup>a</sup>
		2	Parque Est. Intervales, SP	September / 8 <sup>a</sup>
	<i>Bothrops jararacussu</i>	1	Bertioga, SP	May / 3 <sup>a</sup>
		1	Parque Est. Intervales, SP	September / 8 <sup>a</sup>
<b>Elapidae</b>				
	<i>Micrurus coralinus</i>	1	Parque Est. Intervales, SP	August / 5 <sup>a</sup>
<b>SAURIA</b>				
<b>Gekkonidae</b>				
	<i>Gymnodactylus.</i>	11	Bertioga, SP	May / 2 <sup>a</sup>
	<i>darwini</i>	9	Ubatuba, SP	October/ 9 <sup>a</sup>
	<i>Hemidactylus</i>	3	Bertioga, SP	May/ 2 <sup>a</sup>
	<i>mabouia</i>	3	Ubatuba, SP	October/ 9 <sup>a</sup>
<b>Gymnophthalmidae</b>				
	<i>Placosoma glabellum</i>	1	Parque Est. Intervales, SP	June / 4 <sup>a</sup> .
		1	Parque Est. Intervales, SP	August / 5 <sup>a</sup> .
		2	Parque Est. Intervales, SP	September / 6 <sup>a</sup> .
		1	Parque Est. Intervales, SP	September / 8 <sup>a</sup> .
<b>Teiidae</b>				
	<i>Tupinambis merianae</i>	1	Ubatuba	October/9 <sup>a</sup>

**6\* - Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways of solving this lacunae problem.**

**7\* – Indicate geographical gaps knowledge within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem.**

6,7 – We found more amphibians than reptiles, indeed, due to the periods of the year when we had our field trips, autumn and winter time. So, we have begun to study the amphibians with Dr. Radenka Batistic, a specialist on Cytogenetics of Amphibians. Beyond this, we invited specialists on Systematics and Taxonomy of Amphibians, Dr. Ulisses Caramaschi and Dr José P. Pombal Jr from the Museu Nacional do Rio de Janeiro, RJ to work as collaborators in our project.

With Drs. Caramaschi's and Pombal's help and Dr. Batistic's expertise it will be possible to extend our project to include the systematics and genetics of amphibians in the southeastern Atlantic Forest. This extension would be useful as it would close a gap in the present Biota Program. Our proposal to the new title of our project would be Diversity and Conservation of the Herpetofauna in the southeastern Atlantic Forest.

Other participants for Amphibian research would be: Drs. Carlos Frederico D. Rocha e Monique Van Sluys , Universidade Estadual do Rio de Janeiro(UERJ), specialists on Ecology, M.Sc. Renato Feio, Museu Nacional do Rio de Janeiro, working on Biology and Systematics and

Dr.Flavio Baldissieri as specialist on Genetic Diversity of Amphibians who worked with cytogenetics, enzymes and molecular methods. We intend to be in contact with other specialists and researchers of Amphibians.

**1 - Project Title** - THE BIODIVERSITY OF REPRODUCTIVE MODELS CHARACTERIZED IN SPECIES TO BE PRESERVED IN THE SAO PAULO STATE. STRUCTURES AND HANDLING OF THE REPRODUCTION, PLACENTA AND PLACENTATION.

**2 – Coordinator(s)** – Maria Angélica Miglino and Pedro Primo Bombonato – FMVZ/USP.

**3 – HOMEPAGE** - [www.fmvz.usp.br/biotavet](http://www.fmvz.usp.br/biotavet)

**4 - Number of records added to the SINBIOTA databank: 0**

**Obs. If no file has been added, please justify**

The project started in September/2001.

**5 – Summary of Activities carried out between September/01 and October/01**

This project general objective is to study some morphological aspects of the urinary and reproductive male and female organs as well as their correlation with gestation. In this latter topic (gestation), particular attention will be given to the morphology and evolution of the embryonic annexes and the maternal accessory elements. The species to be studied in this project include rodents (*Dasyprocta aguty*, *Hydrochoeris hydrochoeris*, *Agouti paca*, *Kerodon rupestris* and *Calomys callosus*), Edentates (*Bradypus*), Suidae (*Tayassu tajacu*, *Tayassu pecari* and *Sus acrofa scrofa*), felidae (*Leopardus tigrinus*) and primates (*Leontopithecus*). Gathering new knowledge on the reproductive behaviour is essential to preserve these species.

