



## PALEONTOLOGICAL TOURISM AT SANTA MARIA CITY, SOUTHERN BRAZIL: POTENTIAL *VERSUS* REALITY<sup>1</sup>

(With 6 figures)

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**ABSTRACT:** The central region of the State of Rio Grande do Sul has a great potential for the development of paleontological tourism due to the rich and diverse Triassic fauna. A thoughtful and responsible tourism may help to protect the paleontological patrimony, if linked to educational activities and based on a project where public and private institutions operate in an integrated form.

**Key words:** Paleontological tourism. Scientific tourism. Ecotourism. Santa Maria. Brazil.

**RESUMO:** Turismo paleontológico na cidade de Santa Maria, sul do Brasil: potencial *versus* realidade.

A região central do Estado do Rio Grande do Sul possui grande potencial para a implementação do turismo paleontológico, graças a uma rica e diversificada fauna triássica. Um turismo correto e consciente deve ajudar na proteção desse patrimônio paleontológico, se ligado a atividades educativas e a um projeto integrado entre as instituições públicas e privadas.

**Palavras-chave:** Turismo paleontológico. Turismo científico. Ecoturismo. Santa Maria. Brasil.

### INTRODUCTION

The central portion of the State of Rio Grande do Sul, southern Brazil, is known for the Triassic vertebrate fauna and plant fossils (*e.g.*, SCHULTZ *et al.*, 2000). The evolution of early dinosaurs (COLBERT, 1970; BONAPARTE *et al.*, 1999; LANGER *et al.*, 1999; LEAL *et al.*, 2004; BITTENCOURT & KELLNER, 2005) and mammalian cynodonts (BONAPARTE & BARBERENA, 1975; BONAPARTE *et al.*, 2003) are important highlights of that paleontological record. The occurrence of the *Dicroidium* flora in these sedimentary rocks constitute a significant link for the reconstruction of Gondwana (BORTOLUZZI, 1974; GUERRA-SOMMER *et al.*, 1999; GUERRA-SOMMER & KLEPZIG, 2000), and further contribute to the studies on the early evolution of conifers (GUERRA-SOMMER & SCHERER, 1999; PIRES *et al.*, 2005) and the climatic shift from semi-arid to more humid conditions at the end of the Triassic (PIERIN *et al.*, 2002; HOLZ & SCHERER, 2000).

The geologic, climatic, tectonic, and paleobiologic events that occurred at the end of the Triassic can be used as educational tools for the understanding of evolution. Paleontological tourism, integrated education and protection of the fossiliferous patrimony are also important tools for the

improvement of the local socio-economic framework (CARVALHO & DA ROSA, this volume).

In this paper, the potentials and reality of the implantation of paleontological touristic activities at the city of Santa Maria, southern Brazil, is discussed.

### PALEONTOLOGICAL TOURISM

There is no formal definition of paleontological tourism. It is certainly a "trip to the past", a specific type of scientific tourism, and related to ecotourism (SENAC, 1988a,b; CARVALHO, 2004). The paleontological tourism is a form of interaction between the tourist (individually or in a group) and the paleontological knowledge of a certain region, as part of the understanding of evolution. This search for a mixture of scientific knowledge and pleasure is currently done at museums, parks, and on guided fieldtrips (SANTOS & DA ROSA, 2001).

Museums of natural history are the best option for people who are interested in paleontological and/or scientific tourism, as fossil can be seen in a planned and acclimatized visiting circuit environment. Two good examples are the Field Museum (Chicago, USA), which displays permanent and temporary exhibits based on fossils collected

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by its research teams from all over the world, and the British Museum of Natural History (London, UK), scientific home of Charles Darwin, which presents fossils from the beginning of life on Earth up to the human modifications done on our planet, which is already regarded as a “mass extinction” event by some.

Very rich fossiliferous sites can be protected *in loco*, what happens in parks or centers, where the visitor can see fossils still outcropping from the original sedimentary rocks. The Dinosaur National Monument (Utah, USA) is one example where the fossiliferous exposures are preserved under a building that was transformed into a visiting center. In some specific cases, tourists are allowed to join scientific expeditions, where they can explore new sites and collect fossils, which end up housed in the promoting scientific institutions.

Among South American museums and parks, there is only one case of scientific expedition for tourist. Many museums of natural history are old-fashioned or in need of adequate conservation of their permanent exhibits (KELLNER, 2004). One of the exceptions is the Museu Paleontológico Egidio Feruglio (Trelew, Argentina), that was recently transferred to a new building, totally planned to allocate research labs and a new exhibit. In the Centro Paleontológico Lago Barreales (CEPALB), of the Universidad Nacional del Comahue, Patagonia, Argentina, tourists are allowed to participate in excavations of fossils. It is estimated that CEPALB receives more than nine thousand visitors per year (PERINI, 2004).

