Uncertain informations were obtained about commercially valuable mica occurrences in the schist belts of Rodna and Preluka Mountains. The first aim of our survey was a thorough examination of the already discovered occurrences, for advising further investigations. Secondly the genetics and development of mica bearing pegmatites were studied by general petrographic and geologic investigation of the area.

I. General Geology of the Mica Occurrences

Latest description and a geological map of the region was accomplished by Theodor Kräutner: Das kristalline Massiv von Rodna (Ostkarpathen). Anuarul Institutului Geologic al României XIX. 1938. At our survey we relied on this outstanding monography. The great petrographic and tectonic units distinguished by Kräutner are shown in sketch no. 1. The first unit includes epizonal metamorphosed rocks (phyllits, quartz-schists, metamorphosed quartz-porphyries, marbles and epiamphibolites), the second one, mesozonal rocks (mica-schists, mesoamphibolites and marbles). Epizonal rocks are autochtonous covered by relics of an overthrusted nappe consisting of mesozonal rocks. Two larger fragments of these mesozonal rocks were discovered, the greater one around the Rebra valley, the smaller one on the Ünőkő (Ineu).

Mica bearing pegmatites occur in the mesozonal series of the Rebra valley. That of Ünőkő includes pegmatites but without profitable mica-content. Enclosed in a nappe the pegmatites lost connection with the intrusiva which originated them. The pegmatite dikes, 10—50 meters in length, few cm—few meter in thickness, intercalate the schist layers conformingly. The pegmatites were dissected by cross-faults, their fragments cropping out with uniform strike in form of a row of lenses.
In the mesozonal nappe no larger intrusive mass was found. The pegmatites are products of a separated batholite. Among the autochthonous epizonal rocks, several gneissic intrusions were established by Kräutner. Considering two occurrences viz. intrusions of the Nyerges (Negriasa) and that in the Szamos (Someș) valley near Újradna (Șanț), we agree with Kräutner in identifying them as orthogneisses, derived from granite. In the neighbourhood of these intrusions no pegmatite occurrences were observed.

On base of Kräutner's map we hoped to find the root of the pegmatites in the intrusions of the upper section of Rebra valley and that of Ányes (Anieș) valley. Kräutner showed, that these intrusions are surrounded by a contact-metamorphic envelop. Our examinations showed, that both above-mentioned gneiss occurrences are of sedimentary origin (psephitic gneiss) see fig. 1, 2. Rocks described by Kräutner, as contact metamorphosed were microscopically not yet studied, their origin therefore cannot be determined accurately. As far as our present knowledges, the rôle of igneous ingredients in forming these gneisses cannot be excluded, but their importance is undoubtedly restricted. From these formations pegmatites cannot be deducted at all.

Based on above facts, mica prospecting is to be confined within boundaries of the mesozonal schists around the Rebra valley.

II. Description of the Mica-bearing Pegmatites

1. A high pegmatite reef trends in S50°E direction at the junction of Rebra and Kis Rebra (Rebrișoara) rivers (Gura Rebrei) (Saw-mill of Rebra valley). The dike is exposed in 60 metre length of strike, 30 metre of height and 12 metre of width. On the top it dips S65°W-wards with 40°, at the bottom S40°W-ward with 50°. A 2—3 metre thick layer of the dike along the hanging wall consists of pure quartz. This mica prospect may yield useful material. Dislocated parts of this dike appear in the same strike southwards, on the eastern side of Rebra river (foot of La Medlocul Plaiului) in three isolated patches.

2. At the mouth of Scărișoara river is a 35 m long pegmatite exposure. Mica exploitation was arranged here by the fisc (see fig. 3). The dike is 3,20 metre thick and stretches to unknown depth, surely greater, than 12 metre. The dike dips S45°W-wards with 40°, its fractures are directed S30°E 85°. In the basement of the pegmatite an amphibolite dike is exposed by the Scărișoara river. At the southern end of the pegmatite dike amphibolite appears as its prolongation, so that dislocation along a S30°E 85° directed transversal fault is evident. Prolongation of the pegmatite separated by this fault was not discovered.
The structure of the pegmatite has no perceptible orientation. It includes several lenses of mica-schist (20—30 cm thick) lying along the strike. They differ distinctly from the pegmatite by their smaller mica-scales, abundance of tourmaline crystals (1—2 cm long, few mm thick, well developed except the terminal faces) and garnets of pea-sized grains. Crystals of the pegmatite attain far greater dimensions. Plates of gray felspar (microcline) reach 40×22 cm size, tourmaline crystals 23×9 cm, but a crosscut of 16×8 cm was even observed. The reddish crystals of garnet vary between 2—3 cm size, the biotites occurring chiefly along the mica-schist inclusions between 5—8 cm. Exceptionally 20×15 cm large muscovite sheets were found, but the average is 5×8 cm. The scales form 2 cm thick plates. Thick plates are brown coloured, less transparent, thin scales transparent. The altered samples from the surface have silvery glitter. Dark inclusions do not consist of ore — their thorough microscopical study was not yet accomplished. Quartz is never developed in crystals, but in stringers penetrating crystals of the white felspar. Individuals of white felspar, smaller than those of the gray variety, mass in aggregates. Distribution of minerals is not uniform throughout the dike, local enrichments of the ingredients are common. Where gray felspar dominates, mica is absent, while mica-rich parts are abundant in white felspar and tourmaline.