Into sub-project 01/RODENTS - 1) SOME CHEMICAL CHARACTERISTICS OF THE FETAL FLUIDS IN AGOUTI (*Dasyprocta sp*) AND MOCÓS (*Kerodron rupestris*) we investigated levels of glyose (Gly), cholesterol (Chol), calcium (Ca), creatine (Cre), urea (Ure), total protein (TP), present in the amniotic and allantoic fetal fluids of mocós and cutias and found:

- Amniotic fluid from cutias- Gly –54.33; Chol- 21.37; Ca- 7.20; Cre- 0.91; Ure- 13.58, TP- 31.55 and from mocós- Gly-44.6; Chol-21.62; Ca-7.18; Cre-0.46; Ure-35.46; TP-37.01.

- Allantoic fluid from cutias- Gly-58.67; Chol-20.74; Ca-7.39; Cre-0.96; Ure-16.02; TP-31.92 and from mocós - Gly-52.20; Chol-21.33; Ca-6.75; Cre-0.37; Ure-31.75; TP-33.95.

The results obtained confirmed the chemical composition of the fetal fluids is different and their concentrations determine the maternal-fetal metabolic activity.

Now we are finishing the behavioral aspects of agouti (*Dasyprocta aguti*); the morphology and vascularization of agouti placenta. We began the microvascularization of *Agouti placenta*; morphology of male reproductive tract, *Dasyprocta agouti*; Development of the agouti testis (*Dasyprocta agouti*) with 0-14 months; morphology of female genital tract, *Dasyprocta agouti*; morphology of capybara female genital tract (*Hydrochoerus hydrochoeris*); arterial vascularization of the uterus and uterine tubes; macroscopic and microscopic study of mature capybara placenta (*Hydrochaeris hydrochaeris* - Carleton, m. d. 1984); wild animal experimental breeding; biotechnology applied for capybara dairy and breeding (*Hydrochoeris hydrochoeris*); morpho-functional aspects of male reproductive tract in capybara (*Hydrochoeris hydrochoeris*); morphological aspects of the placenta and

fetal annexes of paca (*Agouti paca*, l. 1766); ultrasonographic accompaniment of pregnancy in pacas -(*Agouti paca*, l. 1766); topographic and morphology relationship of *Agouti paca* ovary, l. 1766; morphology of *Agouti paca* male reproductive tract, l. 1766; morphological analysis of the placenta of paca (*Agouti paca* l.1766). study with light microscopy and transmission electron microscopy; the fetal membranes of *Agouti paca* l. 1758; gross and microscopy study of moco placenta, *Kerodon rupestris* (Wied, 1820) in collecting material phase; development of ectoplacental cone in *Calomys callosus*;

Into sub-project 02 – bradipoides, we worked with the sloth placenta, *Bradipus variegatus*, Shinz, 1825 and found that morphological aspects of the placenta were investigated by means of analysis of diagrams of models by fixation with the aim of identifying the placental morphology. It was observed that the sloth placenta is composed of polygonal lobes that occupy the *chorium* in the uterine cavity in a diffuse manner and possessed fractions, which separated the placental mass, surrounded by membranes across which ran vessels that established a connection with the principal mass of the organ. Other lobes were seen to be entirely isolated from the principle mass, here, the vessels established a direct connection with the umbilical cord. The hilus placental region varied from 3 mm (animal 1), 5 mm (animal 3) in diameter and was situated at the margin of the placenta, the region characterized by the presence of larger placental lobes. The umbilical cord was inserted in the dorsal region of the median sagittal plane of the uterus, in the basal region at the placental margin in the left antimere. The fetal membranes identified as chorion at the uterine surface of one side adhered to the fine and delicate amnion on the other side. The chorio-amniotic junction was found at a distance from the uterine wall, leaving it smooth. Microscopical analysis of the organ demonstrated that capillaries of defined morphology, presenting hypertrophied endothelial cells with abundant cytoplasm, represented the maternal element. These vessels were perpendicular arranged to the maternal-fetal interface. In the fetal components it was not possible to identify the cellular limits of the syncytiotrophoblast. The sloth placenta may be classified as labyrinth, endotheliochorial, multiple, discoid (at term) and chorioamniotic.

