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TRANSPARENT LOESS HEAVY MINERALS OF NAPAJEDLA SURROUNDINGS

ABSTRACT: The work deals with the research task results about the transparent heavy minerals from the Napajedla surroundings loess exposures. The work tries to solve the problems of the qualitative and quantitative representation of the individual specific types (or groups) of the heavy minerals as well as mutual relations of the heavy minerals chosen from 6 size fractions: 0.04 till 0.05 mm, 0.05—0.063 mm, 0.063—0.10 mm, 0.10—0.16 mm, 0.16—0.20 and 0.20—0.25 mm, which were all gained from 14 loess samples of 4 localities (therefore 84 fractions in all). Besides other relations ensuing from the detailed sieve analyses results, from the heavy minerals separations (from 2 g of the made-up grounds) are studied here and at the end the results of the special analyses of 2 chosen grenat grains using the method of the electron microprobe analyzer (carried out in the laboratory of the Geological Central Institution in Prague) are mentioned.

INTRODUCTION

Within the framework of the department geological research tasks laid down by Ministry of Culture of CSR for the period of 7th fice-year plan the research task Transparent Loess Heavy Minerals of Napajedla Surroundings (under the designation NM-R2-3/7) was carried out. The whole research task was laid out into 4 main work stages: 1. The landscape survey connected with the taking of the illustrative and more voluminous loess samples (determined for further processing) and with the carrying out of the primary geological sketching of the found out exposures. 2. The laboratory processing of the loess samples till the making out of the microscopical powder preparations of the heavy minerals. 3. The qualitative and quantitative evaluation of the heavy minerals using the optical methods in the polarizing-microscope. 4. The results processing of the microscopical evaluation of the heavy mineral and the drawing of the final report on the carried out research.

The work on the research task was started in June 1981 (the landscape survey part) and the whole task was concluded by sending the above mentioned final report in March 1985 to the National Museum in Prague to the opponent trial which took place in front of the opponent commission of the National Museum on 7. 11. 1985.

The problems concerning the primary sources the loesses were blown out of as well as the questions of the exact age of loess sediments were not the purpose of this work and the research task only touched them. Another special research would have to be carried out for reliable enlightenment of these questions.

LANDSCAPE SURVEY

During the landscape survey stage 4 separate loess exposures in all were documented, 2 of them have been desolated for quite a long time (at the same time rather covered with talus deposits and overgrown with grasses) in loam pits of the past brickworks (localities I. and II.). Other 2 exposures are of less extent, partly it is the exposure at the past UFC facilities (locality III.) and partly it is the subtle exposure of the field way cut (locality IV.) which is situated most northerly of all. The situation of the separate loess localities is plotted in the cut-out of the topographic map with the scale 1:10 000 Napajedla (CSSR basic map lay out 25-33-03).

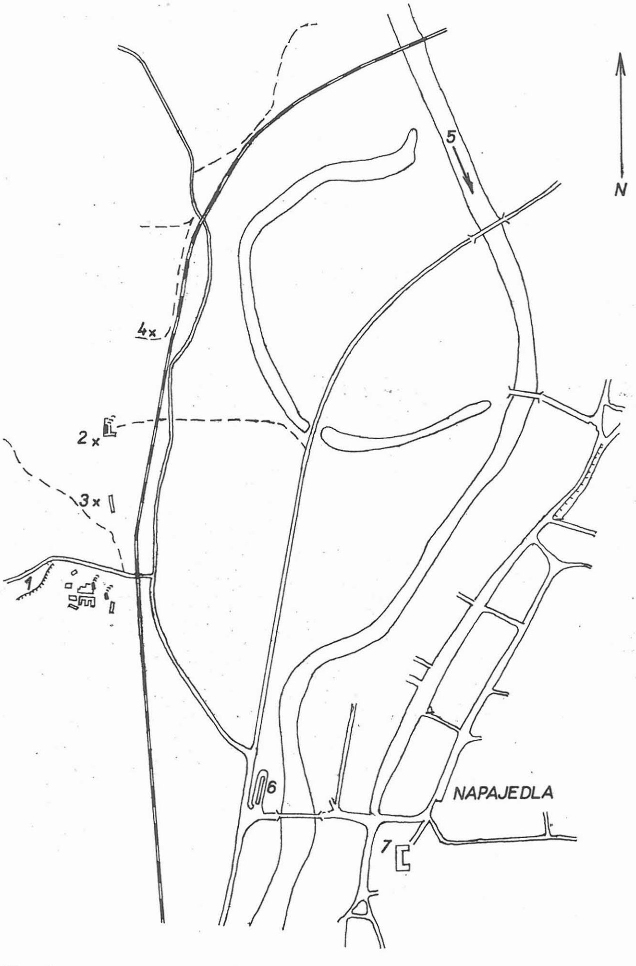

Fig. 1
Situation of all 4 loes localities (cut — cut of CSSR basic map scale 1:10 000 — in original).

Loess localities are marked by No. 1.—4. and a cross.
5 — the Morava r.
6 — bus station
7 — castle

Other natural loess exposures were not found in the Napajedla surroundings (not even during several other tours in the time of the landscape survey stage).

All plotted loess exposures (localities I.—IV.) occur only on the eastern side of the Morava valley and that is in accordance with the general knowledge about the loess originating in blowing out of rock powder by prevailing western or northern circulation (J. PELÍŠEK 1972). The mentioned knowledge was confirmed there by the fact that no other loess exposures were found on the opposite sides of the Morava river in the area of the Napajedla gateway at Napajedla and its nearest surroundings.

During the landscape surveys mostly petrographic-mineralogical knowledge of the 4 mentioned localities were found out and the data concerning the exposure descriptions were gained.

The questions of the age of the origin of the examined loess exposures could not be solved reliably during the landscape survey because no position traces of ancient soils (tobacco horizons) were found in one of the 4 localities and it is likely that there is only the youngest loess of stadial würm 3 on all documented exposures. This finding is also in accordance with the information mentioned in the article "The Central Morava Quarternary Sediments" by A. Zeman, P. Havlíček, D. Minaříková, M. Růžička and O. Fejfar, which appeared in the journal "Antropozoikum", year's volume 13 from 1980. The authors mention that on the north-western edge of the Vizovická Upland only young interstadial toils are known there and in the Fryštácká Cut no interglacial soils have been described yet. The loess exposures described in the Napajedla surroundings have similar character and belong as well to the areas (the geomorfological range according to T. Czudek 1972) mentioned in the quoted article.

During the actual landscape survey on the one hand the sampling of the undivided illustrative samples was carried out besides the graphical sketching and photographical documentation (for the purposes of general museum documentation) and on the other hand the samples of higher weight (about 3 kg in an average) were taken in the same places of the sketched exposures, which later serves for the successive laboratory processing.

The individual loess exposures (localities) are drawn on the geological sketches No. 1—5.

1. Locality (sketch No. 1):

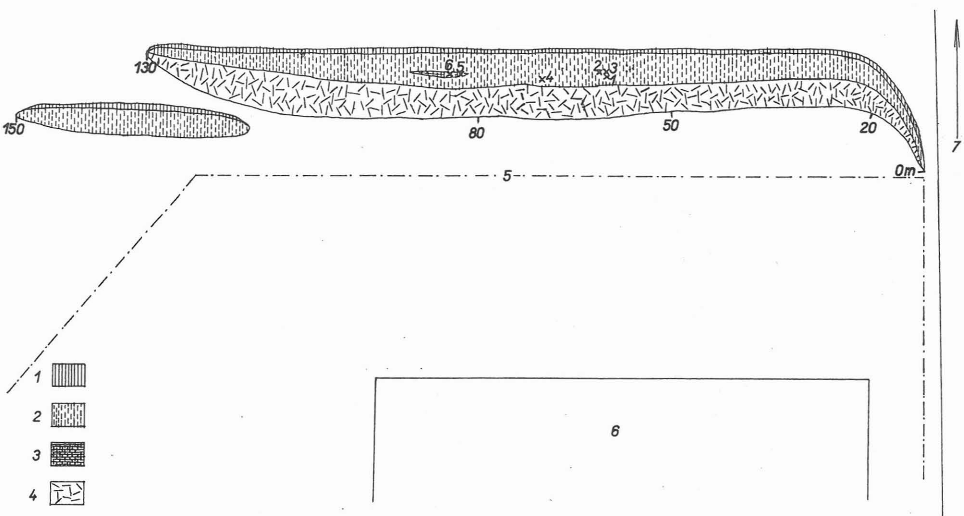

Fig. 2
Napajedla, the past loam pit desolated wall of the brickworks by the road to Halenkovice — locality No. 1. Scale 1:500 (in original)
Explanatory notes: 1 — loess soil (topsoil)
2 — loess

3 — loess with little layers sugestions
4 — loess talus deposits (with vegetations grouths)
5 — the enclosed part round the Agro — concern Gottwaldov facilities
6 — the past brickworks premises (nowadays Agro — concern)
7 — the road to Halenkovice

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the desolated remnants of the past brickworks loam pit walls (nowadays the facilities of Agropodnik Gottwaldov) on the left side from the Napajedla road — Halenkovice road. The right edge of the remnants of the past walls is situated about 200 m (at a vertical distance) to the west of the CST railway line (Břeclav—Přerov).