This occurrence is suitable for exploitation of mica, due to its considerable content of mica along its whole strike. Until now a 0.5 metre thick layer of an exposure of 35×5 metre was worked out.

3. On the Dosul Scărişoarei, southern side of the Scărişoara valley (in 1180 m altitude, measured with the aneroid) a pegmatite dike is cropping out in a 8—11 m high cliff. A central, 1—1.5 m thick layer has considerable mica content. At the bottom, mica scales occur scarcely, while in the upper part they are entirely lacking. The N75°E—S75°W striking dike intersects mica-schists of a S40°W 20° dip. The occurrence may be advised for prospecting.

4. On the slope of the Pescar ridge western side of Rebra valley a pegmatite dike is exposed in a quarry in 870 m altitude. The pegmatite is enclosed in S36°W 46° dipping mica-schists. The exposure is 16 m long and 3—4 m high. The actual thickness of the dike was not measured. Besides the occurrence no. 2, this is the most abundant in mica.

Southern prolongation of the pegmatite dike is marked by a lenticular mass in the mouth of the Pescar valley. It is mica-rich but due to its small extension it has no economic value. A section of the same dike was observed probably by Kräutner in the Pietri valley. This outcrop is now hidden by débris. Inhabitants of
the surroundings relate, that it have had a considerable mica content.

5. Pegmatite outcrops appear most clearly and numerously on the slope of Scărişoara, named Cura Ascuns.

The most northerly lying dike is exploited by a private enterprise. Workings where started next to the mine building, in 1230 m altitude. In this 25 m long, 4—5 m wide exposure pegmatite dips S20°E-wards with 45°, mica-schists of its hanging wall S15°W-wards with 50°. In the bed of the nearby little creek S35°W 55° dip was measured in pegmatite. The bulk of mica-rich pegmatite was already excavated from the quarry. Exploitation may be carried on only if a new mica-enrichment will be discovered.

The pegmatite dike trends from here NW-wards following the boundary of wood and pasture. Outcrops were found near the corner of the forest on the margin of the pasture and farther NW-ward at the Gizella adit.

This is driven in its 4 m length through a 3 m thick, S25°W 60° dipping pegmatite dike included in mica-schists. The exposed mica-enrichment was wholly exploited but from farther excavation new ones may be expected.

Terminal outcrop of this dike was observed on the bank of the Rebra river in 880 m altitude. The S30°W 55° dipping pegmatite occurs in micaschist. Its thickness attains 1 m, thinning out towards the SE. This pegmatite exposure is entirely exhausted.

Elongation of the same pegmatite dike was found again SE-wards from the above mentioned private mine towards the Picićorul Jepei ridge. On the top of this ridge in 1290 metre altitude the S45°W 60° dipping pegmatite is enclosed in mica-schists. Thickness of the dike exceeds 2 metres. It contains mica in considerable quantity.

The pegmatite outcrop on the western side of the Scărişoara ridge along the riding road seems to be the prolongation of the former dike. On the 4—5 m thick dike a S30°W 50° dip was measured. It is worth mentioning that farther to the W, loose blocks of mica-bearing pegmatite were found. Mica occurrences may be suspected even in this area, which was not yet surveyed thoroughly.

6. From the northeastern bank of the Rebra river at the mouth of Pescar brook (770 meter altitude) an other pegmatite dike trends on the Cura Ascuns towards Ø 1168 on the Picićorul Jepei, lying parallel with the former dike. It crosses the valley which originates at the private mine, in 1110 m altitude. From the edge of the pasture (1150 meter altitude) farther to the SE no outcrop was observed.