And now, we begin the study of gross and microscopy anatomy of sloth male reproductive tract (*Bradypus variegatus*).

Into sub-project 03 – Tayassuidae and Suidae, we worked with the collared peccary (*Tayassu tajacu* Linnaeus, 1795) and white-lipped peccary (*Tayassu pecari* link, 1795) placenta were studied. in six placentae of pregnant peccary obtained immediately after slaughter and fixed by immersion in 4% paraformoldehyde and 2.5% glutaraldehyde in 0.1m-phosphate buffer, for light, transmission and scanning electron microscopy analysis. For light microscopy, the specimens were embedded in paraplast or historesin (Ikb). The microvascular architecture was studied with vessels casts prepared from de maternal, fetal and combined maternal and fetal sides. The placenta of *tayassuidae* is chorioalantoid, the chorionic sac is fusiform and its surface is covered with folds and small areolas. The transversal sections show the presence of the trophoblast and maternal epithelium, characterizing the epitheliochorial placenta. The trophoblastic epithelium is columnar and contains polarized cells with cytoplasm in the apical polo and material pas + in the basal polo, and the maternal eosinophilic epithelium is cuboidal. Both of epithelium is richly vascularized with capillaries near the epithelia. The fetal and maternal capillaries are plentiful and they come near to the uterine epithelium and trophoblast. in areolar

region the capillaries are more evident under the uterine epithelium. The vascular architecture of endometrial and fetal ridges and troughs develop into a crosscurrent to countercurrent materno-fetal blood interrelationship.

Now, we are working with the morphology of the ovaries, uterine tubes and uterus in collared peccary (*Tayassu tajacu*, Linnaeus, 1758) and white lipped peccary (*Tayassu pecari*, Link, 1795). And the morphology of cateto (*Tayassu tajacu* Linnaeus 1758) e queixada (*Tayassu pecari* Link 1795) male reproductive tract. A new investigator at another Suidae is with the morphology of *sus scrofa scrofa* male reproductive tract and gross and microscopy anatomy of *sus scrofa scrofa* placenta.

Into sub-project 4 – Felines we are working with sonographic and functional evaluation of *Leopardus tigrinus*' kidneys and into sub-project 5 – Primates with pelvimetric study in black lion tamarin by radiographic examination.

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AMORIM, M. J. A.A.L., MIGLINO, M. A. **A placenta da preguiça, *Bradypus variegatus*, Shinz, 1825.** Tese de Doutorado, 78p., Faculdade de Medicina Veterinária e Zootecnia, USP/SP –2001.

SANTOS, T. C., MIGLINO, M. A., MACHADO, G. V. **Vascularização dos ovários, tubas uterinas e útero em catetos (*Tayassu tajacu*, Linnaeus, 1758) e queixadas (*Tayassu pecari*, Link, 1795).** *Braz. J. Vet. Res. Anim. Sci.*, vol.37 no.4., 2001.

Machado; G.V., Gonçalves P.R.; Parizzi; Miglino M. A.; Santos T. C. **Blood supply of the coendou (*Sphiggurus spp. Cuvier, 1825-(RODENTIA:MAMMALIA)* uterus and ovaries.** Archives of veterinary Science v.6,n.1,p.32-42, 2001

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CAVALCANTE-FILHO, M.F.; MIGLINO, M.A.; CARVALHO, M.A.M.; NEVES, W.C.; ARRIVABENE, M. Irrigação da glândula adrenal em cutia dourada (*Dasyprocta aguti*, Rodentia). **Veterinária Notícias**, (aceito p/ publ.)