In Brazil, there are several science or natural history museums, that can easily receive hundreds of thousands visitors per year. On the other hand, small local museums are trying to renew their exhibits, with or without scientific supervision. Very recently, some important fossiliferous sites have turned into paleontological parks, where protection, education and tourism were integrated (CARVALHO & DA ROSA, this volume) as follows: Centro de Pesquisas Paleontológicas Lewellyn Ivor Price (Peirópolis, State of Minas Gerais); Monumento Natural Vale dos Dinossauros (Sousa, State of Paraíba); Parque dos Pterossauros (Santana do Cariri, State of Ceará); Centro Paleontológico de Mafra (Mafra, State of Santa Catarina); Museu Paleontológico de Taubaté (Taubaté, State of São Paulo); and Parque Paleontológico de Itaboraí (Itaboraí, State of Rio de Janeiro). Another interesting initiative is the

proposition of virtual (*e.g.*, in the internet) geological and paleontological guided tours: the *Caminhos Geológicos*, at Rio de Janeiro/RJ, produced by the Departamento Nacional de Produção Mineral; and the *Excursão Virtual da Serra do Rio do Rasto*, hosted at the Companhia de Pesquisa dos Recursos Minerais – Serviço Geológico do Brasil’s homepage.

At the State of Rio Grande do Sul (RS), southern Brazil, there is a regional project that envisions the creation of a Paleontological Route, integrating several municipalities of the central portion of the state, which are rich in animal and plant fossils (Fig.1). This project intends to improve the rate of local development, provide paleontological knowledge to the respective community, and help to protect the paleontological patrimony (fossils and fossiliferous sites). More than fifteen municipalities are part of the Paleontological Route, in an area about 300km long and 30km wide, including the world known fossiliferous sites of São Pedro do Sul, Santa Maria, and Candelária. The federal and state roads are already signaled, but there is a general lack of information pointing to museums or other tourist attractions in the cities.

Some information on the geological and paleontological importance of the area will be here presented, as well as the present infrastructure for paleontological tourism, as a basis for the discussion on specific needs for its implementation.

#### GEOLOGY AND PALEONTOLOGY OF THE CENTRAL REGION OF RIO GRANDE DO SUL STATE

The central portion of RS is located over Triassic sedimentary rocks of the Paraná Basin (Fig.2). The following formal units represent the Brazilian Triassic (ANDREIS *et al.*, 1980): Sanga do Cabral Formation (Early Triassic), Santa Maria Formation (Middle to Upper Triassic), and Caturrita Formation (Upper Triassic). Approximate ages are based on the correlation of the vertebrate faunas (BARBERENA, 1978; BARBERENA *et al.*, 1985, 1991, 1993; SCHERER *et al.*, 1995; SCHULTZ *et al.*, 2000) and imprints of the *Dicroidium* Flora (BORTOLUZZI, 1974; GUERRA-SOMMER *et al.*, 1999; GUERRA-SOMMER & KLEFZIG, 2000).

In terms of sequence stratigraphy, the Santa Maria and Caturrita formations are grouped into the Sequence II (FACCINI, 2000), Supersequence Gondwana II (MILANI *et al.*, 1998), a Carnian-Eonorian Sequence (SCHERER *et al.*, 2000) or the Santa Maria Supersequence (ZERFASS *et al.*, 2003).

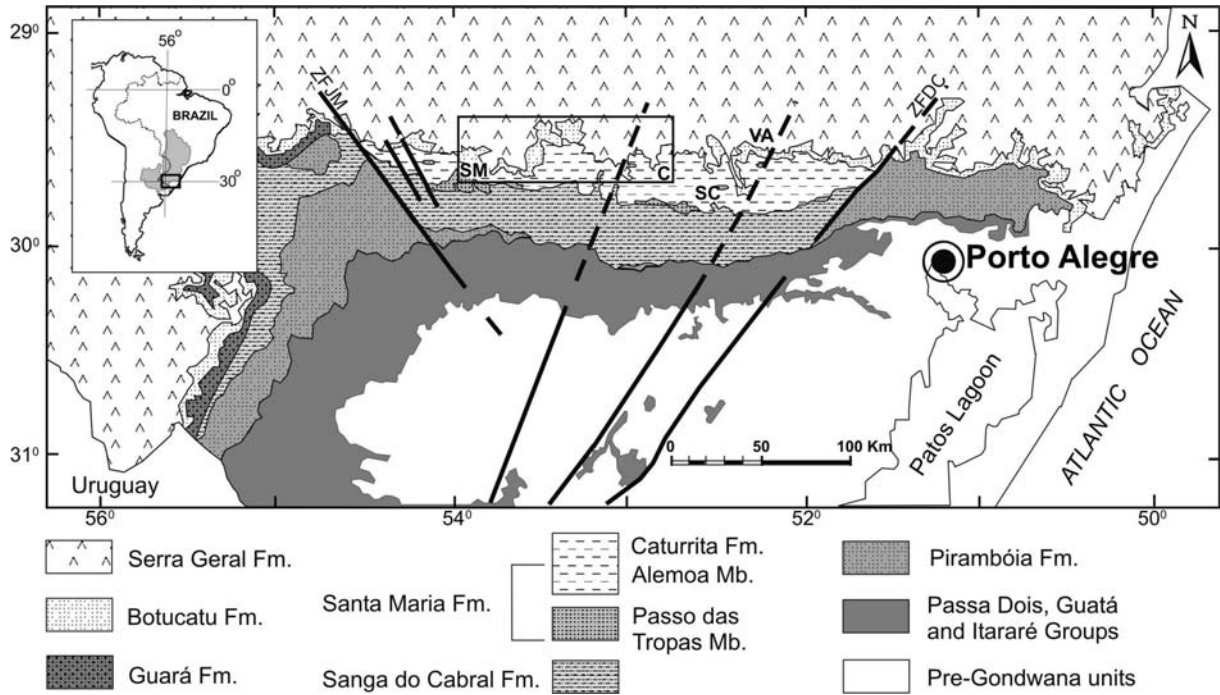


Fig. 1- Location of the central region of the State of Rio Grande do Sul, in the context of Paraná Basin (modified from DA ROSA & FACCINI, 2005).

