

### **3-GENERAL GEOLOGIC MARK**

The space in which this small study is framed belongs to “La Litera” and “Cinca Medio” districts, but there are some references to the “Bajo Cinca” and “Ribagorza” too. The oriental zone of Huesca is a frontier territory by geographic position and by history. Curiously, they are frontier territories with respect to their geology too, because they are in two of the three big geologic unities of which Aragón is composed: “The Pyrenees” and “La depresión del Ebro”. Of course, the zone isn’t enclaved in “The Pyrenees”, and it isn’t crossed by the “Ebro”. The terms used are geologic technicisms.

The studied zone presents three natural unities which have lithologies, antiquities, tectonic characteristics and relief, all of them brightly differentiated, they are presented as NO-SE orientation proximate strips, and they have influence in the kind of vegetation and in the uses that have been given to the territory by its settlers.

#### **a) The south pyrenean hills.**

They occupy the north-oriental extreme of the district, and they appear in the municipal determinations of : “Estopiñán”, “Estaña”, “Gabasa”, “Calasanz”, “Baells”, “Nacha”, “Camporrells”, “Baldellou”, “Castillonroy”, “Santa Ana” y “Zurita”. The zone is distinguished by a sequence of arduous mountain ranges with 850 metres heights. Stratigraphically, the zone is distinguished by the outcrop of the rocks which correspond to the Mesozoic and to the Inferior-Cenozoic.

The Triassic rocks are represented by Keuper gypsums which outcrop in the municipal determinations of “Camporrells” and “Calasanz”. The gypsums are accompanied with pugs and another kinds of salt rocks as the sylvites (potashes) of “Calasanz”.

The ofita intrusions in the rocks of this period are frequent too. The ofitas are subvolcanic magmatic rocks which it can be considered as dark huddles of very disturbed and scattered rocks.

The cretaceous is represented by limestones and marls, sometimes with marine fossils of gasteropods and bivalves, and they are presents too in the Garum facies, which are composed by pugs and sandstones of a red color which are the limit between the Mesozoic and Cenozoic eras and they show a period of withdrawal of the sea.

The sedimentary series of the pyrenean side of “La Litera” concludes with eocene age rocks in form of big volumes of limestones with fossils, which are known as “limestone with alveolina” and can be viewed in the proximities of “Gabasa” and “Camporrells”. The alveolina are marine unicellular systems with millimetric shells of ellipsoid form. These microfossils are accompanied by bivalves and marine gastropods. The limestone with alveolina constitutes the last marine episode of Huesca, in an age (the Eocene) in which the Pyrenees had already emerged as a big mountain range and in the South, the zone of the “Ebro” river was mainland too. Separating both unities, existed a marine arm which communicated the “Cantábrico” with the mediterranean sea, going across the present high “Litera”.

### **The Ebro river hollow:**

The geologic unities which belong to the Ebro river hollow are in the center, West and South zones. During the Oligocene (middle of the Cenozoic) the alpine orogeny had concluded in practice and the Iberian peninsula starts to have its present configuration. In the North-East peninsular have been raised the “pirenaicas”, Iberian and the Coastal-Catalonian mountain ranges, delimiting a close basin which doesn't have communication with the sea, and in which important thicknesses of sediments proceeding from the erosion of the young mountain ranges: The Ebro river hollow, are going to be accumulated during the Oligocene and the Miocene.

The Ebro river hollow behaved as a continental river basin, where the sediments were conveyed and deposited by rivers and fans from the Pyrenees and the Iberian originating strata of clays and sandstones. In the wet ages, the “Ebro” river depression would be occupied by big lakelets, being produced the sedimentation of sandstones and clays. In the arid ages would be produced the fast evaporation of the water, being deposited then gypsums.

In “La Litera” and “Cinca Medio” outcrop rocks of the Oligocene and the Miocene, and there are some interesting differences with both rocks, from the points of view tectonic and geomorphologic evolution, and, so, from the point of view of the resulting landscape.

The Oligocene it's represented by gypsums, clays and sandstones, and outcrop in the zones of “La Almunia de San Juan”, “Monzón”, “Peralta”, “Azanuy”, “San Esteban”,

“Tamarite”, “Albelda” y “Alcampell”. Is important to remember that in this age, the tectonic pushes continued, so, the sediments of The Pyrenees were compressed and folded, raising big folds as the anticline “Barbastro-Balaguer” which go across the zone. The nucleus of the anticline it’s constituted by gypsums easily recognized because they form a kind of white wall of ONO-ESE direction in which are situated villages as “San Esteban”, “Tamarite” y “Alcampell”, and in which there are a lot of folds as the folds of the “Tamarite-Alcampell” road. This gypsums are the responsible too of the karstic collapses that it’s possible to see in the plane of Alcampell as chasms or small circle presions. The gypsums of the Oligocene are responsible in part too of the salt character of the subterraean waters of some zones, that is utilized since old ages to run commercial that salt by salt mines, as the salt mines of “Peralta”.

In both sides of the Anticline “Barbastro-Balaguer” predominate the sandstones and the pugs by hard dips. The fact that the stratification isn’t horizontal, and that the sandstones suport better the erosion than the pugs, originate peculiar structural leavings called slopes and hog-backs, or small asymmetric mounts in which one of the slopes is the surfaces of the stratum. The village of “Albelda” is situated in a landscape with this kind of leaving. The pendants in all the zone are softs and the figure indicating height above datum line is very rare that they are more than 500 metres.

In the center and South of the zone are the rocks more recents of the “Ebro” river pression. They are pugs and sandstones of miocene age and , because of they don’t have had any episodiy of tectonic compression, they are situated in horizontal stratums. They ocupe the municipal determinations of “Binéfar”, “Binaced”, “Pueyo”, “Alfantega”, “Esplús”, “Altorricón”, “Algayón” y “Vencillón”. This are the plane lanas in which is situated the irrigated of the “Aragón y Cataluña” canal and is presented as a monotonous succession of big cultured parcels. However, there are some interesting leaving of plane roof called planes or upper millstones, and the smallest are called inselbergs. An example is the “Sierra de San Quilez” in Binéfar, whose figure indicating height above datum line coincides with it of another tabular leaving near to the “Cinca Medio” or to “Monegros”. The leaving of plane roof is a remembrance of the high that the zone had in the end of the Miocene, when the “Ebro” river pression was finished. Since then, and coinciding with the open of the drainage net to the Mediterranean Sea, the rivers and the precipices have eroded the land, dropping some metres and doing go back the parts of tableland which are alone.

But the planes of the South of “La Litera” and “Cinca Medio” keep another surprise. In the roof of all of them exists a thick cloak of cemented pebble gravel, of boulders, that have served of protection to the miocene rocks which are under they and that are decidely more soft, and so, more sensible to the erosion. The boulder cloaks are of pleistocen age (a million of years, more or less) and are the superior terraces and so the oldest of the “Cinca” river.

The sediments more recents are of the quaternary, and have their origin in the sedimentation of the river. They are in a big strip of North-South orientation and are the plane of flood and the terraces of the river. Some of them, ocupe positions very far of the present channel, that tell us that the “Cinca” is put on the miocene rocks, but it have had a clare displacement to the west along the quaternary too. The rest of the materials of this age appear as alone stains of little thick and are glacis and bottoms of precipices.