#### Book:

Modes of Reproduction in the Elasmobranchs of Brazil. HAMLETT, W.C.; FERRI, A.G.; **MIGLINO, M.A.** In: Reproductive Biology of South American Vertebrates, Springer-Verlag, 3-18, 1992

**O cervo do Pantanal de Porto Primavera - “Resultado de dois anos de pesquisa Jaboticabal: FUNEP, 2001-CD-Rom.** MACHADO, M.R.F.; ARAÚJO, M.L.; ARTONI, S.B.; BARGUE CRUZ, C.; FERRAZ, R.H.S.; MELO, A.P.F.; MIGLINO, M.A.; PACHECO, M.R.; SOUZA, N.T.; SOUZA, W.M. **Morfologia do cervo do Pantanal (*Blastocerus dichotomus*).** In: Duarte, J.M.B

**6 - Indicate knowledge gaps within the taxonomic(s) group(s) you are working with and suggest ways of solving this lacunae problem.**

We are working with male and female reproductive morphology of some Rodents, Suidae, Taiassuidae, Felines and Primates that nothing is found into references. This knowledge will increase reproductive date for improve these wild animals breeding and preservation of these species.

**7 - Indicate geographical gaps knowledge within the taxonomic(s) group(s) you are working with and suggest ways of solving this problem.**

Rain forest of Sao Paulo State have some natural areas of these animals, however wild animals breeding spread by the state trying to produce and preserve these animals beyond other states like Piauí Federal University – PI, Uberlândia University – MG, Paraná Federal University, Rio de Janeiro Federal University and Agriculture School of Mossoro. In the complementation of the agreement and the spreading of relative information about Wild specie's Biology of the Reproduction, with intention to know the biodiversity of the State of Sao Paulo, divulging these knowledge on the viviparidade and the species that need to be preserved in our environment.

**1 - Project Title** - FLORISTIC AND COMMUNITY STRUCTURE OF ELEVEN SEMIDECIDUOUS FOREST FRAGMENTS AT ENVIRONMENTAL PROTECTION AREA OF SOUZAS AND JOAQUIM EGÍDIO, CAMPINAS – SP

**2 – Coordinator(s)** – Luiza Sumiko Kinoshita and Flávio A. Maes dos Santos - IB/UNICAMP

**3 – HOMEPAGE** - <http://www.unicamp.br/ib/botanica/fragmentosflorestais.html>

**4 - Number of records added to the SINBIOTA databank: 14**

Fourteen records have presently been included to the SINBIOTA databank. Some records however have a few taxa not identified at species level, which will be included afterwards

**5 – Summary of Activities carried out between October/00 and October/01**

The main purpose of this work is to deal with some questions referring to the ecosystem fragmentation, which will be made by means of an analysis of the floristic composition, forest structure and the distribution of tree species in eleven forest fragments located in Campinas (22°45' to 23°00' S, 47°00' to 47°12' O), state of São Paulo, SE Brazil. The study area comprises the Environmental Protection Area of Souzas and Joaquim Egídio. In this area, the conservation of regional biota depends entirely on the retention and management of the small forest remnants. By studying such fragments we can take lessons for conserving diversity in the future. The growing need for the use of criteria to improve the conservation of these areas requires a clear understanding of the fragmentation effects and the present situation of the remnants.

Forest fragmentation has been currently related to deleterious effects over the biotic communities. Such effects would be: species loss, increasing rates of damaged or dead trees and a proliferation of lianas or vines. The extent of these alterations has been mainly associated to the size of the forest remnants. It has been said that small fragments often have fewer species recorded for the same effort of observation than large fragments or areas of continuous forest.

In order to investigate a few of the questions raised in this discussion, eleven fragments of the semideciduous forests, floristically similar, were chosen: ten of the fragments have an area between 10 and 65 hectares (ha) and one fragment of 238ha, that was used as a control area. The fragments smaller than 65ha were grouped in three classes: 10-15ha (small), 16-25ha (medium) e 35-65ha (large).