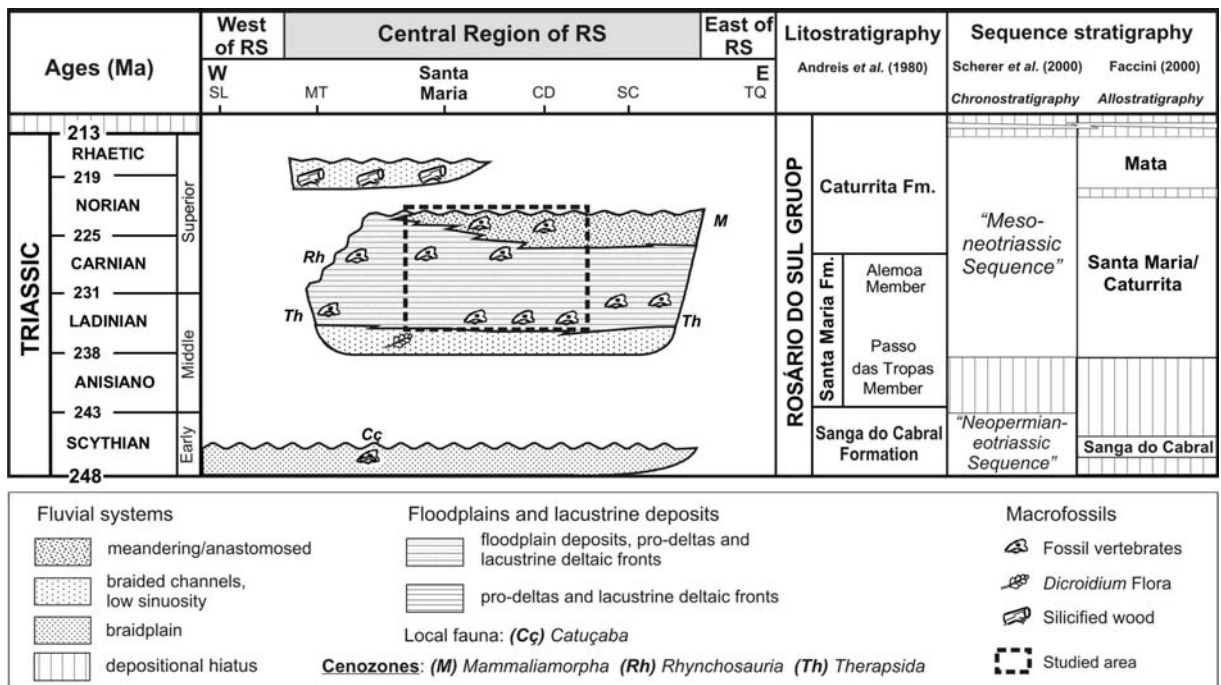


Fig. 2- Schematic diagram of the stratigraphic relations and fossiliferous associations of analyzed lithologies (modified from DA ROSA & FACCINI, 2005).

In lithostratigraphic terms (and relevant to biostratigraphy), the Santa Maria Formation is subdivided into (ANDREIS *et al.*, 1980): Passo das Tropas Member, formed by coarse to medium sandstones that were deposited in moderate sinuosity channels (FACCINI *et al.*, 2003), and the Alemoa Member, characterized by reddish mudstones, deposited on floodplains, with carbonate paleosoils, aeolian siltstones (*loess*) and secondary sandy channels (DA ROSA, 2005).

Fossil vertebrates at the Alemoa Member were known since the beginning of the XX Century (BELTRÃO, 1965; HUENE, 1990; SCHULTZ, 1995). The leaf imprints of the *Dicroidium* Flora, exclusive to the Passo das Tropas Member (BORTOLUZZI, 1974; GUERRA-SOMMER *et al.*, 1999; GUERRA-SOMMER & KLEPZIG, 2000); and the invertebrate fossils also registered to the Passo das Tropas Member (GALLEGO, 1996, 1999; KATOO, 1971; PINTO, 1959) for stratigraphy, evolution, and paleogeography (Tab.1).

The fossil content of the Santa Maria Supersequence (*sensu* ZERFASS *et al.*, 2003) may be subdivided into cenozones, based on the abundance of certain fossil vertebrates (BARBERENA, 1978; BARBERENA *et al.*, 1985; BARBERENA *et al.*, 1993; SCHERER *et al.*, 1995; SCHULTZ

*et al.*, 1994; SCHULTZ *et al.*, 2000; ABDALA *et al.*, 2001; RUBERT & SCHULTZ, 2004). The following progressively younger cenozones are recognized (Tab.2): Therapsida, Traversodontidae, Rhynchosauria, and Mammalianomorpha. At the city of Santa Maria, only fossils from the Rhynchosauria cenozoone are recorded (AZEVEDO & SCHULTZ, 1990; HUENE, 1990; LANGER *et al.*, 1999; DA ROSA & LEAL, 2002; DA ROSA, 2004).

