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Darnó-Line, a Structural Line in the Hungarian Basin

by S. Jaskó

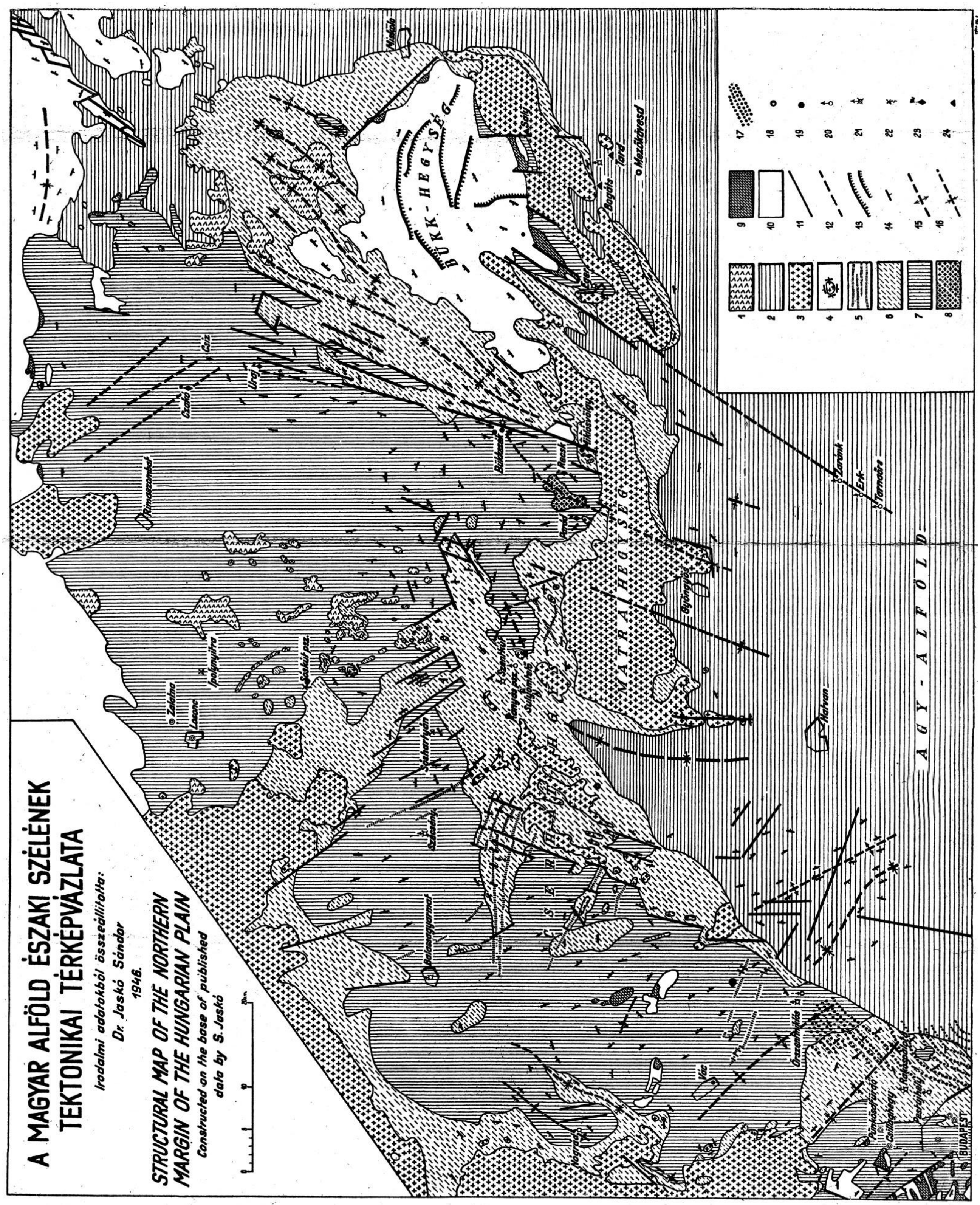
In this report structural observations were collected which refer to the margin of the Hungarian Basin between Budapest and Miskolc. The geological map was constructed with support of all published results of the detailed geological surveys in the Cserhát, Mátra and Bükk Mountains.

In the first part of this report results of Schréter, Vadász and Noszky sen. will be summarized completed with own observations about the general features of the region. In the second part an attempt will be made to determine the position of the region in the Alpine-Carpathian System.

Mesozoic-Palaeozoic formations appear only in isolated patches on the northern margin of the area, at Ipolyság, Vác, Sirok, Uppony and several points of the Bükk Mountain.

Palaeocene and Eocene beds are subordinate in these mountains bordering the Hungarian Plain on the N. They appear only in restricted chips connected with older formations. Their maximum thickness attains 250 metres.

