

## FOSSILS OF THE SIERRA MADRE FIELD REPORT 2004

### LOCATION.

### TECOLOTLÁN, STATE OF JALISCO. SIERRA MADRE OCCIDENTAL.

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During winter of 2004, assisted by 17 enthusiastic and vigorous **Earthwatch** volunteers I had the opportunity to continue the paleontological investigations in the Tecolotlán Basin, located in the Sierra Madre Occidental, in the state of Jalisco. The first talk in the Albatros Hotel, I told the volunteers 2004 was the last year for the project, Why? mainly the most important objectives of this project were focused on collecting and prospecting the vertebrate faunas that lived in this basin, tries to contribute on the biostratigraphy and the geological history of Mexico and North America during the late Tertiary in North America, however, later I change my mind.

Throughout the expeditions, in the last seven seasons, the results, amount and diversity of fossils, accurately document the diverse geological and biological events that took place before the Great Biotic Interchange between the Americas, by way of the Panamanian land bridge. Also, with the collection of fossil collected, we are already study the evolution and dispersion of faunas before and after the connection between North and South America were settled, at least one million year before was established with the fossil evidences from the faunas of southern states United States. However, in the winter 2004, we had one of the best years collecting different important fossils, especially we find the best material of *Glyptotherium*, and our evidences in the past expeditions were restricted to only few isolated scutes in one locality, besides, we find two osteoderms of a new south American immigrant the genus *Plaina*, never collected in the study area.

The importance of the fossils collected this year, push me to ask The Earthwatch Institute to continue the research in the Tecolotlan area another year, the answer was positive and the 2005 will be the last field season in the Tecolotlan basin.

Objectives. The field work this year was focused to establish the biostratigraphy sequence in the Tecolotlán basin, the correlation between all the sedimentary basin in central Mexico and specially, to filled the gap of information between the San Miguel Allende faunas and the Tecolotlán Basin, try to find out, evidences of the sloth *Glossotherium* other South American immigrants to participate in the initial stages of the interchange, and how did the ecosystems, along this new migratory route evolved, to sustain the first participants.

Another important purpose of **Fossils of the Sierra Madre** consists in the assessment of the faunal diversity found in each rock unit (this means the strata encompassing the last ten million years) of the area under investigation. With the adequate prospecting and collecting methods we are assembling enough information to explain the evolutionary patterns of the North American taxa that coexisted with the oldest South American immigrants in this region of Central Mexico.

We started the field work in the southeast part of the Tecolotlan Basin. Before the initiation of the prospecting and collecting procedures, the volunteers were instructed in the different field techniques to be applied. Also, several lectures regarding the scientific importance of the project were given to acquaint the volunteers with the project.

The fossil material collected by the two teams, (isolated post cranial and dental elements) still is under preparation, therefore it is not possible to say for sure how many specimens were recovered, but it is possible to say the most remarkable specimens. However, there were several extraordinary findings recognized in the field that can be mentioned in this report.

## **Results.**

The work began in Los Corrales-Santa Maria section, located southern part of the Tecolotlán Basin, at 20° 07.25' Lat N and 104° 03.38' Long W. It consisted on prospecting the different stratigraphic levels where the fossil material is present and to collect it. At the same time the volunteers made the stratigraphic column of this area, they were instructed about its importance, since these strata sequence are under the lacustrine sediments that covered the lower section for thousands of years and have special fauna, for instance the horse *Nannippus minor* and *Astrohippus stockii* only were discovered in this part of the biostratigraphic sequence. For this reason the collecting was made very carefully and the volunteers were encouraged to take notes of each bed and its fossil content.

During the last year, the volunteers discovered three new localities. This year, we return to prospect more in the same ones.

The locality JAL-TECO- 39 **La Puertas de los Cactus**, we collected more isolated molariforms of *Dinohippus mexicanus* and *Neohipparion eurystyle* and many fragments of mastodon tooth. Also we found fine sediment that will be washed in order to find micro mammals elements.

The other recent discover locality, located in the lower section of the lacustrine sediments is JAL-TECO 43 **La Retirada**, located at 20° 08.34' Lat N and 104° 03.60' Long W. The abundant fossil material, we collect several specimens of horses and one jaw fragment of possible *Hemiauchenia*, the most important was the first phalanx of sloth possible *Megalonyx*. This complement our knowledge for the sloths from Tecolotlán, last year we collected a mandible fragment of *Megalonyx*, the first one for all faunas from central Mexico.