Tree community survey was performed using the point-centred quarter method. For each sampling point were included trees with diameter at breast height (DBH)  $\geq$  5cm and DBH  $\geq$  10cm. Thus we obtained two data sets containing 500 individuals each. The first set keeps hold of the individuals with DBH  $\geq$  5cm, while the other takes the individuals with DBH  $\geq$  10cm.

In each fragment, 125 sampling points were surveyed. In the control fragment three surveys of 125 sampling points were made, in three distinct areas. Each sampled tree was classified, according Oldeman (1989), as *tree of the future* (or potential tree which are young and/or growing individuals), *trees of the present* (adult individuals) or *trees of the past* (damaged or dying individuals). Moreover, it was recorded if the canopy was infested by lianas or vines for each sampled tree.

The collection of floristic and phytosociological data has presently been concluded in all fragments. Till now the data were partially analysed for the samples that included only the individuals with DBH  $\geq$  10cm. A total of 251 species were found, distributed in 58 families. The number of species for each sample of 500 individuals ranged from 47 to 106 species. The species richness in most fragments did not present any variation when compared with the control, revealing 90 species in average. Two samples showed a much lower richness: a small fragment with 47 species and the biggest one presented only 65 species.

The amount of individuals infested by lianas was also similar for most samples. However, in the smallest fragment, the percentage of infested trees was equivalent to half of that shown in the other samples. It is important to stress that this fragment revealed species richness similar to the others.

In most samples the proportion of dead or damaged individuals (*trees of the past*) varied between 30 and 40%. A single fragment, the biggest one, presented twice of the percentage of those observed in the other samples.

Considering the analysed data, the variation found among samples did not seem to be related to the size of the fragments. Indeed, other factors may be associated to the observed variations, such as: history of the preservation, spatial species distribution and preferences for specific environmental conditions. In addition, the preliminary analysis indicated that some species occurred exclusively in one fragment. This fact associated with the differences of the species richness among samples, emphasize the importance of conserving all the existent semideciduous forest remnants, since a relevant portion of the biodiversity of this ecosystem might be spread in such small isolated fragments.

In the next step we intend to make a global analysis of the collected data and the acquaintance of more qualitative and historical information about the fragments. A set of hemispherical photographs will be taken from the sample points in two seasons of the year. This analysis yields to estimate the variation of canopy openness according to the season and to identify a possible relationship between the occurrence of deciduous trees and lianas proliferation. The history of the preservation of each fragment will be investigated by means of aerial photographs and interviews with the local populations, in order to find out the occurrence, in the past, of perturbation factors such as fire, timber extraction and others human disturbances, that could be associated with the loss of species in some fragments and/or the maintenance of richness in others.

## **6 - Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways of solving this lacunae problem.**

We could indicate lack of taxonomic revisions in Myrtaceae, Annonaceae, Euphorbiaceae, Icacinaceae, Mimosaceae, Celastraceae and Rubiaceae. In other groups we found some revisions as thesis without being published. In addition, we would suggest that vegetative characters might be added or emphasized in the taxonomic treatments as the reproductive ones. Our experience in the field showed that these characters are important to identify many species though they have been neglected by the taxonomists in general.

**7 – Indicate geographical gaps knowledge within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem.**

This present work is local and available geographical data have been enough to our proposal.

**1 - Project Title** - DIVERSITY, DYNAMICS AND CONSERVATION IN SÃO PAULO STATE FORESTS: 40HA OF PERMANENT PARCELS

**2 – Coordinator(s)** – Ricardo Ribeiro Rodrigues - ESALQ/USP.

**3 – HOMEPAGE** – Not available yet

**4 - Number of records added to the SINBIOTA databank: 0**

**Obs. If no file has been added, please justify**

The project has just started.