Oligocene beds are much more important. Their extensive bands trend from Budapest to Recsk and Csiz having 1000-1200 metre average thickness. The Oligocene is represented in two facies.


A MAGYAR ALFÖLD ÉSZAKI SZÉLÉNEK
TEKTONIKAI TÉRKÉPVÁZLATA
Irodalmi adatokból összeállította:
Dr. Jaskó Sándor
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STRUCTURAL MAP OF THE NORTHERN
MARGIN OF THE HUNGARIAN PLAIN
Constructed on the base of published
data by S. Jaskó
BÜKK-HEGYSÉG

Fig. 1. Structural map of the Northern margin of the Hungarian Plain. — 1. Pliocene volcanic rocks (basalt, andesite) — 2. Pliocene sediments. — 3. Middle Miocene volcanic rocks (rhyolite, dacite, andesite) cover of effusive rock and agglomerate. - 4. Laccolith. - 5. Dike. — 6. Miocene sediments. — 7. Oligocene sediments. — 8. Upper Eocene and Lower Oligocene volcanic rocks. — 9. Eocene sediments. - 10. Palaeozoic and mesozoic basement formations.— 11. Fault.— 12. Supposed fault. — 13. Overthrust. — 14. General dip. — 15. Lifted areas (horsts and anticlines).— 16. Depressions (grabens and synclines). — 17. Undulations of the beds. — 18. Boreholes penetrating the Palaeogene without hydrocarbon traces.— 19. Productive oil well.— 20. Gas well. — 21. Gaseous saline well. — 22. Saline well without gas. — 23. Petroleum indication. — 24. Asphalt.

Near Budapest brackish and marine deposits were found including many fossils, while deposits on the NE part are poor in fossils and show petrographical analogies with the flysch facies. The occurrence of Pectunculus obovatus is restricted to the surroundings of Budapest, while Pecten corneus var. denudata was found only in the N part.

The Tertiary formations of the NE part differ sharply from the flysch in two respects:

1. The real flysch includes besides Oligocene, the Eocene and Cretaceous too. On the reported area they appear only in restricted littoral development.

2. The real flysch is intensely folded and overthrust, while the mentioned tertiary beds are autochtonous (according to our present knowledge). These Oligocene deposits form transition between the inner Carpathian flysch range and the normal marine-brackish deposits of the Hungarian Central Massif.

Miocene beds have 800 metre average thickness. The development is different on the Plain and in the marginal mountains. The marginal one begins with terrestrial and limnic deposits and turns only in higher levels into the schlier facies. Sarmatian and Pliocene beds were found only in bays protruding from the Plain into the mountain. Their thickness is increasing towards the Plain.

On the margin of the Hungarian Basin several layers of volcanic tuff are intercalating the deposits of different levels between the Upper Eocene, and the top of Pliocene. According to alternation and intensity of the eruptions 5 periods of volcanism were established:

1. Between the Upper Eocene and Lower Oligocene: rhyolitic and andesitic tuff around Budapest and on the S slope of the Bükk Mountains. Andesitic eruption of the Lahóca-Hill near Recsk.

2. Between the Upper Oligocene and Lower Miocene: the "lower rhyolitic tuff".

3. Between the Helvetian and Tortonian : dacitic and andesitic eruptions of the Mátra and Cserhát Mountains and the "middle rhyolitic tuff,,. This was the period of strongest volcanic activity.

4. Between the Upper Miocene and Lower Pliocene: the "upper rhyolitic tuff,,.

5. Between the Upper Pontian and Lower Levantean: basaltic eruptions around Salgótarján and Fülek, andesitic agglomerates at the N foot of Bükk Mountains.