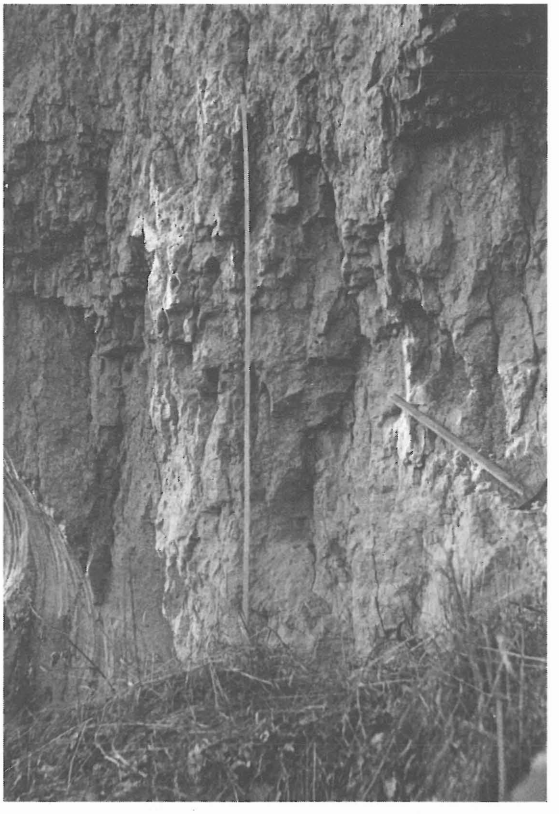
The main desolated wall is 135 m long and the farther (from Napajedla — Halenkovice road) smaller separate wall reaches 35 m long. The height of the main desolated wall ranges max. from 5,5—6 m including the upper topsoil but another 5 m under it there is still the height of talus which is partly overgrown with various vegetation (from grasses and shrubs to trees). The smaller separate wall reaches the max. height of 5 m including the topsoil. In all still preserved walls of the past loam pit there is loess of the typical light grey-yellowish colour. In the loess walls you can also sporadically notice some not too clear coarser grained sandy little layers and even an implication of fine cross bedding (herringbone structure) (in the position of about 1 m thick between 80—90 m exposure). On the surface of the present loess walls thin crusts of loam and loess are often formed, they were run down there apparently by run-off.

On the surface you can also see little holes and little pipes caused by plant roots (these are already mostly dried or putrefied but there are also little holes formed by various insects) (e. g. some kinds of solitary bees and wasps).

For the purposes of further laboratory processing 5 more voluminous samples in all were taken from the main desolated loam pit wall. They were taken from the same places of the loess wall as the undivided illustrative samples were before. At the same time the more voluminous sample No. 5 was also taken from the place of the illustrative sample No. 5 (altogether 6 illustrative samples were taken).

Fig. 3. Napajedla — locality No. 1 (the desolated brickworks loam pit by the road to Halenkovice). The wall with the taken samples No. 1—3.

Fig 4. Napajedla — locality No. 1 (the desolated brickworks loam pit by the road to Halenkovice). The detailed wall take with samples No. 1—3.



2. Locality (sketch No. 2 and 3):

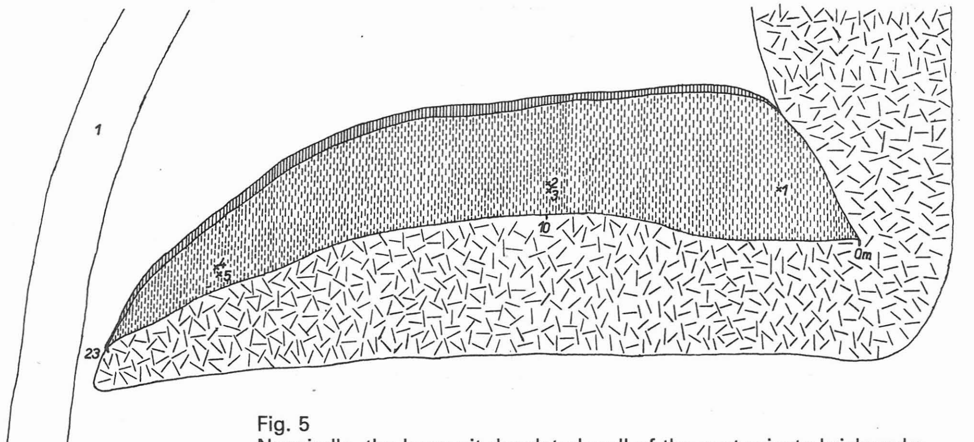


Fig. 5
Napajedla, the loam pit desolated wall of the past private brickworks — locality No. 2. Scale 1:100 (in original)
1 — the field way

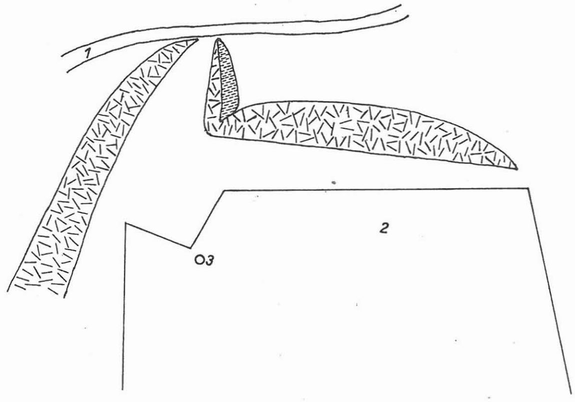


Fig. 6
Napajedla, the schematic sketch of the loam pit position and of the part of the past brickworks premises. Scale 1:1000 (in original)
1 — the field way
2 — the past brickworks premises
3 — the past circular brick kiln's chimney

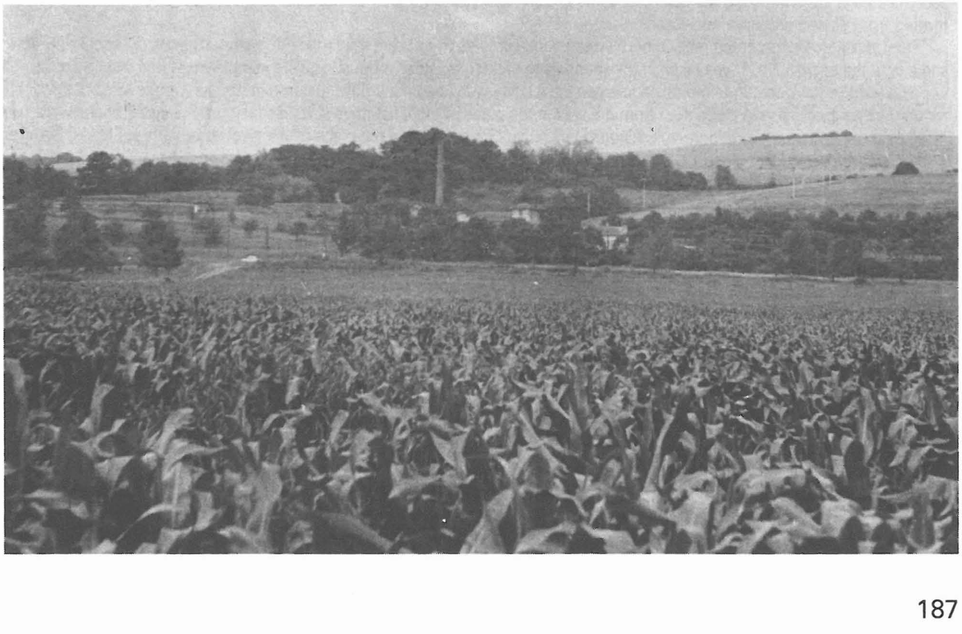
the desolated loam pit wall of the past private brickworks which is situated about 300 m to the north of the loam pit of 1[th] locality if need be this wall is about 150 m (at vertical distance) to the west-north-west of the Břeclav—Přerov railway line.