The only good exposure of the pegmatite dike is in the bed of a little tributary of the Rebra river near its mouth. Here a 30 metre
long, 5 metre wide section seems worth prospecting. The whole length has not been judged in lack of exposures.

Farther to the S two smaller dikes were established on the base of scattered blocks lying on the surface. Being not exposed at all, their value is uncertain.

7. On the map of Kräutner two pegmatites are shown in the saddle between Scărişoara and Detunata. Both were examined by us on the field. The lower one is of small dimensions, having no significant mica content. Mica-schists of its hanging wall dips S20°W-wards with 40°.

Blocks of the upper dike are spread on the slope of Detunata between 1580—1560 meter altitudes in a 100 metre long section. On the micaschist of its footwall a S35°W 30° dip was measured. The dike is worth investigations due to its mica plates reaching 10x10 cm size.

On the ridge extending from the Detunata towards the Cormaja valley three farther dikes were discovered. Their outcrops may be fixed as follows: 1. Beside the road, running underneath the peak at 1545 metre altitude. 2. Near ϕ 1344 of the ridge. 3. In the northern branch of Părăul Craiul at 1490 metre altitude. This later has a dip of S60°W 45°.

Among the blocks of the pegmatit no greater mica-content was observed; prospecting is advised on this area, based upon the considerable extension of the outcrops. These outcrops suggest, that the dikes established on the northern slope of the Detunata-Scărişoara ridge reach into the Cormaja valley.

III. Mica Content and Commercial Value of the Pegmatites.

Poor exposures yielded scarce details about the mica-content of the occurrences. Most reliable facts were obtained from the pegmatite exposure in the mouth of the Scărişoara valley. Calculation of mica-content of two farther pegmatites (the one at the saw-mill in Rebra valley and on the Pescar ridge) was attempted rather by guessing, than by accurate measurements.

Figures in the first column of the following tabulations express the summation of the spaces, occupied by each mineral species along a straight line drawn on the rock surface. Muscovite is divided into muscovite I. forming smaller crystals than 3 cm in diameter and muscovite II. the larger ones. Linear and weight percentages are counted from these data.
Pegmatite of Scărișoara.

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Occupied lengths</th>
<th>Linear %</th>
<th>Spec. grav.</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orthoclase</td>
<td>1.064</td>
<td>27.67</td>
<td>2.55</td>
<td>25.59</td>
</tr>
<tr>
<td>Microcline</td>
<td>408</td>
<td>10.61</td>
<td>2.56</td>
<td>9.85</td>
</tr>
<tr>
<td>Quartz</td>
<td>679</td>
<td>17.63</td>
<td>2.65</td>
<td>16.93</td>
</tr>
<tr>
<td>Tourmaline</td>
<td>314</td>
<td>8.16</td>
<td>3.12</td>
<td>9.24</td>
</tr>
<tr>
<td>Garnet</td>
<td>28</td>
<td>0.73</td>
<td>3.50</td>
<td>0.92</td>
</tr>
<tr>
<td>Muscovite I</td>
<td>1.174</td>
<td>30.54</td>
<td>2.95</td>
<td>32.67</td>
</tr>
<tr>
<td>Muscovite II</td>
<td>177</td>
<td>4.60</td>
<td>2.95</td>
<td>4.92</td>
</tr>
<tr>
<td></td>
<td>3.844</td>
<td>99.94</td>
<td></td>
<td>100.32</td>
</tr>
</tbody>
</table>

Pegmatite near the saw-mill of Rebra valley.

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Occupied lengths</th>
<th>Linear %</th>
<th>Spec. grav.</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orthoclase</td>
<td>623</td>
<td>31.1</td>
<td>2.55</td>
<td>29.0</td>
</tr>
<tr>
<td>Quartz</td>
<td>603</td>
<td>30.00</td>
<td>2.65</td>
<td>29.1</td>
</tr>
<tr>
<td>Muscovite I</td>
<td>578</td>
<td>28.9</td>
<td>2.95</td>
<td>31.2</td>
</tr>
<tr>
<td>Muscovite II</td>
<td>201</td>
<td>10.0</td>
<td>2.95</td>
<td>10.8</td>
</tr>
<tr>
<td></td>
<td>2.005</td>
<td>100.0</td>
<td></td>
<td>100.1</td>
</tr>
</tbody>
</table>

Pegmatite of Pescar ridge.