The *Dicroidium* Flora has a Triassic range, with some species restricted to Middle to Upper Triassic. However, it is most important to realize that those ramified leaves that first appeared in this geological period represent an important evolution of terrestrial plants (GUERRA-SOMMER & KLEPZIG, 2000). They also confirm the ancient link of South America, Africa, India, Madagascar, Australia and Antarctica, and the existence of Gondwanaland.

The fossil vertebrates are divided into two distinct groups (Fig.3): the archosauromorphs, with reptilian characteristics, and the therapsids, with mammalian characteristics. Rhynchosauroids, primitive archosaurs (=‘thecondonts’), and dinosaurs represent the first ones. The therapsids are represented by dicynodonts and cynodonts.

TABLE 1. Animal and plant fossils recorded to the city of Santa Maria, according to lithostratigraphic unit, and indicating its geological or paleontological importance.

UNIT	FOSSILS	LOCATION AND REFERENCES	IMPORTANCE
Caturrita Formation	Silicified logs (“madeira pedra”) and dinosaurs	Itararé, Água Negra (DA ROSA, 2004; LEAL <i>et al.</i> , 2004)	Vegetation change, from arbustive to forests, adaptation of dinosaurs and specialized herbivores
Passo das Tropas Mb.	Leaf imprints, insects wings, conchostracs, fish scales	Passo das Tropas Creek (GUERRA-SOMMER & KLEPZIG, 2000; PINTO, 1959)	<i>Dicroidium</i> Flora is an important element of stratigraphic correlation and paleogeographic and paleoenvironmental reconstruction
Alemoa Mb.	Rhynchosauroids, archosaurs, dinosaurs and cynodonts	Sanga Grande da Alemoa, Cerro da Alemoa, Faixa Nova, Vila Kennedy, Vila Caturrita (HUENE, 1990; DA ROSA & LEAL, 2002)	Vertebrate fauna represents the early evolution of dinosaurs, as well as the extinction of archosaurs

TABLE 2. Tetrapod-based cenozones of the Triassic of southern Brazil.

AGE	CENOZONE	TETRAPODS
Upper Triassic	EoNorian	Mammalianomorpha
	Carnian	Rhynchosauria
Middle Triassic	NeoLadinian	Traversodontidae
	EoLadinian	Therapsida



Not belonging to any presently known groups are the lizard-like parareptilian procolophonoids: *Candelaria barbouri* (CISNEROS *et al.*, 2004); *Soturnia caliodon* (CISNEROS & SCHULTZ, 2003) *Procolophon pricei* (LAVINA, 1983), and *Procolophon brasiliensis* (CISNEROS & SCHULTZ, 2002).

The rhynchosaurs are specialized herbivores, with an adapted skull similar to a parrot beak (SCHULTZ, 1995). Three species are known: ‘*Scaphonyx*’ *fischeri* (WOODWARD, 1907), *Scaphonyx sulcognathus* (AZEVEDO & SCHULTZ, 1990), and *Hyperodapedon huenei* (LANGER & SCHULTZ, 2000).

Archosaurs are represented by the following taxa: *Cerritosaurus binsfeldi* (DORNELLES, 1992 and references there), *Chanaresuchus* sp. (DORNELLES, 1992 and references there), *Hoplitosuchus raui* (HUENE, 1990), *Aetosauroides subsulcatus* (ZACARIAS, 1982; DA ROSA & LEAL, 2002; DESOJO & KISCHLAT,

2005). They are regarded as the precursors of the dinosaurs, the latter being represented by the basal theropod *Staurikosaurus pricei* (COLBERT, 1970), the basal sauropodomorph *Saturnalia tupiniquim* (LANGER *et al.*, 1999), the comparatively more derived theropod *Guaibasaurus candelariensis* (BONAPARTE *et al.*, 1999), the ‘prosauropod’ *Unaysaurus tolentinoi* (LEAL *et al.*, 2004), and the ornithischian *Sacisaurus agudoensis* (FERIGOLO & LANGER, 2006).

In a global stratigraphy, aetosaurs and rhynchosaurs are important to correlation and the establishment of land vertebrate faunas (LUCAS, 1998). The most basal dinosaurs that are present at the region among northern Argentina, southern Brazil and southern Africa, evolved in less than 10 My (SERENO, 1999). An osteologic and functional comparison has confirmed that *Staurikosaurus* is the most primitive dinosaur, when compared to *Eoraptor* and *Herrerasaurus*.