From the whole past loam pit of the brickworks only one side of loess wall 23 m long and about 4,5 m high max. is still preserved but at the same time under the wall there is still about 4,5 m height of loess talus which is overgrown with grass, brushes and little trees. The loess here has again mostly typical light greyyellowish colour but here and there subtle whitish calcareous pseudomycelia can be seen. Sporadically you can see there relatively hard oval (as if spiral wound) loess concretion from $CaCO_3$ — the lime nodules (the so called "hrkávka" — rattle-stone was found, it has an inner hole and while motioning the

Fig. 7. Napajedla — locality No. 2 (the desolated loam pit of the past private brickworks). The part of the exposed loess wall near sample No. 1.

Fig. 8. Napajedla — locality No. 2 (the desolated loam pit of the past private brickworks). The detailed wall take in the sampling place of sample No. 1.

Fig. 9. Napajedla — locality No. 2 (the desolated loam pit of the past private brickworks). The loess wall is covered by bushes and trees in the background of the past circular brick kiln's chimney of the premises. ▼



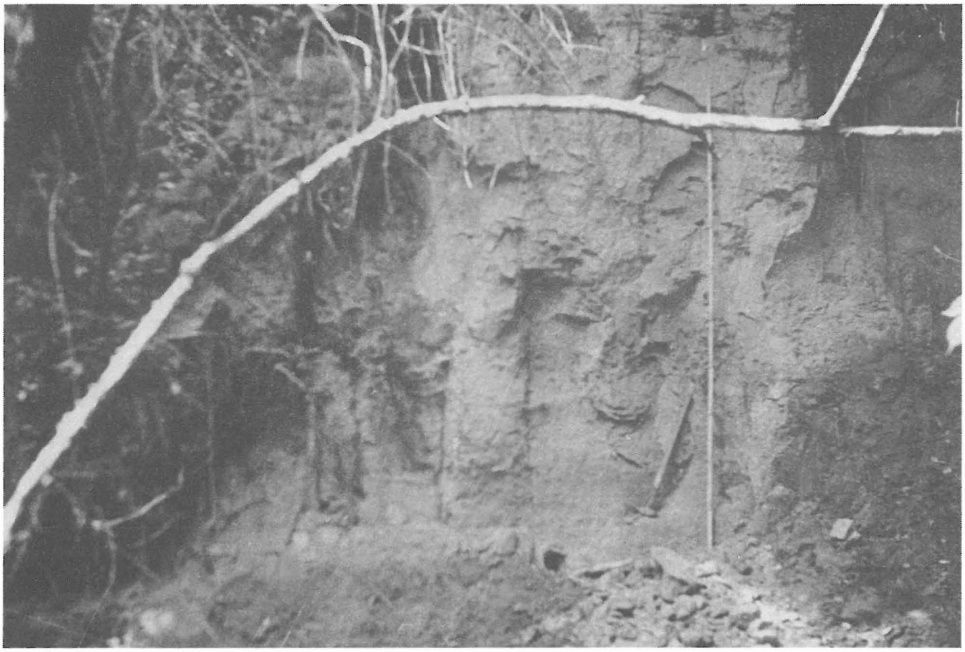


Fig. 10. Napajedla — locality No. 2 (the desolated loam pit of the past private brickworks). Still preserved loess wall take (hidden under the vault of bushes and trees' branches) — from its western border where samples No. 4 and 5 were taken.

fragments rattle). The loess concretions reach their size about 5 cm in diameter. In the places where more hydroxide Fe is accumulated in loess there are various rusty spots and schliers evident in the wall. You can also see here and there coats or crusts formed from ablationed loam and loess on this wall.

From this side documented wall 3 more voluminous samples in all were taken for the further laboratory processing. At the same time the sample No. 1 was taken in the same place of the exposure as the illustrative sample No. 1 (the illustrative samples were taken here more than one months ago when the locality was documented for the first time). The sample No. 2 determinated for the further analysis was taken then from the wall in the place of the illustrative samples taking No. 2 and 3 (these were taken close next to each other) and large voluminous sample No. 3 was taken in the place of the illustrative samples taking No. 4 and 5, which were taken again close next to each other.

3. Locality (sketch No. 4):

the wall loess exposure near the past facilities of UFC (the cowshed) which is situated between 1[th] and 2[th] localities that is 110 m at vertical distance from the CST railway line (Přerov—Břeclav) to the west-north-west direction.

The whole lenght of the wall (along its upper ridge) is 58 m and the height reaches max. 5 m. The still exposured wall but not continuous in its whole lenght any more — interrupted in about half of it and in this place the talus deposit already covered all its height. In this exposure as well there is a growth of grasses, brushes and little trees on the parts of the walls so filled with talus deposits. In the preserved parts of the walls the loess has again its typical light grey-yellowish colour and there are subtle calcareous pseudomycelia as well as oval harder limestone — calcite concretions apparent (the loess dolls of rattle-stone type) but in some places of the loess walls there are even harder concretions from more concentrated hydroxide Fe apparent.

In low sections of the both parts of the loess wall there are traces of certain fine loess bedding — you can see there thin reddish rusty but not always continous little beds with the higher content of hydroxide Fe. The restricted bedding of this place could have been the sympthom of certain local restricted redeposition of the material from the primarily older loess. When splitting this bed loess into slices you can also notice more abundant accumulation of little white tests and their fragments belonging to subtle youngpleistocene gastropores on the planes of division.

On the both sides of the loess walls just like on the former localities there are many subtle little holes caused partly by

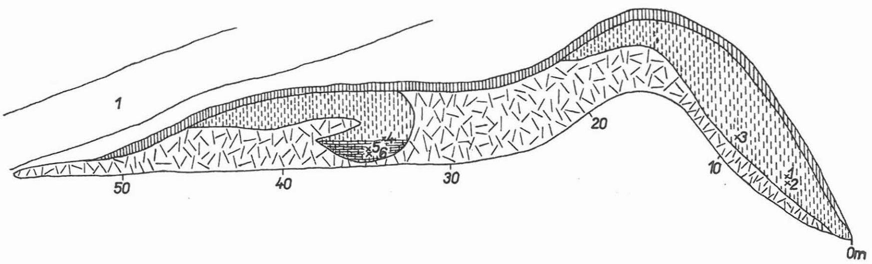


Fig. 11
Napajedla, the wall loess exposure near the past UFC propertly.
Scale 1:200 (in original)
1 — the field way
2 — the part of the past UFC propertly (cow-shed)

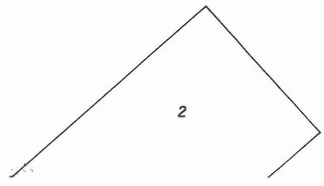


Fig. 12. Napajedla — locality No. 3 (the wall loess exposure by the UFC property — the past cow-shed). Both largest exposed walls of the whole exposure are taken in the picture.

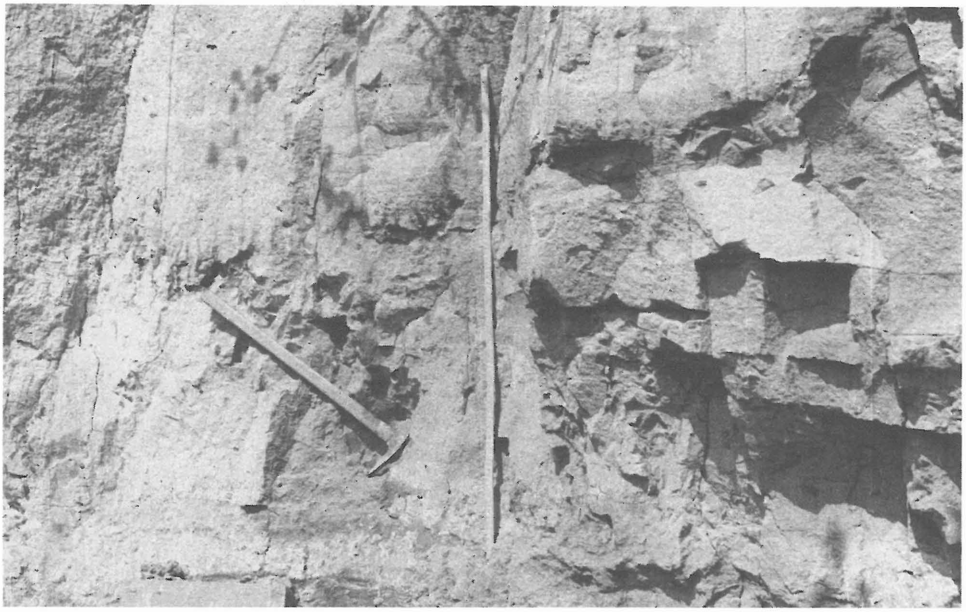


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Fig. 13. Napajedla — locality No. 3 (the wall loess exposure by the UFC property — the past cow-shed). The detailed take of the left uncovered wall with the places of samples No. 4, 5 and 6 taking.