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Occupied lengths</th>
<th>Linear %</th>
<th>Spec. grav.</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orthoclase</td>
<td>548</td>
<td>45.8</td>
<td>2.55</td>
<td>42.0</td>
</tr>
<tr>
<td>Quartz</td>
<td>354</td>
<td>28.5</td>
<td>2.65</td>
<td>28.0</td>
</tr>
<tr>
<td>Muscovite I</td>
<td>75</td>
<td>6.7</td>
<td>2.95</td>
<td>7.5</td>
</tr>
<tr>
<td>Muscovite II</td>
<td>229</td>
<td>19.0</td>
<td>2.95</td>
<td>22.5</td>
</tr>
<tr>
<td></td>
<td>1.206</td>
<td>100.0</td>
<td></td>
<td>100.0</td>
</tr>
</tbody>
</table>

For obtaining accurate volume percentages linear proportions ought to be measured in three directions perpendicular to each other and taken average of them. Exposures did not allow measurement but in the plane of schistosity, therefore no average could be obtained. Counting with the cube of the obtained linear percentages would be mistaken due to the lamellar mica crystals, which cannot be regarded as isometric. Weight percentages were counted therefore by immediate multiplying of linear percentages with the specific gravity.
Before drawing conclusions from above data following circum­stances ought not to be overlooked: On the Pescar ridge the most micarich section of the pegmatite was exposed, at the time of measurements. At the saw-mill of Rebra valley surfaces of separated blocks were measured. These surfaces being cleavage planes preformed by pre­dominance of mica plates in them, show relatively high content of mica.

4.6 per cent profitable mica (muscovite II.) content measured on the pegmatite dike in the mouth of Scărișoara valley may approximate reality.

Based on calculations made on East-Alpine and American mica occurences, the content of rough mica was found 2—5% in the mica-rich „precious“ sections of pegmatite dikes. Lowest content yielding profit was of 2—3%.

The relative quantity of waste and trimmed mica in the product, and quality of mica could not be judged without taking in account the data of exploitation and sorting. In the Rebra valley, mining, adjustment and sorting is executed in a very primitive rude way, therefore only a partial extraction is obtained.

From the blocks, obtained by blasting mica is extracted by rough chiseling. The mica plates on which metamorphism produced cleavages, breaks, and folds, are often strongly damaged. This could be avoided if trimming would be executed by skilled labourers with finer tools. This way larger and undamaged plates could be obtained.

Most important features of mica classification is the transparency and absence of inclusions. The mica of the Rebra valley is convenient from this point of view belonging into classes 1—4 of the Indian sorting: 1. clear, 2. slightly stained, 3. fairly stained, 4. good stained.

Size of the cut mica plates cannot be foretold from the dimensions of the muscovite crystals occurring in pegmatite, just because they were sheared by metamorphism. The classification refers to uncleaved, un­scratched surfaces of mica, which can be cleaved by skilled hands to 1/1000 inch thin scales without diminution of size.

The bulk of the mica plates mined in the Rebra valley does not satisfy these requirements. The plates, free from any disturbance which can be cut out are of course much smaller than the raw crystals. Almost half part of the product fullfills the requirements of the three lowest classes of the classification, put up by the American Society for Testing Material. A small portion reaches the class no. 5. (rectangles of 1—2 x 2—2½ inches), slightly more the class no. 5½ (rectangles of 1½ x 2 inches). The bulk of the amount, which can be arranged in classes, belongs to class no. 6. („Punch“, above 1 square inch).

The waste can be used for manufacturing of „reconstructed mica“ and »micanit«. 1/1000 inch thin scales of mica, if free from inclusions
may be joined together to obtain plates suitable for electrotechnical purposes.

Despite the various purposes to which ground mica can be used (isolation, lubricant on wooden axes, decorative paints) the main lucrativity of a mica occurrence depends on its applicability in electrical industry viz. the average dimension of the plates. Average surface of mica plates above 22 cm² is supposed generally to be a proof of lucrativity.

As the mica product of Rebra valley does not undergo accurate sorting its proportionate distribution in classes could not be therefore calculated numerically. Considering above data it is evident, that average size of mica plates is far below 22 cm². Despite its relative clearness, mica of Rebra valley cannot compete — supposing free exchange of goods — with foreign (Indian, American) products.

In Scărişoara mine until August 1942 the State produced 1.000 kgs of „first class“ mica and 200 kgs of waste, in the Pescar mine 200 kgs of „first class“ mica and 100 kgs of waste. On the pegmatite dike of Scărişoara a 0,5 metre thick sheet of $35 \times 5 = 175$ square metre surface was mined viz. 87,5 cubic metre = 236 ton of rock material was put out until now. Before mining of the State started, exploitation of unknown extension was managed by a private enterprise. Supposing that the half of exploited rock material (118 tons) was mined by the State, the yielded 1200 kg mica is calculated as its 1%. (More accurate data could be obtained if the amount of the mine’s consumption of explosives would be accessible.)

