

much darker than the cores, variations due to varying Fe and Mg contents.

A second generation of light green tourmalines also occurs in quartz veins of Quartzite. These are alkali-deficient, Cr- and V-bearing tourmalines with higher Mg# than those of the schorl-dravite series. The occupancy of the X-site, according to X-ray fluorescence data, is $\delta_{0,51}\text{Ca}_{0,33}\text{Na}_{0,15}$, thus corresponding to foitite, considered as an alkali-deficient schorl.

Raman studies also discriminated two groups of tourmalines, one belonging to the buergerite-schorl series and the other to the dravite-buergerite-uvite series.

Stable isotope data allowed to define sediment and hydrothermal waters as fluid sources, ruling out the association of the tourmalines with e.g. the Brasiliano granitoid bodies found in the area. $\delta^{18}\text{O}$ compositions for tourmalines (+12 per mil) and host metachert and quartz veins (+13 per mil) are very similar, showing fluid equilibration during (re)crystallization of quartz and tourmaline.

The presence of at least two distinct groups of tourmalines indicates distinct environments and timing for tourmaline generation. In Tapera Grande, tourmalines were formed in a submarine exhalative-sedimentary environment. Their composition was not strongly affected by medium-grade metamorphism.

In Quartzite, tourmaline compositions reflect that of the country rock, once fluid percolation along Sertãozinho fault and associated fractures caused leaching of Cr (and V) and the crystallization of alkali-deficient, Cr-(V)-bearing tourmalines in veins, together with quartz. The heat source for mineralizing fluids must have been a granitoid body (Pau Pedra) south of Tapera Grande and intermediate to acid pipes in the Quartzito area. These fluids were also responsible for distinct types of mineralization, characterized in Tapera Grande by the assemblage gold-pyrite-pyrrhotite-chalcopyrite, and in Quartzite by electrum-pyrite-chalcopyrite-sphalerite-galena-scheelite-molibdenite. — (December 14, 2001).

A BONE FRAGMENT OF A PROBABLE AQUATIC VERTEBRATE IN THE SERRA ALTA FORMATION (UPPER PERMIAN OF PARANÁ BASIN)

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Presented by ANTONIO C. ROCHA-CAMPOS

We have found a robust bone fragment (4cm long; 2.5cm in average diameter) in a suspension deposit of the Serra Alta Formation, Upper Permian of the Paraná Basin, along the Castelo Branco highway near Cesário Lange (SP). The bone expands towards one end with longitudinal protuberances and has fine superficial striae. The fossil-bearing sediments comprise submetric and metric beds of dark-gray siltstone with centimetric intercalations of dirty carbonate exhibiting bioturbation, coprolites and fossil remains (hardgrounds).

This skeletal fragment is interpreted as probably part of a posterior (bones: tibia; fibula; femur) or anterior (bones: radius; ulna; humerus) limb of an aquatic reptile or amphibian or, possibly, as a portion of the fin of a crossopterygian fish.

On the basis of thin sections of transverse cuts of the bone, it was possible to observe the original phosphatic nature (with low birefringence, concentric lamellae, negative elongation, and wavy extinction) and structure of the submillimetric and millimetric pore-canals filled by microcrystalline silica, as well as subordinate calcite cement.

This bone fragment was preserved due to the relative anoxic depositional conditions of the Serra Alta Sea, the low hydrodynamic energy of sedimentation, and the presence of alkaline fluids during early diagenesis which filled bone voids, mainly its pore-canal system with CaCO_3 .

The fragment is massive but slightly broken at both ends. Its massive nature contrasts with the much smaller and more fragile bones of mesosaurids of the subjacent Irati Subgroup (the most stagnant palaeoenvironment of Paraná Basin). Its body may have reached around 1.5m, in length, making it perhaps the largest aquatic organism of its time. If it was carnivorous, it would have been a considerable threat to the other animals of the Serra Alta Sea. — (December 14, 2001).

HEAVY METALS IN CONTAMINATED SOILS – SEQUENTIAL EXTRACTIONS

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In order to understand the mechanisms of contamination by metals, it is necessary to know the ways in which

they are bound to the different soil components since their mobility depends on this, as do the mitigation and remediation of contaminated areas.

By means of sequential extractions the hydrogeochemical behavior of metal ions in contaminated soils will be determined. This method selectively extracts metallic ions associated with different soil fractions through sequential utilization of reagents from the least to the most aggressive.

Of interest in this project are the exchangeable ions, bound to oxides/hydroxides of iron and manganese, to carbonates, to organic matter, and to residual binding fractions.

The sequential extraction procedure for determination of heavy metals and their speciation in soils have been developed in the past 20 years. This methodology was introduced by Tessier et al. (1979) and later publications are largely based in this work.

In most of the literature references, the conditions under which the extractions were performed are not completely specified. Also, depending on the soil type and the metals analyzed, the extractions may present difficulties which have to be overcome.

In this study, the selective extraction methods will be chosen, those which are most interesting will be tested, and new methods will be developed.

An experimental station will be built for collecting soil and water samples, monitoring wells and carrying out experiments. In situ monitoring of parameters such as pH, Eh, CE, temperature and alkalinity will also be performed.

This project will contribute to our understanding about important mechanisms of mobility and fixation of metallic ions associated with soils. — (*December 14, 2001*).

MORPHOLOGY OF THE IBIRAQUERA DUNEFIELD, SC*

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The Ibiraquera beach is located in the municipal district of Imbituba, mid-south coast of the Santa Catarina State. The active dunefield present in this beach possesses parabolic geometry and oblique position to the coastline. It begins with foredunes, that locally appear cut and destabilized by for blowouts. Towards the inte-

rior, the dunefield passes into an extensive deflation area. This area is composed by deflation plains, usually vegetated and/or flooded, gegenwalle ridges, trailing ridges and isolated parabolic dunes. The trailing ridges appear as lateral portions of transverse and barchanoid dunes. They are fixed by vegetation and left back while the rest of the dune migrates, forming straight ridges of sand, vegetated in the external part and unvegetated in the internal part. The gegenwalle ridges appear in the deflation plain as small ridges of sand (approximate height of 1 m) that possess the identical format of the barchanoid and parabolic dunes' windward limit. They form periodic sequences that record dunefield migration in the deflation area. The parabolic dunes present unvegetated sands in the main advance front (depositional lobe), trailing ridges on both sides with a deflation plain between them. In the internal part of the dunefield the deflation facies disappears, giving place to chains of transverse and barchanoid dunes. They finish in secondary advance fronts contained by the vegetation (precipitation ridges). The whole internal and frontal dunefield borders possess precipitation dunes. In old dunefields totally vegetated now, morphologic features were also recognized such as precipitation dunes and deflation plains.

In Ibiraquera it is possible to notice that the dunefield started from the north part of the beach and migrated SW, toward the continent. The north section of the beach possesses higher sediment supply than the other sites, seeing that the foredunes in this area are not very well developed, and are buried by small transverse dunes that appear close to the beach.

The characterization of the facies of the Ibiraquera dunefield allowed to correlate this dunefield to the typical distal or deflation facies association described by Giannini (An Acad Bras Cienc (1998) 70(3): 696). — (*December 14, 2001*).

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HEAVY METALS CONCENTRATION (Cr, Cu, Ni and Zn) IN BOTTOM SEDIMENTS OF THE EMBU-MIRIM RIVER – SP

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