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Fig. 14. Napajedla — locality No. 3 (the wall loess exposure by the UFC property — the past cow-shed). The detailed take of the loess wall's right side with the distinct perpendicular jointing and the place of samples No. 1 —3 taking.

vegetable tissues (various roots often still preserved) partly by insects visible. The loess walls heve developed here already mentioned thinner crusts caused probably by run-off.

From the both parts of this loess wall 3 voluminous samples (there were 6 illustrated undivided samples) were taken in all as follows: the voluminous sample No. 1 was taken in the place of the illustrative undivided samples No. 1 and 2 (they were taken close to each other), the voluminous sample No. 2 from the place of the illustrative sample No. 3 and the voluminous sample No. 3 from the place of the illustrative sample No. 5.

4. Locality (sketch No. 5):

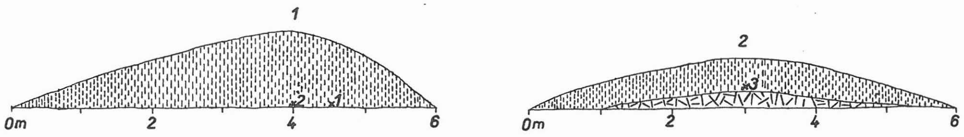


Fig. 15
Napajedla, the field way cut subble exposures — locality No. 4. Scale 1:50 (in original)
1 — rihgt side; 2 — left side

the field way cut turning to the orchard which is situated to the north-north-east of the locality No. 2. The cut is situated in the close nearness (about 52 m vertically of the line to the west-north-west) of the mentioned railway line.

The right and the left side of the field way cut is max. 6 m long, max. 110 cm high at the right side and max. 70 cm high at the left side. In the both sides the brownish yellowish greyish secondary loess till loess containing a bit larger admixture of humus

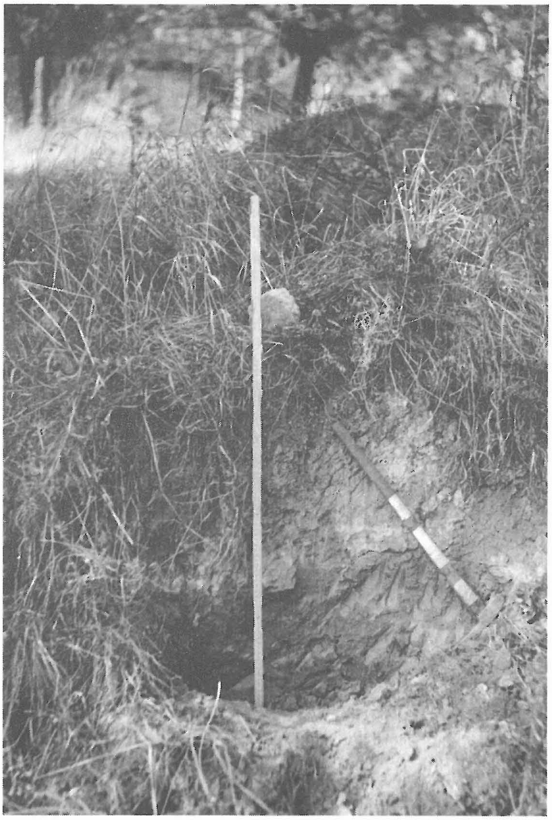
Fig. 16. Napajedla — locality No. 4 (the field way cut near the CST railway line). The view of the field way cut's right size in front of the trees group — behind the ploughed field.

Fig. 17. Napajedla — locality No. 4 (the field way cut). The detailed take of the cut's right side with the place of samples No. 1 and 2 taking.

constituent ingredient which may be caused partly by the fact that there is already once artificially drawn down material (in the next orchard there is terrace dressing treatment evident) is exposured. The loess till secondary loess contains even here subtle whitish calcareous pseudomycelia and little holes caused by vegetable or insect tissues, at the same time, however, in loess or secondary loess there were here and there perceivable even various grass roots etc., which have just grown over the sides of the cut.

From the right side of the cut 2 voluminous samples were taken and from the left side one such sample, all these 3 samples were taken at the same time from the places of the illustrative undivided sample taking.

Fig. 18. Napajedla — locality No. 4 (the field way cut). The detailed take of the cut's left side with the place of sample No. 3 taking.



LOESS SAMPLES LABORATORY PROCESSING

In the first phease of the laboratory works (in September 1981) the decantation of the weighted 1000 g and 500 g amount of the homogenized loess (the so called voluminous) samples and at the room temperature (about 20 °C) dried out was carried. The decantation was always carried out by the elutriation on the finest sieve with the mesh average of 0.04 mm in the elutriating laboratory sink when supplying lukewarm water (with the temperature of about 20 °C) — all fractions finer than 0.04 mm were removed. As the elutriation of the whole 1000 g sample on the sieve took relatively a long time (nearly 6 hours), only the sample No. 1 from 1th locality of the Napajedla surroundings was elutriated. All other samples (No. 2—5 from 1th locality and the samples No. 1—2 from 2nd locality) were that's why elutriated from the made-up ground 500 g each and the time of elutriation ranged roughly between about 2.5—5 hours. The rest 4 samples from the landscape survey in 1981 were decantated in October 1981 and the time for the elutriation of one 500 g made-up ground ranged between 3—5.5 hours.

Dr. Krystek, CSc., mentions in her candidate's work in 1975 that "reliable mineralogical research can be carried out only with the material which has grain size larger than 0.05—0.06 mm". These data are assumed from the E. Guenther work (1961) and the similar datus about the use of the decantation for the removal of the fraction under 0.66 mm was taken from the Carver work (1971). According to my own experience from the elutriation and in the end from the microscopical evaluation of the already ready powder preparations it is possible really to use the sieve from the mesh average 0.04 mm when elutriating the loess samples carefully and so to capture the upper limit of the granularity range of the actual loess which are from the typical mineral parts with the average 0.01—0.05 mm (Pelíšek 1972).

All the elutriated remains on the sieve 0.04 mm were always removed into the prepared valves and then dried out and weighted. The weights of these 11 elutriated remains ranged from 145 g i. e. 29 % to 275 g i. e. 55 %.

In the further part of the laboratory processing a shaker apparatus "Vipo" on which the set of these sieves were arranged (from the bottom): 0.04 mm, 0.063 mm, 0.10 mm, 0.16 mm, 0.20 mm and quite on the top 0.25 mm. Every elutriated and dried out rest was first poured on the upper sieve with mesh average 0.25 m and after covering the upperest sieve and fastening by a rubber girth, it was possible to switch the apparatus on. The time of the sieves shaking was mostly about 20 minutes. Continuously growing and slowing (to the end of the time) speed of the run of the apparatus was chosen. Thus these 6 size fractions were gained from every sample: 1) 0.04—0.05 mm, 2) 0.05—0.063 mm, 3) 0.063—0.10 mm, 4) 0.10—0.16 mm, 5) 0.16—0.20 mm and 6) 0.20—0.25 mm.

In addition to that while sieving there was always even less undersizes remains (under the sieve 0.04 mm) and even more less oversizes remains (over the sieve 0.25 mm). Individual size fractions acquired by unsieving were always accurately weighed on semi-automatic scales (accurate to 0.01 g).

The decantation and the sieving of the loess samples taken in 2nd part of the landscape survey (September 1983) were carried out in November 1983. For the acceleration of the decantation processing by elutriation on the sieve 0.04, 4 made-up grounds (250 g each) were prepared for every sample and each was elutriated separately. The time of elutriation of 1 made-up ground was thus shortened to 1/2 to 1 hour. These 4 elutriated and dried up remains from 250 g made-up grounds of every sample were then poured together and it caused that the initial weight of every individual sample at the beginning of the decantation was 1000 g. This initial weight at the time of the beginning of the decantation was important mainly because the individual unsieved size fractions wieght may be higher (than it was with the samples elutriated in 1981 — only from 500 g made-up grounds). It was important to ensure the higher weight of these fractions from that reason above all: with these first 11 processed samples there were several fractions the weight of which did not reach even the neede 2 g necessary for the actual separations by heavy liquid and owing to this only small amount of the separated grains of the heavy materials could be acquired. These grains did not make their entirely reliable microscopical qualitative and quantitative evaluation possible.