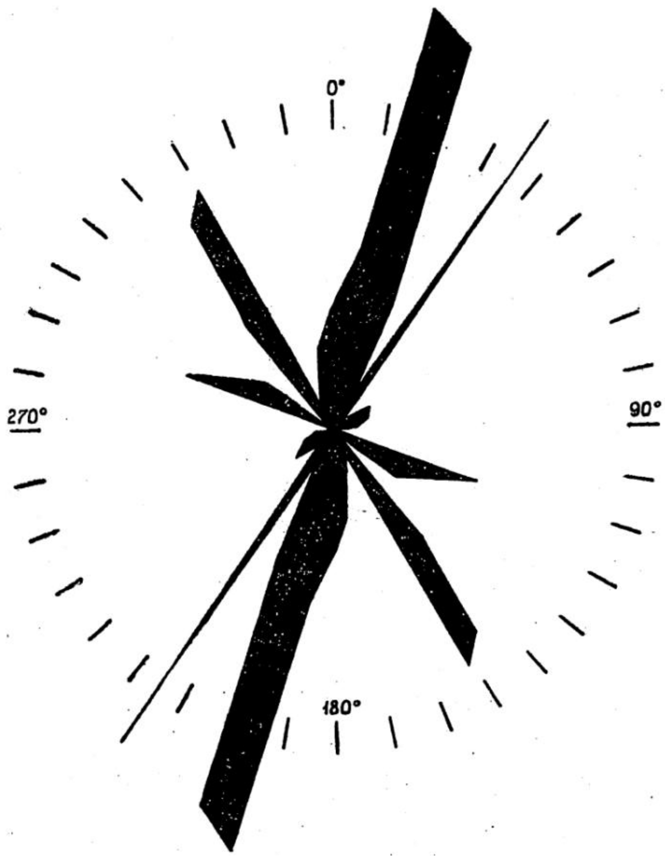

Fig. 2. - Statistical diagram showing the vector distribution of fractures.

Pyroclastic products of the second and fourth periods were not marked on the map. Eruption centres could not be determined and tuff layers became dislocated just as other beds. The coincidence of volcanic activity and dislocations is attested by tectonic discordances between conforming layers and by changing outlines of the depositing basins.

It is remarkable that stronger volcanic activities on the margin of the Hungarian Plain are connected with structural lines.

Parts of quiet geological structure are characterized by feeble volcanism.

Pre-Tertiary movements are related only briefly as lying beyond the special topic of this report. Mesozoic-Palaeozoic rocks were affected by folding and thrust-faults connected with the movements of the "central crystalline mass,, of the Carpathians (surely before the Oligocene). The Mesozoic-Palaeozoic formations moved later only en bloc being nuclei of diapiric folds or acting as resistant masses.

Oligocene and Miocene movements may be outlined as follows. Folding and faulting is combined producing structures between anticline and ridge fault or syncline and trough fault. Alternately folding or faulting factor dominates. No brachy-anticline systems could be observed on the area.

Structures between Budapest and Vác strike NW-SE-wards. The axis of the anticline of Nógrád-Kismaros stands nearly at right angle to these. The warping of Recsk-Bükkszék trends NE-SW-wards. The flattened prolongation of the Recsk-Bükkszék and Nagybátony folds can be followed through a double elbow shaped curve towards the Pliocene deposits of the Hungarian Plain (at Hatvan and GyGyöngyös). These structures show that no regional folding could have found place.

Anticlines are folds of the Tertiary cover due to uplifts and sinking along structural lines. Periclinal dips were sometimes caused by diapirs (Naszály) or volcanic laccoliths (Csódi-Hill, Karancs).

Fracture lines appear often in clusters forming zones of dislocations between territories of quiet structure. Three such zones were determined: I. On the line of Gacs-Salgótarján-Mátraszele in NNW-SSE direction. II. On the line Galgagyörk-Szécsény in NNE-SSW direction. III. On the line Bükkszék-Csiz-Tornaalja in NNE-SSW direction.

The third one is the most important called by Károly Róth "Darnó-Line" as observed first on the Darnó Hill at Sirok. The fractures are here very near to each other (the whole zone having a few 100 metres width) and produced great vertical dislocations. Towards the NE the fracture lines are diverging and produced dislocations decrease. At Ózd the zone of dislocations is 10 km wide. Further N-wards they are no more susceptible.

Farthest sign of these NNE-SSW dislocations is the edge of the Triassic mass at Tornalja. On the N of Csiz another fracture system is manifested, which has NNW-SSE strike.

The geological constitution is very different on both sides of the Darnó Line. Oligocene beds are much thicker on the W side than on the E one. Miocene beds are significant on the E side while lacking on the W.

This may be explained on two ways:

l. During the Savian and Styrian orogenesis the flanks on the sides of the Darnó Line might have alternatively risen and sunk. At the end of the Oligocene the E flank were lifted and strongly eroded. After the deposition of the Miocene beds the W flank had risen and eroded more intensely.

2. Horizontal dislocations and partial overthrusts might have taken place along the Darnó Line bringing distant deposits in contact.

On the W side of the Darnó Line Oligocene beds are arranged in a row of anticlines. The axis of this row crosses the Lahóca Hill near Recsk (5 km distant from the Darnó Line) and the anticline of Bükkszék (1 km distant from the Darnó Line).

Anticlines were observed farther N-wards at Fedémes, Járdánháza and Uraj. At Csiz a synclinal structure was established. The western limb of these anticlines was followed through 8-10 km, having gentle dip of < 30 degrees.

Their E limb is dissected by the Darnó-Line. Miocene beds between the Bükk Mountains and the Darnó-Line are arranged in two gentle anticline ranges. Parallel with them faults are manifested.