**5 – Summary of Activities carried out between July/01 and October/01**

**Abstract:** The project "Diversity, dynamics and conservation in São Paulo State Forests: 40ha of permanent parcels" will be carried out in four Conservation Units (P. E. da Ilha do Cardoso, E. E. de Carlos Botelho, E. E. de Caitetus, E. E. de Assis), representing the four main forest formations of São Paulo State (Restinga Forest, Slope Atlantic Forest, Semideciduous Seasonal Forest and Cerradão). 256 permanent sub-parcels of 400m<sup>2</sup> will be placed in each area, in a major parcel of 320x320m, totalizing 10.24ha of represented area in each area and 40.96ha at the four areas. The major parcel in each area will be placed using images produced by multispectral videography. In each sub-parcel all specimens with PAP bigger or equal to 15cm will be sampled, georeferenced and identified. In each represented area soil (three depths in each parcel ) and topography (1:500 scale) will be characterized in detail; a continued characterization (4 years) of weather, ground water and light will be carried out, considering all units of the forest mosaic, and also a characterization of the microbial soil fauna, through the 16S rDNA profile produced by DGGE method. A characterization of the species occurring in each area (in various forms of life) will be carried out, and illustrated guides for field recognition of each forest species sampled will be elaborated. The structure will be characterized with two phytosociological, physiognomic and sylvigenic surveys, with intervals of 3 years between them and the spatial distribution will be estimated through K function. Literature models of generation and maintenance of biodiversity and forest dynamics will be tested for the community and species and compared between the areas. The vegetational data will be correlated with physical data of each area, between areas, in order to understand the difference between the vegetational types and adequate practices of management and conservation. The data will be also compared with those generated in permanent parcels for typically tropical formations.

**6 - Indicate knowledge gaps within the taxonomic(s) groups(s) you are working with and suggest ways of solving this lacunae problem.**

Not applicable to our project

**7 – Indicate geographical gaps knowledge within the taxonomic(s) groups(s) you are working with and suggest ways of solving this problem.**

Not applicable to our project

**1 - Project Title** - PHYSIOGNOMIC-ECOLOGICAL UNITS ASSOCIATED TO THE REMNANTS OF THE NATIVE VEGETATION OF THE STATE OF SÃO PAULO

**2 – Coordinator** - João Batista Baitello and Francisco José do Nascimento Kronka - Instituto Florestal/SMA

**3 – HOMEPAGE** – [www.biota.org.br/sia/atlas](http://www.biota.org.br/sia/atlas)

**4 - Number of records added to the SINBIOTA databank: 0**

**Obs. If no file has been added, please justify**

No file has been added because our project does not collect organisms

**5 – Summary of Activities carried out between October/00 and October/01**

The project is improving the vegetation legend of the BIOTA/FAPESP maps, using the RADAMBRASIL classification system that mapped the potential physiognomic-ecological vegetation units. This procedure consists of photo interpretation, mapping, and quantification of the different phyto-physiognomy units of the natural vegetation and reforestation.

In the 70's a major effort was done to develop a system to classify Brazilian vegetation units in accordance to international patterns/names. This project, RADAMBRASIL, produced printed maps of the potential vegetation units using the scale 1:250.000. Unfortunately, the results for the State of São Paulo were never published.

The potential physiognomic-ecological units of the RADAMBRASIL 1:250.000 sheets were mapped using climatic, geomorphologic and pedologic data to predict the original vegetation that covered the area before anthropogenic changes. São Paulo State RADAMBRASIL sheets are: Franca (SF.23-V-A), Ribeirão Preto (SF.23-V-C), Campinas (SF.23-Y-A), São Paulo (SF.23-Y-C), Guaratinguetá (SF.23-Y-B), Santos (SF.23-Y-D) and part of Ilha Grande (SF.23-Z-C) and Volta Redonda (SF.23-Z-A). With this information it is possible to improve the classification of the remnants mapped with the satellite images.

The 1:250.000 sheets were obtained from IBGE (Brazilian Institute of Geography and Statistics) and converted into a digital format. The conversion of the legends of the 1:50.000 maps started focusing on the Atlantic Forest areas, because they are the major remnants of native forest. Color aero-photographs, taken at the end of the year 2000 and beginning of 2001, at the 1:35.000 scale are also being used to improve this work.

Considering the stage and speed of the development of the work we plan to finish legend conversion by the end of March 2002.