The weights of the decantated 1000 g made-up grounds from the 3 samples carried out in November 1983 were with the sample No. 1 435 g in all i. e. 43.5 % of the primary weight of the sample No. 1, then it was 437 g i. e. 43.7 % of the primary weight of the sample No. 2 and with the sample No. 3 the decantated made-up ground of the weight 489 g was 48.9 % of its primary weight.

In the further stage of the laboratory processing of the loess samples (again accurate to 0.01 g) 2 g of made-up ground of the every separate size fraction accurately weighted on were got ready and then the actual separation of the heavy minerals followed. For the separations the heavy liquid bromoform (with bulk specific gravity 2.8846—2.8896 according to the data of the sticker of Reachim works in U.S.S.R.) was used.

The separations were always carried out in the column of 6 glass separators (for all 6 size fractions of each sample). 2 g made-up grounds were always after pouring into the upper funnels with bromoform several times over mixed with glass stirrig rods. At the same time it became evident however that the heavy minerals ramained deposited on the sides of the glass funnels especially the finest fractions (0.04—0.05 mm and 0.05—0.063 mm) and when opening the outlet valve they are only whipped off with difficulty by the running stream of the heavy liquid out of the funnel for catching into the filter paper under the little hope with the outlet valve. So that the most little grains of the heavy minerals (recovery factor) were gained, the special small spatula were made (from small pieces of polyethylen hoses through which the separated heavy minerals were let out from the upper separation funnel) which were fastened with the thin copper wires to the glass rods. By using these spatula the deposited layers of heavy minerals could be wipped off well in the direction of the funnel mouth to the outlet valves. As soon as it could be found out by the look through the glass funnel that no other thin layers deposit on the funnels' sides (nor when mixing the made-up ground several times in bromoform) — it could be possible to open the valves for a short time (only in seconds) and to let out the little stream of the heavy liquid with the grains of the heavy minerals to the prepared cornet of filter paper on the lower funnels. The filtrated heavy minerals were then washed by pure denaturated alcohol, dried, wrapped and carried over for weighing. In a balance room of the laboratories all the gained separated heavy minerals were accurately weighed on analytical balance (accurate to 0.0001 g).

The weights of 66 separated heavy minerals from 1st part of the laboratory processing (in 1981) ranged from 0.0405 to 0.0006 g. In 2nd part of the laboratory processing (in 1983) the weights of the 18 separated heavy minerals from the 3 separated samples ranged from 0.0109 to 0.0487 g — generally thus were a bit higher than the weights of the heavy minerals from 1981.

The final stage of the lab processing of the loess samples was making out of constantly fixed microscopical powder preparations in Canada balsam. Considering to the size of the gained object carriers, 2 preparations could be mostly made out on one object carrier (always 2 linking up size fractions).

In 1st part of the lab processing — these preparations making out stage, 59 preparations altogether were prepared (at the turn of the years 1981 and 1982). From the whole number of 66 separated size fractions it could not be possible with 5 fractions to make out constantly fixed preparation because their weight was not sufficient enough (0.0028 g, 0.0006 g, 0.0030 g, 0.0011 g and 0.0014 g). The fractions of these small weights of heavy minerals could be evaluated qualitatively and quantitatively only as loose little grains in the droplet of imersions liquid (again bromoform was used). The droplet was carefully placed on the horizontally fixed object stage of the polarising microscope which however had its disadvantages (while revolving the object stage the loose little grains of heavy minerals can even at inappreciable centrifugal force displace in various ways and probably escape out of the viewing field, the used liquid is relatively evaporated rapidly and its evaporations are toxic. There were certain advantages of this way of the microscopical analyses. When very sensitive handling the little grains of heavy minerals can be examined from different sides and relevantly chosen just those that are needed to be examined separately by other methods) which was used when preparing some little grains of heavy minerals for the analysis using laser and electron microprobe analyzer — it is mentioned at the end of this work.

In 2nd part of the lab processing (the stage of microscopical preparations getting ready) all 18 microscopical preparations of heavy minerals from the same number of the separated fractions were made out at the beginning of 1984. Save several exceptions sufficient number of loose little grains in the paper storage bins always remained after the making out of the constantly fixed powder preparations. That's why it is possible with these fractions both making out of the further constantly fixed preparation and the examination of the little grains entirely loose in the imersion liquids by a great number of further analysis methods.

Sieve Analyses and Heavy Minerals Separations Results

I. Napajedla — locality No. 1

Sample No. 1

A. Percentages of all the size fractions from the loess sample primary weight of 1000 g

a) undersize (= remains under the sieve 0.04 mm after unsieving: 40.32 g)
+ powder (partly) and clayish decantated fractions (568.74 g)
= 609.06 g = 60.91 % from the primary sample of 1000 g

b)	fr. 0.04 —0.05 mm:	sieved out	138.14 g = 13.81 %	from prim. 1000 g
c)	fr. 0.05 —0.063 mm:	sieved out	114.14 g = 11.41 %	from prim. 1000 g
d)	fr. 0.063—0.10 mm:	sieved out	121.71 g = 12.17 %	from prim. 1000 g
e)	fr. 0.10 —0.16 mm:	sieved out	12.86 g = 1.29 %	from prim. 1000 g
f)	fr. 0.16 —0.20 mm:	sieved out	2.14 g = 0.21 %	from prim. 1000 g
g)	fr. 0.20 —0.25 mm:	sieved out	0.99 g = 0.10 %	from prim. 1000 g
h)	oversize (over 0.25 mm):	sieved out	0.96 g = 0.10 %	from prim. 1000 g
			total 100.00 %	

B. Reciprocal percentage of the individual 6 size fractions (used for the heavy minerals separations): their total weight 389.98 g = 100 %.

a)	fr. 0.04 —0.05 mm:	sieved out	138.14 g = 35.42 %	from prim. 389.98 g
b)	fr. 0.05 —0.063 mm:	sieved out	114.14 g = 29.27 %	from prim. 389.98 g
c)	fr. 0.063 —0.10 mm:	sieved out	121.71 g = 31.21 %	from prim. 389.98 g
d)	fr. 0.10 —0.16 mm:	sieved out	12.86 g = 3.30 %	from prim. 389.98 g
e)	fr. 0.16 —0.20 mm:	sieved out	2.14 g = 0.54 %	from prim. 389.98 g
f)	fr. 0.20 —0.25 mm:	sieved out	0.99 g = 0.25 %	from prim. 389.98 g
			total 99.99 %	

C. Percentages of the unseparated heavy minerals (recovery factor) from 2 g made-up grounds of the unsieved fractions (except the fraction 0.20—0.25 mm with it there was the total weight as the made-up ground used because of its small unseparated amount)

a)	fr. 0.04 —0.05 mm:	unseparated	0.0098 g = 0.49 %	from 2 g made-up g
b)	fr. 0.05 —0.063 mm:	unseparated	0.0154 g = 0.77 %	from 2 g made-up g
c)	fr. 0.063 —0.10 mm:	unseparated	0.0113 g = 0.56 %	from 2 g made-up g
d)	fr. 0.10 —0.16 mm:	unseparated	0.0185 g = 0.92 %	from 2 g made-up g
e)	fr. 0.16 —0.20 mm:	unseparated	0.0059 g = 0.30 %	from 2 g made-up g
f)	fr. 0.20 —0.25 mm:	unseparated	0.0028 g = 0.28 %	only from 0.99 g
			total 0.0637 g, ∅ rec. fac. 0.55 %	

D. Reciprocal percentage of 6 individual separations of the heavy minerals (the total weight of all 6 separations of heavy miner. is 0.0637 g = 100 %).

a)	fr. 0.04 —0.05 mm:	0.0098 g = 15.38 %	from total weight 6 sep.
b)	fr. 0.05 —0.063 mm:	0.0154 g = 24.18 %	from total weight 6 sep.
c)	fr. 0.063 —0.10 mm:	0.0113 g = 17.74 %	from total weight 6 sep.
d)	fr. 0.10 —0.16 mm:	0.0185 g = 29.04 %	from total weight 6 sep.
e)	fr. 0.16 —0.20 mm:	0.0059 g = 9.26 %	from total weight 6 sep.
f)	fr. 0.20 —0.25 mm:	0.0028 g = 4.40 %	from total weight 6 sep.
		total 100.00 %	

