

GEOLOGICAL ORIGIN OF THE SOILS IN NORTHERN PANNONIA

BY J. SÜMEGHY

The parent rocks of the mean soil types in N. Pannonia, viz. the western part of Hungary lying west- and northwards from the Danube (Dunántúl and the northern part of the Kisalföld) are the followings: loesses red clays, fluvialite and dune sands, alluvia peat and the primary rocks exposed in the mountains. As far as superficial distribution is concerned, aeolic sediments play the chief rôle among them. The real and sandy varieties of loesses furnished chernozem, while the brown, reddish brown, pale brown and greyish brown varieties of the «red clay» yielded wood soils.

The most important parent rocks, corresponding soil-varieties and their occurrence:

Real loess	black and brown chernozem	N. part of the Kis-Alföld (Mátyusföld)
«Plain-loess»	chestnut-colour chernozem	Flat region stretching on S side of the Danube alluvium, Mezőföld.
Sandy loess	sandy, chestnut-colour colour chernozem	Kis-Alföld, Mezőföld, Somogy and Baranya counties.
Pale brown clay	degraded (pseudo-degraded) chernozem	S part of the Kis-Alföld, hills of Somogy, Tolna and Baranya counties.
Brown clay	wood soil	On the SE—NW slopes of the Pannonian Central Mountain and in Zala county.
Pale clay	grey wood soil	On the E foothills of the Alps.

Fluvialite and dune sands were intermingled with loesses or its weathering products, so that they led to soil varieties shapeing sandy chernozem, degraded chernozem or brown wood soils.

Soils deriving from alluvia (both bordering riverbeds and the microrelief of the country) are wide-spread. Their petrographic and chemical composition as well as pedologic characteristics depend on the varieties of aeolic matter dominating on each territory. On peat different types of neutralized and acid peat- and marsh-soils were developed. Their chemical characteristics are determined by the secondary aeolic anorganic matter. The weathering products of the rocks exposed in the mountains include even a certain amount of aeolic constituents.

As far the soils of the mountain slopes derived by eluvation from the underlying rocks are concerned, the customary scheme may be applied. In this sense coarse grained sands may be expected from the weathering of granites, clays from crystalline schists and clays or clayey sands from limestones and dolomites. There is no medium grained weathering product between the fine grained «eluvial» sheet and the coarse boulders imbedded in it. Aeolic matter is therefore an important ingredient of the sub-soils in the Transdanubian Mountain. Even the «rendzina»-soils developed on the barren surface of limestones and dolomites of Pannonia are not free from aeolic sediment.

It is hard to classify the soil types of N. Pannonia. The most important soil-forming factors, the geologic and climatic zones manifested themselves therefore in indistinct regions and reliefs. The soil-types and varieties influenced by small-scale climatic tracts (intra-zonal and azonal, typical and rudimentary varieties) may not be always satisfactorily distinguished and determined. The various kinds of reliefs (micro-, meso- and macro-reliefs) impede in many instances the evolution of soil types of customary accordance with climate and vegetation present. Besides climatic factors and natural vegetation the development of the soils in N. Pannonia is highly influenced by orographic, hydrographic and geologic conditions, not the least even by the cultivation so that produced soil-types show local divergencies from the general climatic and vegetational zones.

Climate and vegetation determine only the initial tendency of soil-forming, its further course is surveyed by the geological conditions. While soils of the hill-sides are exposed to abrasion of various intensity depending on steepness, plains are spots of accumulation and renewal of soil material. Soil profiles on mountain slopes are accordingly deficient, on hill-sides almost complete and on plains immature. Evolution of soils in N. Pannonia follows the general rule: soil-forming factors are most effective on even and calm territories where deriving soil varieties are determined by the elevations of the region.

The appearance of many transitional, pseudo-degraded soil-varieties of mixed origin is due to the mutual action of climatic and geologic factors. This is manifested even in the inner variability of soil-zones and in the development of a «complex» stripe between

them, N. Pannonia, as well as whole Hungary, lies on the boundary of humid and arid climate zones of Europe, hence both groups of soil-varieties are represented. Solar effects brought about subtropical climate due to the latitude of the region. To-day the N boundary of the subtropical climate (l. 45° N) crosses Mitrovica, its witnesses, the laterites and red soils (terra rossa) should appear actually only in the southernmost region of the contry. But in the Pleistocene this climate reached even N. Pannonia and moved southwards since then due to cold and humid currents burst in through the «gate of Vienna». Subtropical soil-types were replaced by the brown and grey soil-varieties of the moderate climate. Remnants of the subtropical red soils are to be found e. g. on the foothills of the Siklós and Mecsek Mountains.

The soils of N. Pannonia show that the influence of the eastern European climate exceeded the one of western Europe. The soils of the eastern foothills of the Alps wear common characteristics with the continental soil types of the Carpathian Basin. On the N, NW slopes pale, stony soils were developed with *Calluna vulgaris*, *Betula pendula*, *Populus alba*, *Pinus silvestris*, while on the S, SE slopes brown wood-soils with *Picea excelsa*, *Fagus silvatica* and *Castanea sativa*. All over N. Pannonia we can find besides the red, reddish brown clays even the brown, brownish grey and grey varieties on northwards steeping hillsides.

In N. Pannonia a great variability of soil types was developed due to its climate inclined to anomalies and the influence of its changeful relief, hydrography and vegetation obliterating climatic effects. The bulk of the occurring soil varieties is ranging to the H and Ca soils bound to their acid red clay and limy loess sub-soils. These soil-varieties were only indistinct marks of the relative altitudes. Local varieties are due to particularities of the parent rock or hydrography.