As a result of our investigations it can be stated, that the maximum output, by connected exploitation of five occurrences (I. near the sawmill of Rebra valley, II. mouth of Scărişoara valley, III. Pescar ridge, IV. Across mouth of Pescar brook, VII. on Dosul Scărişoarei) may reach about 10 tons annually during 2—3 years. Larger quantity cannot be calculated due to the extreme variability of mica-content along the pegmatite dikes. Further prospecting may be arranged on the Scărişoara-Detunata ridge and in the Cormaja valley.

The area suitable for mica prospects is confined from the northwestern side by a flysh cover.

Production can be eventually increased by accepting the prospecting rights of the area occupied by privates. Though mica-rich parts are actually exhausted all over the area, systematical prospecting would reveal surely new ones. The need of correlation of prospecting and exploitation must be firmly emphasized.
A. Földvári și G. Pantó: Ivirile de pegmatită în Mții Rodnei.

Cu scopul de a clarifica poziția pegmatitelor după grupuri petrografice și unități tectonice, cercetează Mții Rodnei, pornind din lucrarea lui Krăutner. Cu toate că ivirile de pegmatite exploatable se găsesc în zona pânzei micasișturilor mezozonale, traversată de valea Rebrei, în această unitatea tectonică nu se găsesc masive intruzive, care ar putea fi puse în legătură genetică cu filoanele pegmatitice. Krăutner descrie intruziuni de ortogneisuri în autochtonul epizonal. Autorii arată că tocmai ivirile cele mai extinse de gneisuri (V. Anies și V. Rebrei) nu pot fi considerate ca fiind gneisuri de injecție, ci au o origine sedimentară. În legătură cu ele nu ne putem deci aștepta la desocperirea unor noi filoane de pegmatită. Conținutul de mică a filoanei dela Scărișoara este de 4,6%. Tablele de mică exploata te în cea mai mare parte aparțin în primele patru clase a le clasificației indiene.

Др. Фелдвари Аладар и Др. Панто Габор: МЕСТОРОЖДЕНИЕ СЛЮД В РАДНАЙСКИХ ГОРАХ.

Чтобы выяснить положения месторождения слюдоносных пегматитов со стороны петрографической и тектонической, они проводят исследование Раднайских гор на основании работ Крайтнера. Хотя месторождение пегматитов, подходящих для эксплоатации слюд органичиваются территорией покрова слюдяных сланцев, пересеченной долиной Ребра, в этой тектонической единице не находится таких интрузивных массы, с которыми песматитонные жилы могли бы быть приведены в генетическую связь. Ортogneйсовые интрузии Крейтнер описывает из эпизонального автохтона. Исследования авторов показали, что как раз гнейсы самых больших размеров (Аньеш и Долина Ребра) не могут рассматриваться, как инекционный гнейс, потому что они являются происхождения осадочного (псевфитгнейс). Вследствии чего, месторождения пегматических жил ожидать нельзя. Содержание слюды в пегматитовой жиле Скарикиосара представляет собою 4,6%. Главная масса добитой слюды относится к первым четырем разрядам индейской классификации.
A Radnai-havasok földtani térképe Kräutner T. 1938. évi felvétele nyomán

Geological map of the Radna mountains according T. Kräutner 1938

1. Kréta és terciér
   Cretaceous and Tertiary
2. Andezit
   Andesite
3. Fekete kvarcitpalák
   Black quartzite schists
4. Epizonális kristályos palák
   Epimetamorphic schists
5. Mezozonális kristályos palák
   Mesometamorphosed schists
6. Paragneisz
   Paragneiss
7. Ortogneisz
   Orthogneiss
8. Gneissinjekció (Kräutner) =
   paragneisz (Földvári—Pantó)
9. Kontaktpalák (Kräutner)
   Contact metamorphosed schists
   (Kräutner)
10. Pegmatitdús zóna
    Richly pegmatitic area
A Rebravölgy környéki csillámelőfordulások
Mica occurrences of Rebra Valley
Mapped by Földvári A.—Pantó G. felvétele

EXPLANATION:
1. Pegmatit
2. Gyakorlatilag felhasználható csillámelőfordulások és barométerrel megállapított tengerszint feletti magasságuk
3. Nem szálban álló pegmatit-tömbök
4. Muskó Pál bérletének határa

Micas occurrences of economic value with altitudes measured with aneroid

Limits of the area rented by Mr. Muskó