Sample No. 2

A. Percentage of all the size fractions from the loess sample primary weight of 500 g

a) undersize (= remains under the sieve 0.04 mm after unsieving: 12.85 g) + powder (partly) and clayish decantated fractions (275.95 g) = 288.80 g i. e. 57.76 %.

b)	fr. 0.04 —0.05 mm:	sieved out	109.04 g = 21.81 %	from prim. 500 g
c)	fr. 0.05 —0.063 mm:	sieved out	62.82 g = 12.56 %	from prim. 500 g
d)	fr. 0.063 —0.10 mm:	sieved out	34.71 g = 6.94 %	from prim. 500 g
e)	fr. 0.10 —0.16 mm:	sieved out	3.51 g = 0.70 %	from prim. 500 g
f)	fr. 0.16 —0.20 mm:	sieved out	0.62 g = 0.12 %	from prim. 500 g
g)	fr. 0.20 —0.25 mm:	sieved out	0.20 g = 0.04 %	from prim. 500 g
h)	oversize (over 0.25 mm):	sieved out	0.30 g = 0.06 %	from prim. 500 g
			total 99,99 %	

B. Reciprocal percentage of the individual 6 size fractions (used for the heavy minerals separations): their total weight 210.90 g = 100 %.

a)	fr. 0.04 —0.05 mm:	sieved out	109.04 g = 51.70 %	from prim. 210.90 g
b)	fr. 0.05 —0.063 mm:	sieved out	62.82 g = 29.79 %	from prim. 210.90 g
c)	fr. 0.063 —0.10 mm:	sieved out	34.71 g = 16.46 %	from prim. 210.90 g
d)	fr. 0.10 —0.16 mm:	sieved out	3.51 g = 1.66 %	from prim. 210.90 g
e)	fr. 0.16 —0.20 mm:	sieved out	0.62 g = 0.29 %	from prim. 210.90 g
f)	fr. 0.20 —0.25 mm:	sieved out	0.20 g = 0.09 %	from prim. 210.90 g
			total 99.99 %	

C. Percentages of the unseparated heavy minerals (recovery factor) from 2 g made-up grounds of the unsieved fractions (except the fraction 0.16—0.20 mm and 0.20—0.25 mm with it there was the total weight as the made-up ground used because of its small unseparated amount).

a)	fr. 0.04 —0.05 mm:	unseparated	0.0078 g = 0.39 %	from 2 g made-up g
b)	fr. 0.05 —0.063 mm:	unseparated	0.0100 g = 0.50 %	from 2 g made-up g
c)	fr. 0.063 —0.10 mm:	unseparated	0.0144 g = 0.72 %	from 2 g made-up g
d)	fr. 0.10 —0.16 mm:	unseparated	0.0146 g = 0.73 %	from 2 g made-up g
e)	fr. 0.16 —0.20 mm:	unseparated	0.0051 g = 0.82 %	separ. only fr. 0.62 g
f)	fr. 0.20 —0.25 mm:	unseparated	0.0006 g = 0.30 %	separ. only fr. 0.20 g
			total: 0.0525 g Ø recov. fac. 0.58 %	

D. Reciprocal percentage of 6 individual separations of the heavy minerals (the total weight of all 6 separations of the heavy minerals: 0.0525 g = 100 %).

a)	fr. 0.04 —0.05 mm:	0.0078 g = 14.86 %	from total weight 0.0525 g
b)	fr. 0.05 —0.063 mm:	0.0100 g = 19.05 %	from total weight 0.0525 g
c)	fr. 0.063 —0.10 mm:	0.0144 g = 27.43 %	from total weight 0.0525 g
d)	fr. 0.10 —0.16 mm:	0.0146 g = 27.81 %	from total weight 0.0525 g
e)	fr. 0.16 —0.20 mm:	0.0051 g = 9.71 %	from total weight 0.0525 g
f)	fr. 0.20 —0.25 mm:	0.0006 g = 1.14 %	from total weight 0.0525 g
		total: 100.00 %	

Sample No. 3

A. Percentage of all the size fractions from the loess sample primary weight of 500 g

a) undersize (= remains under the sieve 0.04 mm after unsieving: 16.65 g) + powder (partly) and clayish decantated fractions (in all 311.05 g) = 327.70 g i. e. 65.54 %.

b)	fr. 0.04 —0.05 mm:	90.42 g = 18.08 %	from prim. 500 g
c)	fr. 0.05 —0.063 mm:	38.22 g = 7.64 %	from prim. 500 g
d)	fr. 0.063 —0.10 mm:	35.73 g = 7.15 %	from prim. 500 g
e)	fr. 0.10 —0.16 mm:	7.15 g = 1.43 %	from prim. 500 g
f)	fr. 0.16 —0.20 mm:	0.39 g = 0.08 %	from prim. 500 g
g)	fr. 0.20 —0.25 mm:	0.17 g = 0.03 %	from prim. 500 g
h)	oversize (over 0.25 mm):	0.22 g = 0.04 %	from prim. 500 g
		total: 99.99 %	

B. Reciprocal percentage of the individual 6 size fractions (used for the heavy minerals separations): their total weight is 172.08 g = 100 %.

a)	fr. 0.04 —0.05 mm:	90.42 g = 52.55 %	from total weight 172.08 g
b)	fr. 0.05 —0.063 mm:	38.22 g = 22.21 %	from total weight 172.08 g
c)	fr. 0.063 —0.10 mm:	35.73 g = 20.76 %	from total weight 172.08 g
d)	fr. 0.10 —0.16 mm:	7.15 g = 4.16 %	from total weight 172.08 g
e)	fr. 0.16 —0.20 mm:	0.39 g = 0.23 %	from total weight 172.08 g
f)	fr. 0.20 —0.25 mm:	0.17 g = 0.10 %	from total weight 172.08 g
		total: 100.01 %	

C. Percentages of the unseparated heavy minerals (recovery factor) from 2 g made-up grounds of the unsieved fractions (except the fraction: 0.16—0.20 mm and 0.20—0.25 mm with it there was the total weight as the made-up ground used because of its small unseparated amount).

a)	fr. 0.04 —0.05 mm:	unseparated	0.0045 g = 0.22 %	from 2 g made-up g
b)	fr. 0.05 —0.063 mm:	unseparated	0.0124 g = 0.62 %	from 2 g made-up g
c)	fr. 0.063 —0.10 mm:	unseparated	0.0129 g = 0.65 %	from 2 g made-up g
d)	fr. 0.10 —0.16 mm:	unseparated	0.0069 g = 0.34 %	from 2 g made-up g
e)	fr. 0.16 —0.20 mm:	unseparated	0.0030 g = 0.15 %	from tot. we. 0.39 g
f)	fr. 0.20 —0.25 mm:	unseparated	0.0011 g = 0.06 %	from tot. we. 0.17 g
			total 0.0408 g Ø rec. fact.: 0.34 %	

D. Reciprocal percentage of 6 individual separations of the heavy minerals (the total weight of all 6 separations of heavy miner. 0.0408 g = 100 %).

a)	fr. 0.04 —0.05 mm:	0.0045 g = 11.03 %	from total weight 6 separ.
b)	fr. 0.05 —0.063 mm:	0.0124 g = 30.39 %	from total weight 6 separ.
c)	fr. 0.063 —0.10 mm:	0.0129 g = 31.62 %	from total weight 6 separ.
d)	fr. 0.10 —0.16 mm:	0.0069 g = 16.91 %	from total weight 6 separ.
e)	fr. 0.16 —0.20 mm:	0.0030 g = 7.35 %	from total weight 6 separ.
f)	fr. 0.20 —0.25 mm:	0.0011 g = 2.70 %	from total weight 6 separ.
		total: 100.00 %	

Sample No. 4

A. Percentage of all the size fractions from the loess sample primary weight of 500 g

a) undersize (= remains under the sieve 0.04 mm after unsieving: 38.33 g + powder (partly) and clayish decantated fractions (in all 299.36 g) = 337.69 g i. e. 67.54 %.

b)	fr. 0.04 —0.05 mm:	88.65 g = 17.73 %	from prim. weight 500 g
c)	fr. 0.05 —0.063 mm:	36.53 g = 7.31 %	from prim. weight 500 g
d)	fr. 0.063 —0.10 mm:	28.36 g = 5.67 %	from prim. weight 500 g
e)	fr. 0.10 —0.16 mm:	5.31 g = 1.06 %	from prim. weight 500 g
f)	fr. 0.16 —0.20 mm:	1.05 g = 0.21 %	from prim. weight 500 g
g)	fr. 0.20 —0.25 mm:	0.41 g = 0.08 %	from prim. weight 500 g
h)	oversize (over 0.25 mm):	2.00 g = 0.40 %	from prim. weight 500 g
		total: 100.00 %	