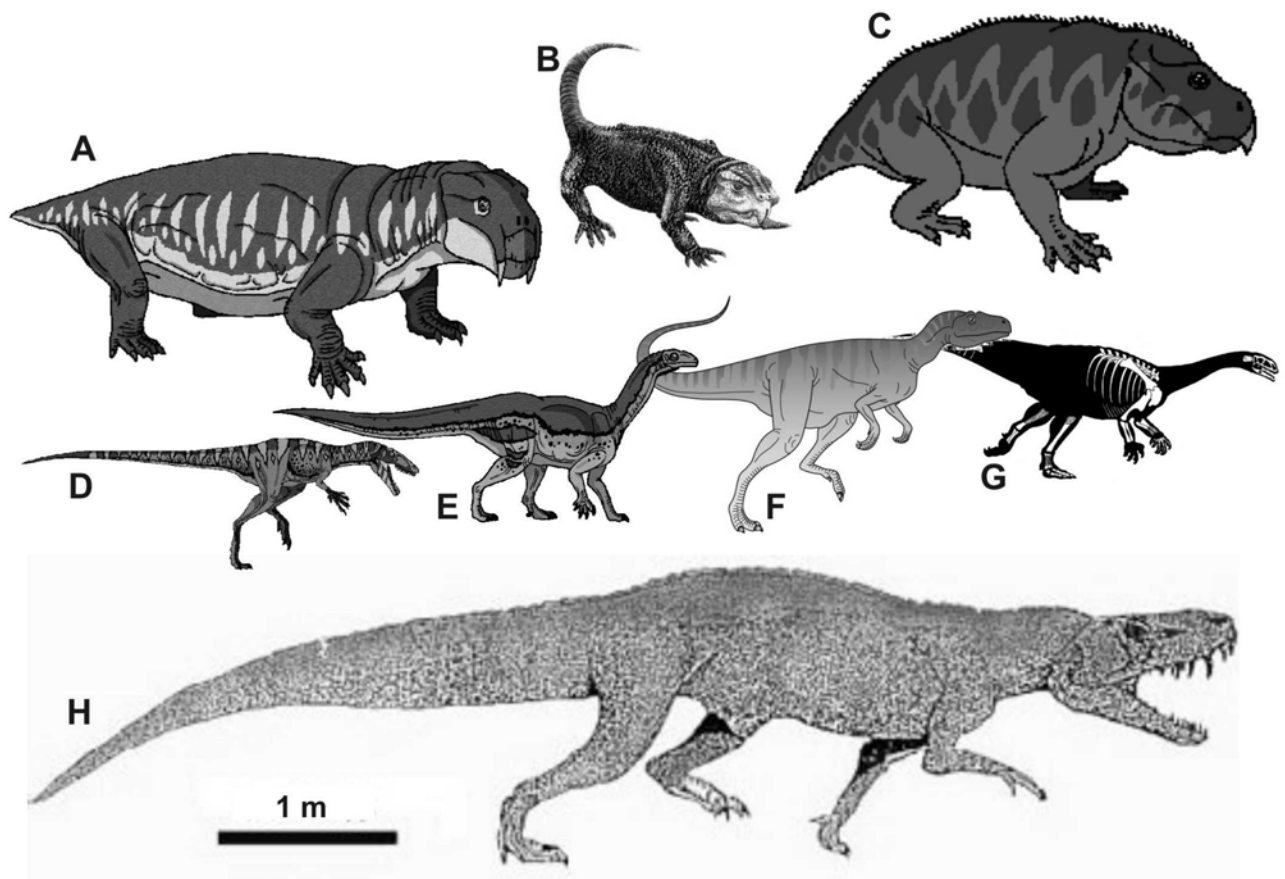


Fig.3- Examples of the fossil vertebrates of the central region, showing distinct forms of tourist interest. *Dinodontosaurus* sp., *Scaphonyx fischeri* and *Jachalera* sp.; the archosaur *Karamuru vorax*; the dinosaurs *Staurikosaurus pricei*, *Saturnalia tupiniquim*, *Guaibasaurus candelariensis*, and *Unaysaurus tolentinoi*. Drawings from several paleoartists: Felipe A. Elias (A, C, D, E), Euverman (F), Maurilio Oliveira (G), and José Eduardo F. Dornelles (H).

The dicynodonts are huge herbivores from the Middle Triassic, therefore not present at the city of Santa Maria. Two genera are known, which need to be revised (SCHWANKE, 1998): *Stahleckeria potens*, *Dinodontosaurus oliverai*, and *D. turpior*. So far, fossiliferous sites of this cenozoone are Chiniquá (HUENE, 1990), Dona Francisca, Paraíso do Sul (DA ROSA *et al.*, 2004a), Novo Cabrais (DA ROSA *et al.*, 2004b), and Candelária (ROMER, 1969; PRICE, 1946, 1947).

Cynodonts are distributed over all cenozones. They can be divided into mammalian and non-mammalian cynodonts, and both in herbivore and carnivore forms (OLIVEIRA & LAVINA, 2001). A revision of non-mammalian cynodonts is provided elsewhere (ABDALA, 1996), but recent findings have greatly increased the knowledge of this group (*e.g.*, ABDALA *et al.*, 2001). Non-mammalian cynodonts are known for the following species: *Therioherpeton cargini* (BONAPARTE & BARBERENA, 1975), *Charruodon* sp. (ABDALA & RIBEIRO, 2000), *Santacruzodon hopsoni* (ABDALA & RIBEIRO, 2003), *Riograndia guaibensis* (BONAPARTE *et al.*, 2001), *Brasilodon* sp. and *Brasilitherium* sp. (Bonaparte *et al.*, 2003), and *Irajatherium hernandezii* (MARTINELLI *et al.*, 2005). Several *Exaeretodon* skeletons (a medium-sized cynodont) have been collected at the vicinities of Santa Maria and São João do Polésine cities.

