

Epigenetic rivers

This is the term applied to rivers that cut across bedrock structures as if these rivers are unaffected by the different degrees of resistance of the underlying rock formations. They fall into two types (figure 1).

Figure 1 (left). Epigenetic rivers: superimposition and antecedence.

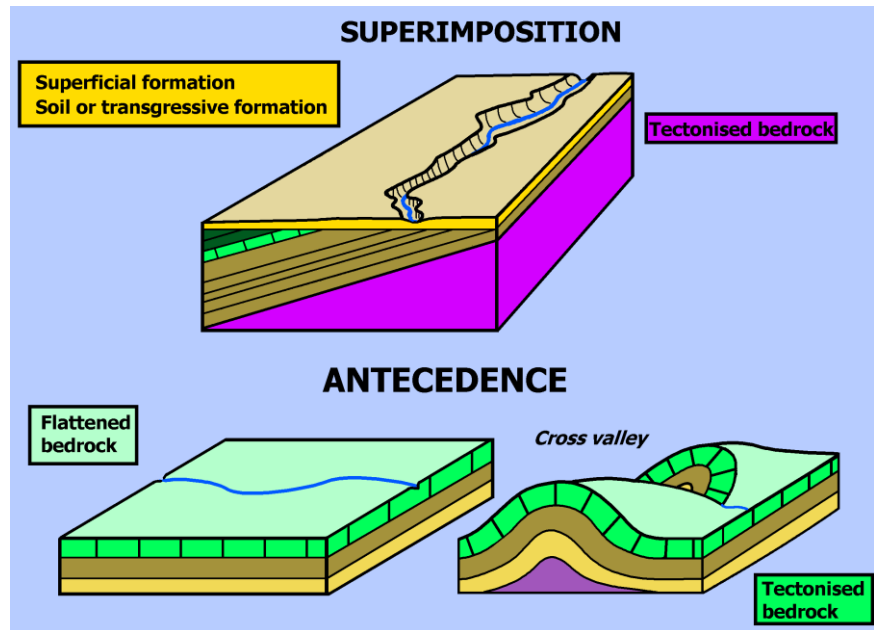


Figure 2 (below). The Meuse Valley at Bogny-sur-Meuse. The river has carved its way into the Ardennes massif, formed of old, hard rocks from the Paris Basin formed from soft rocks. This suggests that the river's course is unaffected by the underlying geological structure: it is therefore an epigenetic river.

In superimposition, a river flows across a soft superficial formation, which can be divided into two main types. The first is a transgression formation such as the sands and clays of Hainaut, which cover the hard rocks of the underlying bedrock (figure 3).



Figure 3. Transgression formation. This is the bluestone quarry in Soignies. The quarry workers are uncovering the limestone bedrock, visible at the bottom of the photo, for quarrying. Note that this is a karstic form suggesting the continental development of the bedrock. Behind the quarry worker, the yellow sand covering the limestone can be seen. The sand is itself covered by another dark, more argillaceous layer. This sand has been proven to be of marine origin. It was therefore deposited in a shallow sea that gradually covered the limestone bedrock after a long period of continental evolution.

The second type is a fairly thick residual alterite (as found in certain parts of the Ardennes). This alterite is the result of chemical attack (weathering) on the bedrock beneath a soil that is itself the product of the action of living organisms (forest cover, burrowing animals, bacteria, fungi, etc.) on the rock. This results in a chemical alteration that breaks down and partially dissolves the rock. Uplift of the surrounding region then causes the river to become deeply incised. When it comes into contact with the bedrock, the river's course is already established and it cuts across the hard formations of the bedrock.

In cases of antecedence, on the other hand, the river remains in place during the tectonisation of the bedrock and, the case of figure 1, an anticline is formed. The river must then cut through the relief thus created, forming a water gap. This is largely the case of the Meuse as it flows through the French Ardenne (figure 2).