

LUCIAN BADEA (BUCUREȘTI)

ON THE EVOLUTION OF THE PARÎNG-CINDREL MOUNTAINS (SOUTHERN CARPATHIANS) DURING THE MIOCENE

The Parîng-Cindrel Mountains of crystalline rocks extend between the Olt, Jiu and Strei river valleys and constitute the greatest and most uniform block in the Romanian Carpathians. One of their principal orographic features is the radial pattern of the valley network. Its development was in part favoured by the pre-existing structural conditions (Fig. 1).

The main valleys drained by the rivers Lotru, Sadu, Cibin, Sebeș, East Jiu, Jieț, Gilort, Oltet, Bistrița Vilcii divided the mountain block into minor mountain groups. These are the Parîng Massif, the Latorița Mts, and the Căpățina Mts in the south, and the Șurean Mts, the Cindrel Mts and the Lotru Mts in the north.

Insufficient geomorphological work has as yet been done to permit a reconstruction of the stages of valley evolution in this area during the Tertiary. Some information basic to this subject stems from the early work of de Martonne (1907), Murgoci (1907) and Grozescu (1925) who tried to outline the evolution of the middle and upper Lotru valley. Recent studies show that all of the main valleys have certain features in common. Consequently, one can assume that all of them underwent the same major phases of modelling being controlled by the evolution of the whole mountain block.

It appears that in each mountain group the highest peaks rising over 2000 m a.s.l. are rather rounded and level. They represent remnants of the oldest surface named the Borăscu surface or platform. This is preserved at an altitude of 1900—2100 m and it descends to 1800 m a.s.l. in the outer parts of the main ridges. It is considered to be a unique surface, an old Carpathian pediplain to Upper Cretaceous-Palaeogene foundation (Po sea *et al.* 1974). This uppermost surface slopes some 150—200 m toward the middle surface named Rîu Șes. It is found in the outer parts of all ridges radiating toward the mountain margins.

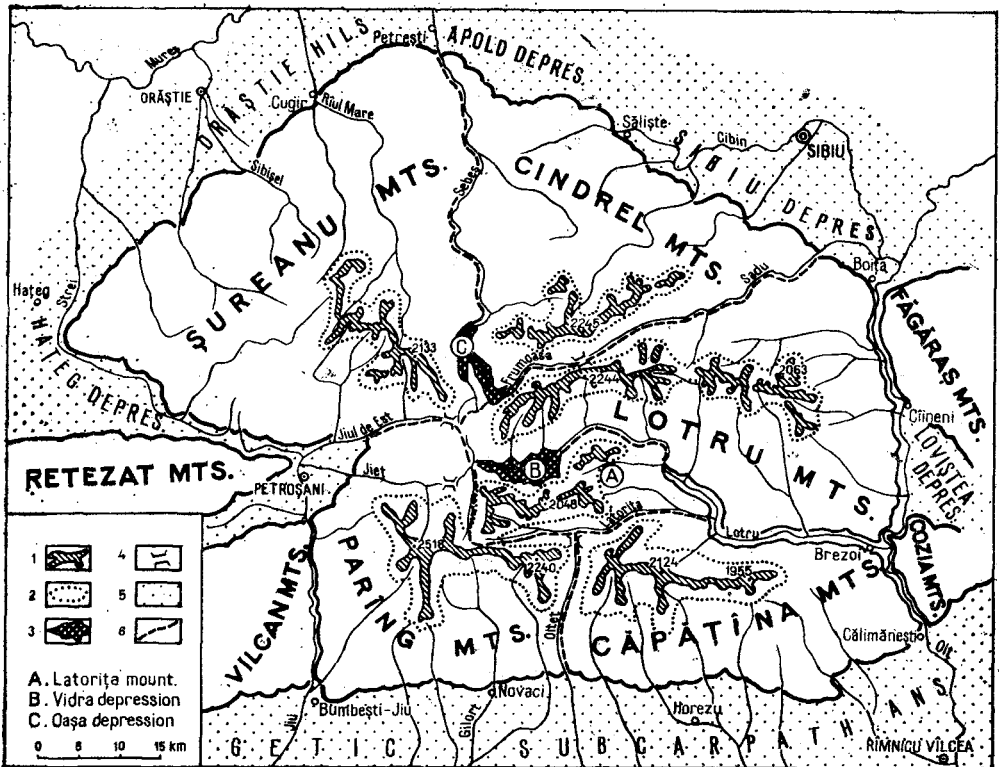


Fig. 1. The Paring-Cindrel Mountains: 1 — uppermost denudational surface at 1800—2200 m a.s.l., 2 — probably extent of the Middle Miocene (Badenian) marine transgression, 3 — intermontane hanging depressions, 4 — saddles, 5 — hills and depressions, 6 — limit of the mountainous units

Ryc. 1. Góry Paring-Cindrel: 1 — najwyższa powierzchnia degradacyjna (1800—2200 m n.p.m.), 2 — przypuszczalny zasięg transgresji morskiej w środkowym mioceenie (baden), 3 — śródgórskie obniżenia o zawieszonych dnach, 4 — siodła, 5 — pagóry i obniżenia, 6 — granice mniejszych grup górskich

Although it has frequently been stated that the middle surface is very fragmented and represented by a level of narrow ridges rather than by an extensive, undulant surface or by one having the aspect of small tablelands, this surface is quite well developed, especially in the Cindrel Mts and the Șurean Mts. Locally, it is planated and cut by deep valleys with steep slopes. The Rîu Șes surface corresponding to the Miocene modelling cycle either descends in small steps, a few scores of metres high, or slopes gently toward the subsequently lower level at altitudes of up to 1200—1300 m. In places, e.g., in the northern part of the Cindrel Mts and to the west of the Șurean Mts, one can hardly notice how it passes into the lower level at altitudes below 1000 m (Badea, Sandu 1981).