Fish scales are recorded at several outcrops (LIMA *et al.*, 1984; PEREZ & MALABARBA, 2002; RICHTER, 2001). A phytosaur was recently described for the Caturrita Formation (KISCHLAT & LUCAS, 2003).

At the city of Santa Maria, it is very common to find silicified logs at the Itararé neighborhood, while excavating for construction of buildings foundations. At the backyard of the Escola Estadual Xavier da Rocha, cross-bedded coarse sandstones from the Caturrita Formation present logs at the stratification sets. In the same formation, there are conchostracs on the road BR 158 (KATOO, 1971), and fossil vertebrates at Água Negra (AZEVEDO *et al.*, 1998; DA ROSA *et al.*, 1998; LEAL, 2001, 2005; LEAL *et al.*, 2004), Quilombo (DA ROSA, 2005), and Campinas (BELTRÃO, 1965; LYRIO *et al.*, 2003, 2004).

Up to now, there are 21 fossiliferous sites at the urban area of the city of Santa Maria (DA ROSA, 2003, 2004). Those sites comprehend public and private areas, with different degrees of accessibility, thus needing an urgent protection.

#### INFRASTRUCTURE FOR THE PALEONTOLOGICAL TOURISM

According to SOMMER & SCHERER (2000), the

'Petrified Forest from Mata' represents one of the most important paleobotanic sites from South America. Fossil logs are conifer-related gymnosperms, which represent the climatic shift at the end of Triassic. The 'Fossil vertebrates from Santa Maria region' consist of a reptilian fauna, including the first dinosaurs and some mammal precursors (SCHULTZ, 1995).

All these fossils occur in several cities from the region. The fossil logs also outcrop at São Pedro do Sul, Santa Maria, and Faxinal do Soturno. The fossil vertebrates are found in outcrops from São Pedro do Sul through Venâncio Aires. However, just a few cities have prepared themselves for the paleontological tourism. The Mata city, for example, relies on the work done by Daniel Carginin (deceased), a Christian priest that helped in local conservation and education. His work was based primarily exhibiting large logs on the city public parks, numbered small logs on sidewalks, and some fossil vertebrates and plants at the Museu Pe. Daniel Carginin (former Museu Guido Borgomanero) (Fig.4). A convention between the Prefeitura Municipal and the Universidade Federal de Santa Maria created an open-air exhibit, the Jardim Paleobotânico, where the visitor can see the trunks in the original outcrops.

Fossils from this region, including vertebrates and plants, are housed the following museums:

- Museu Paleontológico e Arqueológico Walter Ilha - Located at the municipality of São Pedro do Sul, it was created due to the work and effort of Walter Ilha, who also acted fiercely on the preservation of the paleontological patrimony;
- Museu Educativo Gama D'Eca - Located at the municipality of Santa Maria;
- Museu Histórico e Cultural Vicente Pallotti - Located at the municipality of Santa Maria, it presents a paleontological section organized by the late priest Daniel Carginin;
- Museu de Ciências - Fundação Zoobotânica do Rio Grande do Sul - Located at the municipality of Porto Alegre, presents a paleontological section;
- Museu de Paleontologia - Universidade Federal do Rio Grande do Sul - Located at the municipality of Porto Alegre, nowadays presents only one room exhibit;
- Museu de Ciência e Tecnologia - Pontifícia Universidade Católica do Rio Grande do Sul - Located at the municipality of Porto Alegre, it presents a paleontological section.

In an early attempt to protect the paleontological patrimony, the municipalities of Mata, São Pedro do Sul, and Santa Maria have created local laws to avoid fossil commercialization and to obligate

teachers to deal with that subject in local schools (MINELLO, 1995). Nowadays, the State Law 11.738/02 determines the legal protection of fossiliferous sites and their fossils.



Fig.4- Examples of museums near the city of Santa Maria. (a) The Museu Paleontológico e Arqueológico Walter Ilha, at São Pedro do Sul; (b) The Museu Pe. Daniel Cargnin, at Mata; (c, d) Fossil trunks on the public squares at Mata; (e) the Jardim Paleobotânico at Mata.



The implantation of a tourist route, based on the paleontological knowledge, necessarily involves a correct evaluation of the local infrastructure. Two museums, a research lab, and several important fossiliferous outcrops are recorded at the city of Santa Maria (Fig.5), but no improvement of the infrastructure so far can be recorded.

The Museu Educativo Gama D'Eça, a unit of the Universidade Federal de Santa Maria (UFSM) located at the downtown area, is divided in thematic rooms: history of the UFSM and its founder, Dr. José Mariano da Rocha; archaeology; paleontology; natural history; guns and cannons. At the paleontology room named after Dr. Mário C. Barberena, an exhibit of minerals, rocks, and fossils from southern Brazil was recently reorganized (LEAL *et al.*, 1998).

The Museu Histórico e Cultural Vicente Pallotti, part of the religious society named Sociedade Vicente Pallotti, houses collections of stuffed animals, minerals and rocks, archaeological and paleontological specimens, tools and guns. The paleontological collection is greatly indebted to the Priest Daniel

Cargnin (*in memoriam*), who was responsible for the preservation of the paleontological patrimony for the entire region. In his homage, several species were designated (*e.g.*, *Therioherpeton cargini* Bonaparte & Barberena, 1975), as well as a public square (Pe. Daniel Cargnin square), that is located at the crossing of road BR 158 and the Fernando Ferrari Avenue.