**1 - Project Title - INVENTORY METHODS FOR TREE SPECIES BIODIVERSITY**

**2 – Coordinator(s) – Hilton Thadeu Zarate do Couto - ESALQ/USP**

**3 – HOMEPAGE - <http://mq.esalq.usp.br/biota>**

**4 - Number of records added to the SINBIOTA databank: 0**

**Obs. If no file has been added, please justify**

No file has been added because the project does not deal with any organism.

**5 – Summary of Activities carried out between January/01 and October/01**

The project began on January/2001. During these 10 months the sampling grids were installed in all study areas: 3 grids in Carlos Botelho State Park, 3 grids in Caetetus State Reserve and 2 grids in Assis State Reserve. Each study area is a forest formation and the grids were located in different forest types. The field crews have begun to install the first type of sampling units, that are 10x90m rectangular plots. Plot installation includes: marking plot limits, tagging individual trees (DBH > 5cm), measuring trees' DBH and a preliminary species identification. About 3000 trees have been measured, but identification is only preliminary and material collection is reduced in this phase of the project, therefore no records were added to the SINBIOTA databank yet. Videography images have been taken on Carlos Botelho State Park and Caetetus State Reserve and preliminary image analyses have been done. Four graduate students have begun their programs with research projects related to this project: two at a masters program and two at a doctoral program. Most of their times was expended on the course work necessary to fulfill credit requirements, but they are also doing field work and are deeply involved with the data collection, include the videography data.

**6. Indicate knowledge gaps within the taxonomic(s) group(s) you are working with and suggest ways of solving this lacunae problem.**

Several projects in the BIOTA/FAPESP program are dedicated to tree species. Although lianas, shrubs and forest herbs are not distinct taxonomic groups, they are different life forms with particular ecological attributes necessary to understand the relation between ecological processes and biodiversity. We think that more attention should be given these life forms.

**7. Indicate geographical gaps knowledge within the taxonomic(s) group(s) you are working with and suggest ways of solving this problem.**

Vegetation classification is not directly related to geographical occurrence of taxonomic groups of plants, but a classification system is important to understand geographical patterns of biodiversity. Currently, the IBGE classification system is the most used system in São Paulo State. This system was developed to Brazil as a whole and we feel that a more detailed system should be developed to São Paulo State. The BIOTA/FAPESP program is an ideal circumstance to discuss this matter, because detailed information about the flora and fauna of the State is being collected and this information and the experience of the researchers in the program could be use to improve the current vegetation system.

**1 - Project Title - MONITORAMENTO E AMPLIAÇÃO DO BANCO DE GERMOPLASMA DE PLANTAS MEDICINAIS DO CERRADO**

**2 – Coordinator(s) – Ana Maria Soares Pereira – UNAERP/Ribeirão Preto**

**3 – HOMEPAGE - not available yet**

**4 - Number of records added to the SINBIOTA databank: 0**

**Obs. If no file has been added, please justify**

**5 – Summary of Activities carried out between February/01 and October/01**

Report not delivered in time to enter the Annual Report.

**1 - Project Title** - SÃO PAULO ENVIRONMENTAL ATLAS PROJECT. PHASE 1:DIAGNOSIS AND BASIS FOR THE DEFINITION OF PUBLIC POLICIES FOR SÃO PAULO'S GREEN AREAS

**2 – Coordinator(s)** – Harmi Takiya – Secretaria do Verde/Prefeitura de São Paulo

**3 – HOMEPAGE** - [http://www.prodam.sp.gov.br/svma/atlas\\_amb/index.htm](http://www.prodam.sp.gov.br/svma/atlas_amb/index.htm)

**4 - Number of records added to the SINBIOTA databank: 0**

**5 – Summary of Activities carried out between October/00 and October/01**

This project constitutes the first stage of the Environmental Atlas of the city of São Paulo, the cartographic product of the Environmental Information System, which will be implemented in the City of São Paulo, in medium term.

What one intends to obtain is the diagnosis for all the Municipality, in regional scale, with detailing of major interest areas of vegetation, associated with socioeconomic aspects, with land use and occupation, and with environmental characteristics, as a support for public policies, for the increase and conservation of green areas. Known technics such as cartography, remote sensing and geographic information system are being adopted.