B. Reciprocal percentage of the individual 6 size fractions (used for the heavy minerals separations): their total weight is 160.31 g = 100 %.

a)	fr. 0.04 —0.05 mm:	88.65 g = 55.30 %	from prim. 160.31 g
b)	fr. 0.05 —0.063 mm:	36.53 g = 22.79 %	from prim. 160.31 g
c)	fr. 0.063 —0.10 mm:	28.36 g = 17.69 %	from prim. 160.31 g
d)	fr. 0.10 —0.16 mm:	5.31 g = 3.31 %	from prim. 160.31 g
e)	fr. 0.16 —0.20 mm:	1.05 g = 0.65 %	from prim. 160.31 g
f)	fr. 0.20 —0.25 mm:	0.41 g = 0.26 %	from prim. 160.31 g
		total: 100.00 %	

C. Percentages of the unseparated heavy minerals (recovery factor) from 2 g made-up grounds of the unsieved fractions (except the fraction 0.16—0.20 mm and 0.20—0.25 mm with it there was the total weight as the made-up ground used because of its small unseparated amount).

a)	fr. 0.04 —0.05 mm:	unseparated	0.0207 g = 1.04 %	from 2 g made-up g
b)	fr. 0.05 —0.063 mm:	unseparated	0.0173 g = 0.86 %	from 2 g made-up g
c)	fr. 0.063 —0.10 mm:	unseparated	0.0296 g = 1.48 %	from 2 g made-up g
d)	fr. 0.10 —0.16 mm:	unseparated	0.0183 g = 0.92 %	from 2 g made-up g
e)	fr. 0.16 —0.20 mm:	unseparated	0.0149 g = 1.42 %	from 1.05 g
f)	fr. 0.20 —0.25 mm:	unseparated	0.0031 g = 0.76 %	from 0.41 g
			total: 0.1039 g Ø rec. fact. 1.08 %	

D. Reciprocal percentage of 6 individual separations of the heavy minerals (the total weight of all 6 separations of heavy miner. 0.1039 g = 100 %).

a)	fr. 0.04 —0.05 mm:	0.0207 g = 19.92 %	from total weig. 6 separ.
b)	fr. 0.05 —0.063 mm:	0.0173 g = 16.65 %	from total weig. 6 separ.
c)	fr. 0.063 —0.10 mm:	0.0296 g = 28.49 %	from total weig. 6 separ.
d)	fr. 0.10 —0.16 mm:	0.0183 g = 17.61 %	from total weig. 6 separ.
e)	fr. 0.16 —0.20 mm:	0.0149 g = 14.34 %	from total weig. 6 separ.
f)	fr. 0.20 —0.25 mm:	0.0031 g = 2.98 %	from total weig. 6 separ.
		total: 99.99 %	

Sample No. 5

A. Percentage of all the size fractions from the loess sample primary weight of 500 g.

a) undersize (= remains under the sieve 0.04 mm after unsieving 30.59 g) + powder (partly) and clayish decantated fractions (in all 303.98 g) = 334.57 g = 66.91 %.

b)	fr. 0.04 —0.05 mm:	83.46 g = 16.69 %	from prim. weight 500 g
c)	fr. 0.05 —0.063 mm:	42.45 g = 8.49 %	from prim. weight 500 g
d)	fr. 0.063 —0.10 mm:	31.56 g = 6.31 %	from prim. weight 500 g
e)	fr. 0.10 —0.16 mm:	4.18 g = 0.84 %	from prim. weight 500 g
f)	fr. 0.16 —0.20 mm:	0.66 g = 0.13 %	from prim. weight 500 g
g)	fr. 0.20 —0.25 mm:	0.40 g = 0.08 %	from prim. weight 500 g
h)	oversize (over 0.25 mm):	2.72 g = 0.54 %	from prim. weight 500 g
		total: 99.99 %	

B. Reciprocal percentage of the individual 6 size fractions (used for the heavy minerals separations): their total weight is 162.71 g = 100 %.

a)	fr. 0.04 —0.05 mm:	83.46 g = 51.29 %	from prim. 162.71 g
b)	fr. 0.05 —0.063 mm:	42.45 g = 26.09 %	from prim. 162.71 g
c)	fr. 0.063—0.10 mm:	31.56 g = 19.40 %	from prim. 162.71 g
d)	fr. 0.10 —0.16 mm:	4.18 g = 2.57 %	from prim. 162.71 g
e)	fr. 0.16 —0.20 mm:	0.66 g = 0.41 %	from prim. 162.71 g
f)	fr. 0.20 —0.25 mm:	0.40 g = 0.25 %	from prim. 162.71 g
		total: 100.01 %	

C. Percentages of the unseparated heavy minerals (recovery factor) from 2 g made-up grounds of the unsieved fractions (except the fraction 0.16—0.20 mm and 0.20—0.25 mm with it there was the total weight as the made-up ground used because of its small unseparated amount).

a)	fr. 0.04 —0.05 mm:	unseparated	0.0211 g = 1.06 %	from 2 g made-up g
b)	fr. 0.05 —0.063 mm:	unseparated	0.0221 g = 1.10 %	from 2 g made-up g
c)	fr. 0.063—0.10 mm:	unseparated	0.0210 g = 1.05 %	from 2 g made-up g
d)	fr. 0.10 —0.16 mm:	unseparated	0.0084 g = 0.42 %	from 2 g made-up g
e)	fr. 0.16 —0.20 mm:	unseparated	0.0069 g = 1.05 %	from 0.66 g
f)	fr. 0.20 —0.25 mm:	unseparated	0.0014 g = 0.35 %	from 0.40 g
			total: 0.0809 g Ø rec. fact. 0.84 %	

D. Reciprocal percentage of 6 individual separations of the heavy minerals (the total weight of all 6 separations of heavy miner. 0.0809 g = 100 %).

a)	fr. 0.04 —0.05 mm:	0.0211 g = 26.08 %	from total weight 0.0809 g
b)	fr. 0.05 —0.063 mm:	0.0221 g = 27.32 %	from total weight 0.0809 g
c)	fr. 0.063—0.10 mm:	0.0210 g = 25.96 %	from total weight 0.0809 g
d)	fr. 0.10 —0.16 mm:	0.0084 g = 10.38 %	from total weight 0.0809 g
e)	fr. 0.16 —0.20 mm:	0.0069 g = 8.53 %	from total weight 0.0809 g
f)	fr. 0.20 —0.25 mm:	0.0014 g = 1.73 %	from total weight 0.0809 g
		total: 100.00 %	

II. Napajedla — locality No. 2

Sample No. 1

A. Percentages of all the size fractions from the loess sample primary weight of 500 g.

a) undersize (= remains under the sieve 0.04 mm after unsieving: 26.78 g) + powder (partly) and clayish decantated fractions (in all 274.44 g) = 301.22 g i. e. 60.24 %.

b)	fr. 0.04 —0.05 mm:	79.73 g = 15.95 %	from prim. weight 500 g
c)	fr. 0.05 —0.063 mm:	45.23 g = 9.05 %	from prim. weight 500 g
d)	fr. 0.063—0.10 mm:	36.69 g = 7.34 %	from prim. weight 500 g
e)	fr. 0.10 —0.16 mm:	9.42 g = 1.89 %	from prim. weight 500 g
f)	fr. 0.16 —0.20 mm:	4.09 g = 0.82 %	from prim. weight 500 g
g)	fr. 0.20 —0.25 mm:	4.24 g = 0.85 %	from prim. weight 500 g
h)	oversize (over 0.25 mm):	19.38 g = 3.88 %	from prim. weight 500 g
		total: 100.02 %	

B. Reciprocal percentage of the individual 6 size fractions (used for the heavy minerals separations): their total weight is 179.40 g = 100 %.

a)	fr. 0.04 —0.05 mm:	79.73 g = 44.44 %	from prim. 179.40 g
b)	fr. 0.05 —0.063 mm:	45.23 g = 25.21 %	from prim. 179.40 g
c)	fr. 0.063—0.10 mm:	36.69 g = 20.45 %	from prim. 179.40 g
d)	fr. 0.10 —0.16 mm:	9.42 g = 5.25 %	from prim. 179.40 g
e)	fr. 0.16 —0.20 mm:	4.09 g = 2.28 %	from prim. 179.40 g
f)	fr. 0.20 —0.25 mm:	4.24 g = 2.36 %	from prim. 179.40 g
		total: 99.99 %	