When analysing the source areas of the main valleys one finds that only a part of them, e.g., the Lotru, Latorița, East Jiu, Jieț, valleys originate within the uppermost surface, especially in the glacial cirques that cut into it. The other valleys, e.g., those of the Olteț, Sadu, Sebeș, Frumoasa and Strei begin at altitudes of 1800 m. Their headwaters are located near some saddles or ridges which occur in the upper part of the Rîu Șes surface. However, no matter the altitude at which these valleys begin, and whether or not their source sector was formerly shaped by the glaciers, below 1500—1600 m all of them are crossing a remarkably wide sector. It strikingly contrasts with the general aspect of the valleys in the mountains. This sector corresponds to the depressions on the Lotru upstream of the cataracts (gorges), in the source area of the Sadu valley and downstream along the Frumoasa, i.e. the upper sector of the Sebeș. Below this wide sector the valleys are deep and narrow (gorges). The wide upstream valley reaches remain hanging.

E. de Martonne (1907) suggested that the valleys in the Cindrel Mts and in the Șurean Mts are superimposed — epigenetical features: "sans rapport avec la tectonique ancienne [...] aussi peut-on supposer qu'elles se sont établies, au moins dans leur cours inférieur, à la surface des couches miocènes transgressives" (p. 186). Furthermore, on the Lotru „la gorge [...] est encaissée dans une ancienne vallée très nette qui forme une sorte de large plate-forme montant vers l'Quest de 1400 à 1500 m" (p. 189). This fact has also been noticed on the Latorița. Above the gorges there emerges „une ancienne vallée qui se retrouve, respectée par l'érosion entre Coasta Benghei et Muntinu [...] avec son fond plat, presque marécageux, encombré d'alluvions anciennes, est une relique de la topographie miocène" (p. 189). E. de Martonne's assumptions have really been confirmed by the later detailed investigations.

The discovery of Badenian deposits in the Vidra Depression, i.e. in the middle reach of the Lotru valley upstream of the gorges shows that the middle Miocene sea has inundated the mountains extending between the Olt and the Jiu. This also applies to the entire Southern Carpathians which turned into an archipelago. Only the highest parts of the Southern Carpathians were rising above sea level to form some islands. These corresponded to the uppermost surface and to the highest relief of the Paring Massif, i.e. to the landform complex dating from the Borăscu modelling cycle. Locally, in the formation of the 150—200 m slope separating the Borăscu surface from the Rîu Șes surface abrasion was also involved. There is no doubt that post-Badenian sub-aerial weathering which probably manifested itself in the processes of pedimentation refashioned this slope. As a consequence, the combined action of abrasion and pedimentation caused slope retreat (Fig. 1). In the Vidra Depression occupying the middle part of the Lotru drainage ba-

sin at 1300—1350 m a.s.l. as well as on the much lower northern, western and southern margins of the Parîng-Cindrel Mts the predominantly marly and marly-sandy Badenian deposits overlie unconformably the crystalline-Mezozoic rocks. The Badenian sediments buried a pre-existing relief. The latter became largely remodelled by abrasion during the Badenian marine transgression.

The subsequent Sarmatian transgression played an important role in the formation of a still lower surface named Gornovița. This marine transgression was not as extensive as the middle Miocene one. It did not cover the middle surface. It formed a high base level that favoured lateral erosion. Traces of this transgression are evident on the southern mountain margin, between the rivers Jiu and Olt (Bistrița Vilcii). Conglomerates including boulders, blocks and coarse sands lie only on the margins of the crystalline block. Some of the principal ancient valleys which became buried beneath the Sarmatian conglomerates were exhumed in Pliocene and Quaternary times. These valleys pass upstream into the inherited headwaters occurring in the central part of the mountains. Consequently, the newly established valley network of post-Badenian age has preserved the same radial pattern.

In the Neogene orogenic phases the crystalline-Mesozoic block of the Parîng was affected by epeirogenetical movements, except the post-tectonical intramontane sedimentary basins which underwent folding. Such tectonical conditions were favourable for the formation of levels and their subsequent preservation as a peripherally planated succession. The major valleys have maintained the same directions along which they had been cut at the level of the Miocene Rîu Șes surface.

Institute of Geography
Str. Dimitrie Racoviță 12
70307 București

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STRESZCZENIE

L. B a d e a

EWOLUCJA GÓR PARING-CINDREL (KARPATY POŁUDNIOWE)
W OKRESIE MIOCENSKIM

Góry Paring-Cindrel stanowią największy zwarty blok górski w Karpatach rumuńskich. Ich cechą jest m. in. promienisty układ dolin rzecznych założonych na środkowej powierzchni zrównania wieku miocenijskiego zwanej Riu Șes. Przedbadeńskie rysy rzeźby zostały przemodelowane w wyniku działalności rozległego morza w miocenie środkowym (baden). Osady morskie tego wieku odkryto bowiem w obniżeniu Vidra w środkowej części dorzecza Lotru. W tym czasie fragmenty najwyższej powierzchni, zwanej Borăscu (o założeniach górnokredowych i paleogennych), wynurzały się z morza jako archipelag. Kolejna, sarmacka transgresja morska objęła tylko południową część dzisiejszych gór. Z erozją boczną, nawiązującą do poziomu morza sarmackiego, jest związane powstanie najniższej powierzchni zwanej Gornovița. Osady mórz miocenijskich wypełniły starsze doliny, które zostały odgrzebane w pliocenie i czwartorzędzie. Ich górne, zawieszane odcinki, to śródgórskie doliny źródłowe odziedziczone z trzeciorzędu. Dzięki temu główne doliny rzeczne zachowały układ promienisty.