

medida, podemos obter informações sobre o ponto onde o chuveiro alcançou o seu máximo desenvolvimento (X_{max}). Usado independentemente, o aparato Cerenkov é principalmente dedicado a medidas de astronomia gama;

4) 3 antenas de rádio.

Através da observação simultânea de várias componentes do EAS (eletromagnética, muônica, hadrônica, luz Cerenkov), o experimento EAS-TOP é capaz de realizar estudos da composição e inclinação do espectro primário, estudos de astronomia gama, estudos de correlação com os laboratórios subterrâneos de Macro e LVD. Estudando a composição dos raios cósmicos primários próximo ao "joelho" do espectro ($E_0 \approx 3.10^3$ TeV), região de energia onde o espectro muda a sua inclinação, obtemos informações sobre os processos de aceleração e propagação dos raios cósmicos dentro da galáxia.

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¹A quantidade K é chamada inelasticidade e para a região de energia do ISR sabemos que seu valor vale 0.5. Para outros valores de energia, ainda não existem dados experimentais disponíveis, embora existam muitos e contraditórios trabalhos teóricos nesse assunto [J. Bellandi, R.J.M. Covolan e A.L. Godoi, (1995), *Phys. Lett. B* 343: 410].

ADAPTATIVE STRATEGIES OF PERMIAN ANOMALODESMATAN PELECYPODS TO PHYSICAL DISTURBANCE

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Soft-bottom, suspension feeding anomalodesmatans found in event concentrations (Tubarão Group, Early Permian), Paraná Basin, show two types of adaptive strategies: exposed strategy (shallow or active burrowers) and sheltered strategy (deep-burrowers). Exposed strategy is shown by *Myonia? costata*, *M. tayoensis* and *Australomya sinuosa* from the Taió assemblage (Rio Bonito Fm.). Their shells are usually found disarticulated and butterflyed and chaotically

distributed in a fine amalgamated sandstone, generated by storms in a shallow marine environment. When articulated the shells are not found *in situ*, indicating exhumation and rapid sedimentation. Shells of *Astartilla* sp., *Myonia* sp., e *Pyramus* sp. (São Sepé assemblage, Palermo Fm.), show the same preservational pattern. On the other hand, deep burrowers like *Allorisma barringtoni* (Baitaca assemblage, Rio do Sul Fm.) are commonly found *in situ*, in platformal marine siltstone. Life positioned specimens show evidence of escape structures, suggesting ability to elevate the shell during rapid sedimentation, probably induced by storm. However, in this species, reburrowing ability was not efficient, as suggested by the reduced anterior portion of the shell. Our data agree with Kondo's observations, *Canadian Paleont. Conf. Progr. and Abstr.*, p. 18-19, which suggest that shallow-burrowers are easily exhumated, reworked, transported and deep-burrowers are rarely exhumated and exposed on the water/sediment interface, even after death. — (5 de dezembro de 1996).

VERTEBRATE TAPHONOMY IN BAURU BASIN (UPPER CRETACEOUS, BRAZIL)

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The Caiuá and Bauru Groups were deposited during the Late Cretaceous in the Bauru Basin located at the south-central part of the South American Platform (Brazil). This inland basin accumulated as a sandy siliciclastic sequence from marginal alluvial fan systems that supplied sediments for further fluvial and aeolian transport, until their final destination in a great interior desert (Caiuá Group). Life in the Bauru Basin developed best in areas of greatest water availability, such as on the broad plains of braided streams with ephemeral alkaline lagoons (Marília and Adamantina Fms. – Bauru Gr.). There, reptiles mainly dinosaurs, crocodiles and turtles, reigned together with amphibians, fish, molluscs, crustaceans and charophytes.

Carbonate material permineralized or replaced the organic structure of the reptile bones. Sometimes the internal voids are filled with sandy clastic material, mainly quartz. The organic structure is mainly phosphatic material (fluorapatite) of low birefringence, in the form of fibres (flakes) with negative elongation and wavy extinction. Thin sections show concentric lamellae, harvesian systems with fibrous layers and Harvers and Volkmann channels similar to those found in present-day bones of vertebrates. An exceptional case is the Sr-Ba-Ce-rich gorceixite replacement of the original apatite that was observed in a single sample, probably as the result of weathering processes.

The preservation of the bone fragments was due to the characteristics of the semiarid environment in which, during early diagenesis the alkaline water formed calcretes and permineralized the bone voids with calcium carbonate. Transport by braided rivers and flashfloods fragmented the skeletons and concentrated the bones in fluvial channel facies. — (5 de dezembro de 1996).

LATE PALEOZOIC GLACIAL AND FLOATING ICE STRIATED SURFACES IN NORTHEASTERN BRAZIL*

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Striated surfaces of late Paleozoic age developed on bedrock or intraformationally on sandstone are described respectively from the Sergipe-Alagoas Basin and the Santa Brígida graben (Sergipe and Bahia), Northeastern Brazil, and their probably origin is discussed.

Near Igreja Nova (Alagoas), a badly exposed striated surface formed on Precambrian gneiss of the Igreja Nova dome (Rocha-Campos & Brito Neves, 1974; Rocha-Campos, 1981) was re-examined. The undulated surface is polished and bear fine striae and irregular fractures. It is directly overlain by a 2m-thick fining upward sequence of diamictite with chaotically dispersed clasts, some striated, shale and

rhythmites of silt and clay with dropstones, of the Batinga Formation. Orientation of the striae is N118° only slightly oblique to bedrock foliation. The set of features and associated deposits strongly suggest origin of the striated surface by subglacial abrasion. Sense of movement of ice is not clear.

In the second locality examined, near Curituba (Sergipe), multiple striated and furrowed surfaces occur on bedding planes of a large tilted outcrop of indurated sandstone of the Curituba Formation. Bidirectional, medium-sized, through cross-bedding in the sandstone suggests tidal influence. Features on the surfaces vary from striations to ridges and grooves. In addition to the occurrence of multiple surfaces, other features strongly indicate that the sandstone was unconsolidated when abraded. These are: sinuosity and irregular width of grooves which may interfere with each other and become disorganized at their ends; and possible bounce marks. One large furrow almost 4m wide and 30 cm deep is bounded by berms and bear fine striations on its sides and bottom. Striae may be covered by laterally slumped masses of sand, that at places have their tops also striated. Average orientation of striae and furrows is N122°. A similar set of features was also found associated with striated surfaces formed on sandstones and conglomeratic sandstones of the Curitiba Formation at Lagoa Seca, north of Santa Brígida (Bahia). Sandstones exhibit plane parallel, small, planar cross-bedding, normal and reverse grading and truncations. These features and flow deformations in intercalated diamictite beds suggest subaqueous mass gravity flow of the sediments. Striae and furrows trend N96°. Most of the features described, except perhaps the consistent orientation of striae and furrows and absence of intersection coincide with criteria proposed in the literature for distinguishing striated surfaces produced by floating ice masses. Sense of movement of ice in the two localities is difficult to establish, but was probably towards NW. — (5 de dezembro de 1996).

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