There are four small municipal museums near the city of Santa Maria. Two of them located west at São Pedro do Sul and Mata and the other two located east at Faxinal do Soturno and Candelária municipalities.

The Museu Paleontológico e Arqueológico Walter Ilha, at São Pedro do Sul, is located at the building of the local Deputies House, as well as the Museu Histórico Fernando Ferrari. The paleontology room exhibits specimens of fossil vertebrates (dicynodonts, rynchosaurs, and archosaurs) and plants (silicified logs and leaf imprints) of the region. Fossils from other localities from southern Brazil can also be seen. A few outcrops are easily reachable by car, as the Sítio da Piscina, Sítio da Ermida, Sítio Inhamandá, and Sítio Água Boa.

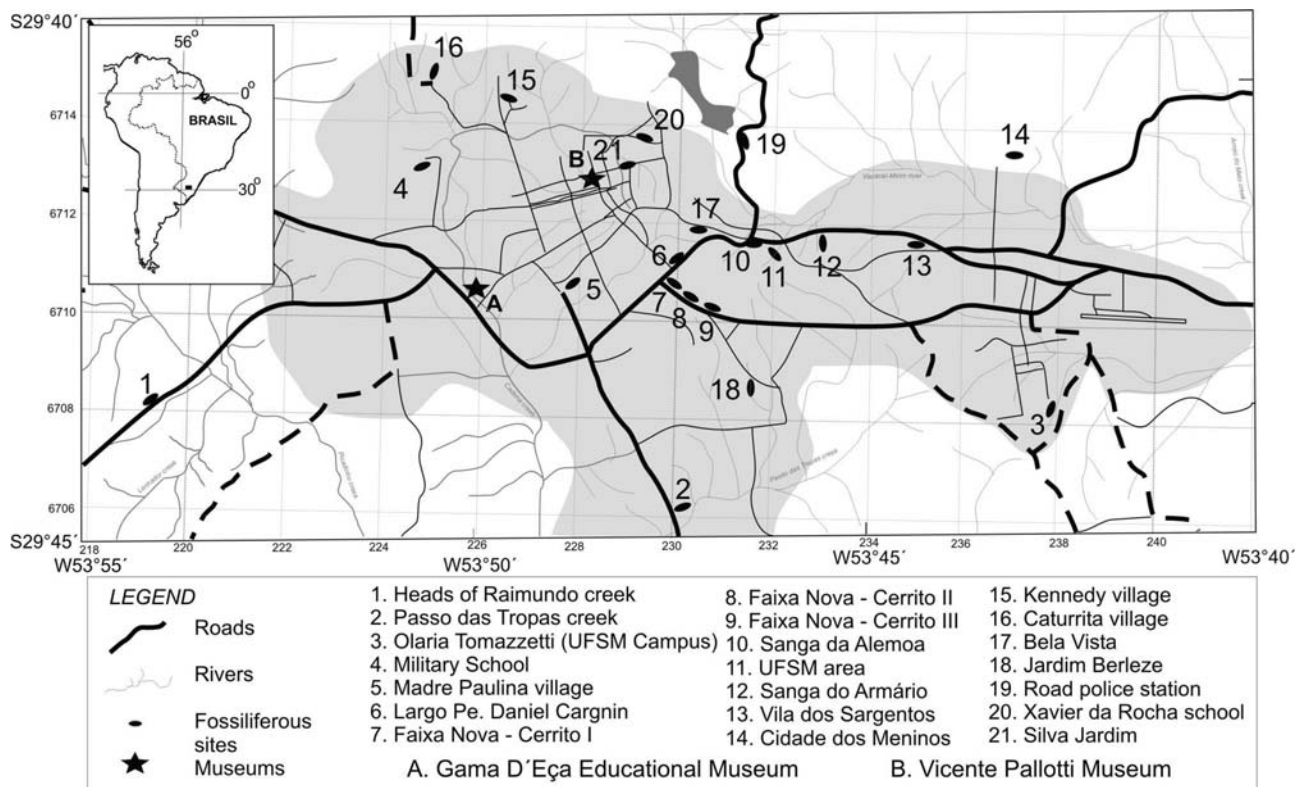


Fig.5- Urban area of the city of Santa Maria, with location of main fossiliferous sites and paleontology museums (modified from DA ROSA, 2004).



The Museu Pe. Daniel Cargnin, at Mata, has a very eclectic collection of historical, archaeological, and biological material. Thanks to the efforts of Priest Daniel Cargnin the museum houses also a rich paleontological collection. People of the city are greatly indebted to Pe. Daniel Cargnin for the preservation and exposure of the silicified logs on the streets and city squares. In the paleontological exhibit, a series of *Dinodontosaurus* skulls and an almost complete dicynodont skeleton are the most important material, collected near the city of Candelária. Aside of the museum, it can be visited the Jardim Paleobotânico de Mata, created by the partnership between the Prefeitura Municipal and UFSM. There, visitors can walk among the silicified logs preserved in the original rock.

At Faxinal do Soturno, a small museum at the district of Novo Treviso exhibits some fossil vertebrates, archaeological, and historical material. This collection is another example of the vigorous work of Pe. Daniel Cargnin, during the few years he did stay in that community.

