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THE LIMESTONE PLATEAUS OF THE CAUSSES,  
SOUTHERN FRANCE

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(Abstract)

Professor **de Martonne** stated that the Causse are high limestone plateaus extending on the southern border of the highlands of central France. It is one of the rare examples of a natural region with a popular name, extending exactly as far as the geological formations which control its physical aspects. Nobody can fail to notice the change in topography when entering the limestone area. Water has disappeared from the surface, all valleys have become dry, many are changed into completely closed depressions called "sotch." These depressions are the only places where you can find some red soil, and, in the spring, some water; for this reason they are the only inhabited places on the plateaus. Sink holes, called "avens," are frequent; they lead to very extensive caverns, showing alternation of domes and narrow galleries, streams with cascades, lakes, splendid stalactites and stalagmites. There are not more than three valleys with water (Tarn, Jonte, Dourbie). Their depths range from 500 to 700 meters. Like the Canyon of the Colorado, they are cut in horizontal layers, showing benches in the weak beds (marls of the Lias and Middle Jurassic) and cliffs in the strong beds (more or less dolomitic limestone of the Jurassic). The cross-section and the width of the valley depends on the height at which the weak beds appear above the bottom. The total thickness of the Jurassic beds which built the Causse is much greater than the depth of the valleys. They have been dislocated by faults which can be very easily seen on the stony sides of the valleys, but do not ordinarily appear in the topography of the plateau, although the displacement can amount to over several hundred meters. The rugged but nearly level surface of the plateau may be considered as a peneplane<sup>1</sup> slightly modified by underground erosion and dissolution. From some well-selected points the continuity of the plateau of the Causse with the rolling surface of the highest summits of the Cévennes (Aigoual, Lozère) appears very clearly. At one point (Col de Perjuret) you can walk across a great fault separating the Jurassic area from the crystalline massif on a nearly level plain, while to the north and to the south you see subsequent valleys and cuestas developed by recent erosion.

<sup>1</sup>I agree entirely with the proposal of Prof. D. W. Johnson concerning the substitution of "peneplane" for "peneplain."—E. de M.

At some points on the surface of the limestone plateaus old gravels coming from crystalline massif may be found. The plateaus of the Causse seem to be a part of the highest and oldest of the three peneplane surfaces shown by Briquet and Demangeon in the central massif of France.<sup>2</sup> One may wonder why only one cycle of erosion seems to have been developed in the limestone region since the late Miocene, while two are shown in the crystalline area. The cutting of the main valley must have been very rapid, while all secondary valleys became dry and many were changed into closed depressions; so that the surface of the limestone plateau suffered only slight changes by underground erosion. The greatest changes certainly did occur in the caverns, and it would be possible to trace the shifting of the base level by the study of some of them. The fact that the main valleys carry water shows that they have reached the level at which torrential circulation in the caverns is relayed by a complete filling up of all hollows, some impermeable layers preventing a deeper infiltration of water.

It may be proposed to use the word Causse in speaking of limestone plateaus similar to these described here, when the surface is dry and very few valleys carry water. One can distinguish between Low Causse, High Causse and the Alpine Causse, referring to the depth of the valleys, the surface of the plateau being more rugged on account of stronger undermining by underground erosion, when the valleys are deeper. We have described High Causse. The Dordogne and Lot cross the lower Causse of Quercy. Alpine Causse are frequent in the limestone Alps of France (Vercors) and Austria (Steinernes Meer, Todtes Gebirge, etc.).

<sup>2</sup> A. Demangeon, *Le relief du Limousin*. *Ann. de Géographie*, 1910, p. 120. A. Briquet, *Sur la morphologie de la partie médiane et orientale du Massif Central*. *Ann. de Géographie*, 1912, p. 30, et 122.