In the beginning of September of this year, a partial report has been handed to FAPESP, in which there were theme maps already prepared within the scope of the project, as follows:

- Administrative geopolitic base map
- Image map (satelite processed image)
- Vegetation map
- Vegetation distibution map
- Natural climate units map
- Surface's aparent temperature map
- Predominant land use map (according to fiscal units)
- Geologic map
- Population socioeconomic profile map

In the Vegetation map was presented information pertaining to wildlife and vegetation, which is being inserted in the Environmental Information System – SINBIOTA. Up to the present, 296 registrations have been inserted, all of which will have to be re-inserted, due to the re-formatting of the system. 1702 registrations of wildlife and 2035 registrations of vegetation are already formatted for insertion in the SINBIOTA system.

As for the preliminary results, it has been observed from the Vegetation and Vegetation distribution maps, the need for more effective housing and environmental control policies, as 75% of the vegetation classified as significant and still existent in the city are located in areas under intensive occupation pressure (Campo Limpo, Capela do Socorro, Jaçanã-Tremembé and Perus), which are clandestine, for the most part, and which are characterized as low buiding standard, vegetation removal, and earthwork.

The city of São Paulo has today a significant deficit of public spaces and vegetation, a situation which is hard to revert, considering that in the consolidated urbanization regions there are no more public areas for the implementation of new parks, as it has already been detected in previous studies. In the regions of urban expansion, the majority of lots with arboreous vegetation are privately owned and, therefore, more susceptible to clandestine housing subdivision.

As regards the inventory of wildlife, it has been possible to identify 313 species of wild animals, 8 of which are fish, 21 amphibians, 28 reptiles, 214 birds and 90 mammals, thus revealing that the city of São Paulo, despite its adverse conditions, has a significant wildlife biodiversity for urban environments, offering adequate sites for the nesting, feeding and breeding of animals, which justifies even more the preservation of the existing areas as well as the creation of new ones.

From the analysis of the Population socioeconomic profile map, it has been demonstrated that, as regards the spacial distribution of the resident population, the city of São Paulo does not differ significantly from the existing standard of other world metropolises. It presents in its more central part an area extensively occupied by horizontal and vertical housing, associated with the medium and high strata of the population. In the interior of this area, it is noticeable the presence of an older nucleus, whereby life conditions are under a deterioration process. The remaining districts, as they distance themselves from this large area, progressively show a decrease in socioeconomic standard, reaching the worst levels in the bordering districts, which end up forming extensive spots of poverty within the municipal territory.

The preliminary results show a good correlation between the information generated in the Surface temperature and Vegetation cover maps, as the poorly vegetated areas coincide with those of higher temperature.

The Temperature map also reveals that the classic idea of large central city areas behaving as heat islands, must be more carefully considered, as colder areas have been observed within the boundaries of the consolidated urbanized mass. Such phenomenon may be explained by the concentration of areas with predominantly vertical occupation which are responsible for the temperature attenuation, as they are heavily shaded, with urban "canyons" configuration and unhealthy microclimates.

**Acknowledgement:** We are grateful to the Professors of the University of São Paulo: Teodoro Isnard Ribeiro de Almeida, José Roberto Tarifa, Waldir Mantovani and Gustavo Armani.

**6 - Indicate knowledge gaps within the taxonomic(s) group(s) you are working with and suggest ways of solving this lacunae problem.**

Concerning the vegetation and wildlife we have identified the following gaps:  
- families: orchidaceae, asteraceae, solanaceae, rubaceae, cyperaceae, araceae  
- amphibian

We suggest training/courses with specialists groups who are working in the BIOTA Program.

**7- Indicate geographical gaps knowledge within the taxonomic(s) group(s) you are working with and suggest ways of solving this problem.**

Inventory of vegetation gaps:

- East area of São Paulo
- Pico do Jaraguá (State Park, North area of São Paulo)
- Parque do Estado (State Park, South area of São Paulo)

There are already studies carried out at Pico do Jaraguá and Parque do Estado, that could be integrated to the BIOTA PROGRAM.