At Candelária, the Casa Cultural of the municipality houses a paleontology room, with fossil specimens and resin casts of vertebrates found nearby, such as the dinosaur *Guaibasaurus candelariensis*.

At the region known as Quarta Colônia, fifteen municipalities gathered themselves in the named Consórcio para o Desenvolvimento Sustentável da Quarta Colônia (CONDESUS), with the aiming of building a center to support the paleontological research, as well as improving the local socio-

economic development. The fossiliferous sites of São João do Polêsine, Faxinal do Soturno, Dona Francisca, and Agudo are planned take part in the Paleontological Route project.

So far, the only paleontological research lab in the region is the Laboratório de Estratigrafia e Paleobiologia (LEP), linked to the Department of Geosciences of UFSM. This lab supports the paleontological exhibit of the Museu Educativo Gama D'Eça, that is responsible for housing the paleontological collection of UFSM, and is also a center for research, teaching, and extension. This lab together with the Laboratório de Estudos e Pesquisas Arqueológicas (LEPA) of the Department of History, compose the Comissão Especial de Resgate do Patrimônio Paleontológico e Arqueológico (CERPPA), created to work together with the regional community in the preservation of its natural patrimony.

#### DISCUSSION AND CONCLUSIONS

The use of the paleontological patrimony for tourist purposes has been a matter of a constant worry of the academic and non-academic community. In this sense, all the present efforts to conciliate preservation of the paleontological patrimony and its socio-economic use are based on the following assumption: the paleontological tourism will only work if properly connected with educational, legislative, social, and economic activities (Fig.6).

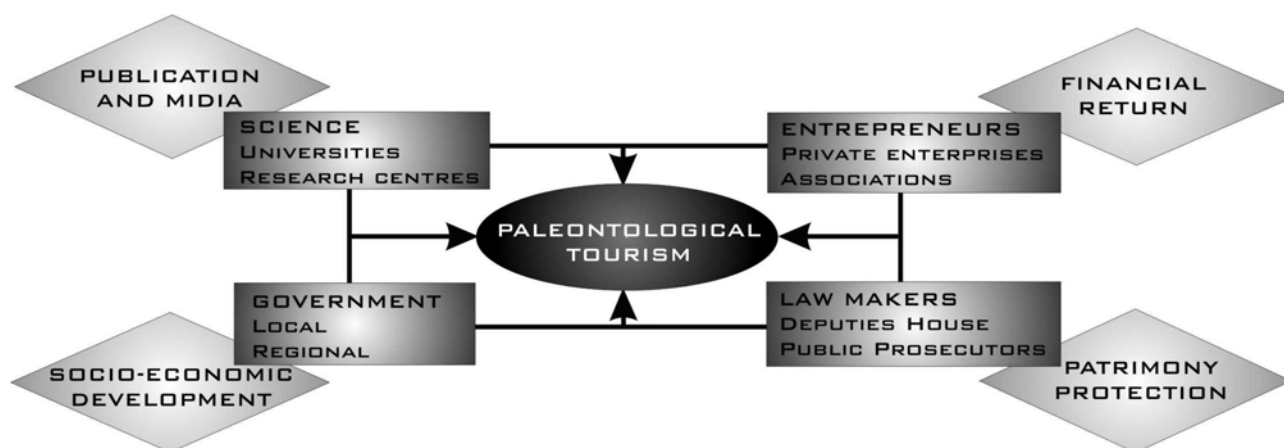


Fig.6- Schematic diagram of the relationships involved on the implementation of paleontological tourism (see discussion on text).

In the city of Santa Maria, there is an effort to legally and physically protect the fossiliferous sites at the same infrastructure for the paleontological tourism is developed. Three regional workshops were organized to specifically discuss paleontological tourism in the region (I and II Paleotur, 1<sup>st</sup> Municipal Forum on Paleontological Tourism in Santa Maria). Those meetings resulted in initiatives to protect the fossiliferous sites including in the central administrative plan (Plano Diretor) of the city. The protection and management of the fossiliferous sites is still a matter of debate, before tourism is set in the region. There are two projects for the construction of thematic paleontological parks, one located at Santa Maria and the other at São João do Polêsine, both in a preliminary phase and waiting for governmental financial support.

A project for the public developed by the UFSM is called Sítio-escola de Escavação. It aims to protect the main fossiliferous site from Santa Maria (Sanga Grande da Alemoa) and to perform educational activities with students at all levels. A protected area of 1.7ha was divided into quadrants and excavated. The site will contain an educational and tourist infrastructure, such as exhibition rooms (long term and temporary), fossil preparation lab, multimedia classrooms, mini-auditorium, cafeteria, bookstore, and souvenir store.

Notwithstanding the richness of fossil localities in RS, there is still very little infrastructure for paleontological tourism. Advertisement on the roads already point to the Paleontological Route, inviting tourists to visit the cities and local museums. However, local citizens were not prepared for this project and there is a general lack of information in foreign languages and education for environmental and paleontological protection.

The implementation of a museum of natural history in the city may boost tourist services, as well as nucleate tourism in the entire region. Whether or not all municipalities will work together, a huge increase in the tourist demand can be foreseen, leading to an expectation for a socio-economic-cultural development of the central region of the Rio Grande do Sul State.

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