Once again, we collect in the Santa María section, were the localities JAL-TECO 8 and 9. The result is more material from *Dinohippus*, *Neohipparion* and specially *Nannippus minor*, these localities are the best ones where this tiny horse can be collected, the best Mexican specimens come from this locality. The results of this season are evidence about the age for the fauna below the lacustrine sediments is older than the San José-La Hacienda sequence.

In the San Buenaventura stratigraphic sequence, we collected late Blancan fossils; among the more important are molars of the proboscidean *Cuvieronius*, glyptodont osteoderms, and *Equus* molars. All were recovered from the new locality JAL-TECO 41, **Rancho Preciado**. In this locality there is an extensive area that we need to prospect in the near future to complement the Blancan-Irvingtonian information of the study area. Also we visit other badlands, however, when we visit the San Buenaventura localities, we expend more of our time in this area. During the past expedition, we collect many different specimens of Horses, which are very important because they show characters in between *Dinohippus* and *Equus*, besides some pecaries molars and a lot of tortuga shell fragments. This year, we have a lot of good luck, first one of the volunteers find an isolated scute of *Glyptotherium*, then we use up more time in the same area and start to find a lot of different parts of the shell of this south American immigrant, in total, we collect several jacquets with fragments of the shell in the same area. In addition of our excellent field work, also we find for the first time, two osteoderms of a new immigrant called *Plaina*. This giant "armadillo", is the most enigmatic immigrant, in the late Tertiary of Mexico, only is known in the Blancan Localities in The San Miguel Allende Basin, and the specimen is one million years older than the specimen from Tecolotlán. This two finds, make possible to correlate the late Blancan faunas from Arizona, Texas and Florida with the Tecolotlán fauna, and they are an important contribution to the understanding the routes of migration for the South American immigrants.

An addition an important discover for this year was a new locality named JAL-TECO 46 CAPIBARA, located in the southermost part of the Tecolotlán basin, almost 7 km far from the San Buenaventura layers where we had all the records for this rodent. This year the land was cleaned, no plants and we had the opportunity to look the sediments, and we find almost all the lower dentition of the lower jaw of the capybaras the big rodent from South America. The associated fauna was several teeth of *Equus simplicidens* and other indeterminate specimens. This specimens is the evidence that in Tecolotlán the population of the capybaras *Nechoerus*, was not only few specimens, but all the individuals of the population were distributed in the entire basin during the late Blancan age.

Finally in the locality La Hacienda, where the two team works one day, we had the opportunity to find a new cat possible the genus *Nimravides*?, if this is the case, then this specimen can be the only record in the Hemphillian sediments in all Mexico.

The two teams, collected sediment for screen washing, technique that is important to discover micro vertebrate material, especially in the locality JAL\_TECO 26 and the

sediments from the Santa Maria section. After washing it, we found rodent mandibles, lagomorphs and reptiles, mainly lizards, and more amphibian remains. All these material is under preparation and will be published later.

### **Field activities conclusions.**

The objectives of this year were completely achieved, the material collected complement the biostratigraphic sequence of the Tecolotlán basin. The new fossil of *Megalonyx* specimens is an important contribution to know its distribution in the faunas of central Mexico. The discoveries of the localities with all the *Glyptotherium* scutes and specially the two osteoderms of *Plaina*, suggest the possibility to find more osteoderms and complement the information of this two taxa and correlate with the material of the faunas of 111 Ranch from Arizona and the Cita Canyon in Texas. About *Plaina*, more osteoderms, can be important help to understanding the origin and evolution of this big armadillo, only known in the early Blancan sediments of México and the late Blancan of Texas and Arizona.

### **Bibliography.**

- Carranza-Castañeda, O. and Wade, E. M. 2003. Inmigrantes Sudamericanos en las Faunas del Terciario Tardío del Centro de México. p. 69-81. In: Avances en los Estudios Paleomastozoológicos. Montellano-Ballesteros, M. and J. Arroyo-Cabrales (Coords). Inst. Nal. Antropol. Hist. Ser. Científica.

Carranza-Castañeda, O., and Miller E. W. in press Late Tertiary Mammals from Central México and their Relationship to South American Immigrants. Paper presented in the Brazilian Paleontological Congress, July 2003, Brasilia, Brasil.

Carranza-Castañeda, O., Miller, E. W. And Kowallis, J. B. 2003 Relevance of the Late Tertiary Mammalian Faunas in Central México, and the Great American Biotic Interchange )) Annual Meeting, Cordillerean Section, Geological Society of America. Vol. 35, N. 4.

New paper will be finished this year

Atentamente

Dr. Oscar Carranza Castañeda  
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