The movements, which affected the Darnó-Line, could have produced even horizontal dislocations. In this case difference might be revealed between the pre-Tertiary formations of the two flanks.

The fracture system of the Rudabánya-Martonyi area was produced by torsion between the Palaeozoic and Mesozoic formations due to regional folding. May be, that pre-Tertiary formations on the W side of the Darnó-Line - if exposed - would show different development, than their equivalents in the Bükk Mountains.

The fracture system of Rudabánya-Martonyi is trending farther to the NE marking the E boundary of pre-Tertiary rocks. From here on the continuation of the Carpathian arch (between the NW and NE Carpathians) is sustained only by the flysch and schlier formations.

Zone I. of the dislocations (Mátraszele-Salgótarján-Gacs) can be followed towards the margin of the Vepor crystalline to the volcanic area of Selmec-Körmöc.

Zone II. of the dislocations (Szécsény-Galgagyörk) can be followed SW-wards to Budapest as marked by the straight boundary of the Pontian beds. Drilling exposed the Mesozoic formations only on the W side of the line. It can be supposed that this line shows the contact of the granite massif of the Velence Mountains and the Mesozoic formations of the Transdanubian Central Mountains.

Chief fracture lines of the Rudabánya-Martonyi area are crossing the NE-SW strike of the metalliferous range at acute angle approaching right angle by torsion. The II. zone of dislocations crosses the Darnó line similarly. A NW-SE (70°) directed dislocation between them can be supposed below the volcanic area of Cserhát. Following the en echelon stepwise structure to the SW and the fracture between the Transdanubian Central Mountains and the Velence Mountains can be considered to be its prolongation.

These fracture systems developed during the Savian and Styrian orogenesis. Noszky sen. considers the SW (15-30°) directed faults to be Lower Pliocene, the NW (30-45°) directed ones Upper Pliocene. These movements could be renewed dislocations along pre-existent faults. Pliocene volcanic eruptions are independent from earlier fractures.

The accumulation of hydrocarbons is determined by the structure. Crests are characterized by oil and gas indications, while depressions (between Salgótarján, Szécsény and Losonc) by saline and iodine springs. Drilling on the margin of the Plain (around Budapest, near Losonc and Szalatna) found no trace of hydrocarbons.

The parent rock of hydrocarbons is Oligocene, they migrated later into the Miocene beds or even into effusive rocks (Sulyom-hill, Miklós valley). Anticlines worth prospecting are suspected even below the Pliocene cover of the Plain. The drilling at Tard did not yield economic results, but exposed Oligocene beds of conspicuous thickness. The parent rock of the hydrocarbons being present, convenient structures can be productive.

Oligocene structures are greatly concealed by Pliocene folding. Even these younger anticlines can store migrating hydrocarbons. The asphalt seams of Bogács and Tard were accumulated probably this way.

The connection between older and younger structures is documented besides the flattish anticlines near Gyöngyös and Hatvan by gaseous wells at Tarnaörs, Erk and Zaránk. Small-scale undulations of the tertiary beds around Budapest described by Pávai Vajna are continuous from the Oligocene to the Pliocene. These are due to local factors.

(Beszámoló a Földtani Intézet Vitaüléseiről, 1946, p.11-15)

The grey lag-goose (Anser anser L.) regularly breeder in Bácska.

Ladislas Szemere.

I observed this goose breeding in the forest-marshes between Bezdán and Monostorszeg (county Bács-Bodrog) from the year 1941 till 1944.

(Aquila, vol.51-54, 1947, p.183)

Little egrets in the Bácska.

Ladislas Szemere.

I saw little egrets (Egretta g. garzetta L.) between 1941—1944 on the Danube islands in the wood marshes between Bezdán and Monostorszeg, and once also in the immediately neighbourhood of the Station Monostorszeg. I met them also in the breeding time, but I could not find their nesting places.

(Aquila, vol.51-54, 1947, p.185)

The town Zombor

Ladislas Szemere

The town Zombor is a very home of the berry-eating birds. The streets of the town are edged along with celtis trees. On these trees gather not only the local birds, but also the winter-guests in great number. For instance also in the winter 1941—42, when the fieldfare and waxwing remained there nearly till April. — The house-pigeon likes also the berries of the celtis trees and while eating the berries it balances itself with very unusual cleverness on the thin branches. — There used to breed also some pairs of the swift (Micropus a. apus L.) in the town. — When I came to this town (in 1941), there were already plenty of Indian ring-doves.

(Aquila, vol.51-54, 1947, p.196)

Snake as prey of the sea-eagle.

Ladislas Szemere.

I observed in the spring 1944 in the county Bács-Bodrog on the island named "Kazuk" a sea-eagle to descend to the water and get its prey — a mighty viperine snake.

(Aquila, vol.51-54, 1947, p.199)