C. Percentages of the unseparated heavy minerals (recovery factor) from 2 g made-up grounds of the unsieved fractions.

a)	fr. 0.04 —0.05 mm:	unseparated	0.0160 g = 0.80 %	from 2 g made-up g
b)	fr. 0.05 —0.063 mm:	unseparated	0.0114 g = 0.57 %	from 2 g made-up g
c)	fr. 0.063—0.10 mm:	unseparated	0.0295 g = 1.47 %	from 2 g made-up g
d)	fr. 0.10 —0.16 mm:	unseparated	0.0236 g = 1.18 %	from 2 g made-up g
e)	fr. 0.16 —0.20 mm:	unseparated	0.0227 g = 1.14 %	from 2 g made-up g
f)	fr. 0.20 —0.25 mm:	unseparated	0.0150 g = 0.75 %	from 2 g made-up g
			total: 0.1182 g Ø rec. fac. 0.99 %	

D. Reciprocal percentage of 6 individual separations of the heavy minerals (the total weight of all 6 separations of heavy minerals 0.1182 g = 100 %).

a)	fr. 0.04 —0.05 mm:	0.0160 g = 13.54 %	from total weight 6 sep.
b)	fr. 0.05 —0.063 mm:	0.0114 g = 9.64 %	from total weight 6 sep.
c)	fr. 0.063—0.10 mm:	0.0295 g = 24.96 %	from total weight 6 sep.
d)	fr. 0.10 —0.16 mm:	0.0236 g = 19.97 %	from total weight 6 sep.
e)	fr. 0.16 —0.20 mm:	0.0227 g = 19.20 %	from total weight 6 sep.
f)	fr. 0.20 —0.25 mm:	0.0150 g = 12.69 %	from total weight 6 sep.
		total: 100.00%	

Sample No. 2

A. Percentages of all the size fractions from the loess sample primary weight of 500 g.

a) undersieve (= remains under the sieve 0.04 mm after unsieving 34.78 g) + powder (partly) and clayish decantated fractions (in all 222.48 g) = 257.26 g i. e. 51.45 %.

b)	fr. 0.04 —0.05 mm:	80.75 g =	16.15 %	from prim. weight 500 g
c)	fr. 0.05 —0.063 mm:	50.08 g =	10.02 %	from prim. weight 500 g
d)	fr. 0.063—0.10 mm:	49.16 g =	9.83 %	from prim. weight 500 g
e)	fr. 0.10 —0.16 mm:	14.51 g =	2.90 %	from prim. weight 500 g
f)	fr. 0.16 —0.20 mm:	7.31 g =	1.46 %	from prim. weight 500 g
g)	fr. 0.20 —0.25 mm:	5.30 g =	1.06 %	from prim. weight 500 g
h)	oversize (over 0.25 mm):	35.63 g =	7.13 %	from prim. weight 500 g
		total:	100.00 %	

B. Reciprocal percentage of the individual 6 size fractions (used for the heavy minerals separations): their total weight is 207.11 g = 100 %.

a)	fr. 0.04 —0.05 mm:	80.75 g =	38.99 %	from prim. 207.11 g
b)	fr. 0.05 —0.063 mm:	50.08 g =	24.18 %	from prim. 207.11 g
c)	fr. 0.063—0.10 mm:	49.16 g =	23.74 %	from prim. 207.11 g
d)	fr. 0.10 —0.16 mm:	14.51 g =	7.01 %	from prim. 207.11 g
e)	fr. 0.16 —0.20 mm:	7.31 g =	3.53 %	from prim. 207.11 g
f)	fr. 0.20 —0.25 mm:	5.30 g =	2.56 %	from prim. 207.11 g
		total:	100.01 %	

C. Percentages of the unseparated heavy minerals (recovery factor) from 2 g made-up grounds of the unsieved fractions.

a)	fr. 0.04 —0.05 mm:	unseparated	0.0358 g = 1.79 %	from 2 g made-up g
b)	fr. 0.05 —0.063 mm:	unseparated	0.0361 g = 1.81 %	from 2 g made-up g
c)	fr. 0.063—0.10 mm:	unseparated	0.0311 g = 1.55 %	from 2 g made-up g
d)	fr. 0.10 —0.16 mm:	unseparated	0.0405 g = 2.03 %	from 2 g made-up g
e)	fr. 0.16 —0.20 mm:	unseparated	0.0380 g = 1.90 %	from 2 g made-up g
f)	fr. 0.20 —0.25 mm:	unseparated	0.0198 g = 0.99 %	from 2 g made-up g
			total: 0.2013 g Ø rec. fact. 1.68 %	

D. Reciprocal percentage of 6 individual separations of the heavy minerals (the total weight of all 6 separations of heavy miner. 0.2013 g = 100 %).

a)	fr. 0.04 —0.05 mm:	0.0358 g =	17.78 %	from total weight 6 separ.
b)	fr. 0.05 —0.063 mm:	0.0361 g =	17.93 %	from total weight 6 separ.
c)	fr. 0.063—0.10 mm:	0.0311 g =	15.45 %	from total weight 6 separ.
d)	fr. 0.10 —0.16 mm:	0.0405 g =	20.12 %	from total weight 6 separ.
e)	fr. 0.16 —0.20 mm:	0.0380 g =	18.88 %	from total weight 6 separ.
f)	fr. 0.20 —0.25 mm:	0.0198 g =	9.84 %	from total weight 6 separ.
		total:	100.00 %	

Sample No. 3

A. Percentages of all the size fractions from the loess sample primary weight of 500 g.

a) undersize (= remains under the sieve 0.04 mm after unsieving 20.48 g) + powder (partly) and clayish decantated fractions (in all 352.93 g) = 373.41 g i. e. 74.68 %.

b)	fr. 0.04 —0.05 mm:	56.48 g =	11.30 %	from prim. weight 500 g
c)	fr. 0.05 —0.063 mm:	30.21 g =	6.04 %	from prim. weight 500 g
d)	fr. 0.063—0.10 mm:	24.91 g =	4.98 %	from prim. weight 500 g
e)	fr. 0.10 —0.16 mm:	4.65 g =	0.93 %	from prim. weight 500 g
f)	fr. 0.16 —0.20 mm:	2.02 g =	0.40 %	from prim. weight 500 g
g)	fr. 0.20 —0.25 mm:	1.89 g =	0.38 %	from prim. weight 500 g
h)	oversize (over 0.25 mm):	6.43 g =	1.29 %	from prim. weight 500 g
		total:	100.00 %	

B. Reciprocal percentage of the individual 6 size fractions (used for the heavy minerals separations): their total weight is 120.16 g = 100 %.

a)	fr. 0.04 —0.05 mm:	56.48 g = 47.00 %	from prim. 120.16 g
b)	fr. 0.05 —0.063 mm:	30.21 g = 25.14 %	from prim. 120.16 g
c)	fr. 0.063—0.10 mm:	24.91 g = 20.73 %	from prim. 120.16 g
d)	fr. 0.10 —0.16 mm:	4.65 g = 3.87 %	from prim. 120.16 g
e)	fr. 0.16 —0.20 mm:	2.02 g = 1.68 %	from prim. 120.16 g
f)	fr. 0.20 —0.25 mm:	1.89 g = 1.57 %	from prim. 120.16 g
		total: 99.99 %	

C. Percentages of the unseparated heavy minerals (recovery factor) from 2 g made-up grounds of the unsieved fractions (except the fractions 0.16—0.20 mm and 0.20—0.25 mm with it there was only 1 g of the made-up ground used because of its small amount).

a)	fr. 0.04 —0.05 mm:	unseparated	0.0315 g = 1.58 %	from 2 g made-up g
b)	fr. 0.05 —0.063 mm:	unseparated	0.0325 g = 1.62 %	from 2 g made-up g
c)	fr. 0.063—0.10 mm:	unseparated	0.0222 g = 1.11 %	from 2 g made-up g
d)	fr. 0.10 —0.16 mm:	unseparated	0.0364 g = 1.82 %	from 2 g made-up g
e)	fr. 0.16 —0.20 mm:	unseparated	0.0243 g = 2.43 %	from 1 g made-up g
f)	fr. 0.20 —0.25 mm:	unseparated	0.0166 g = 1.66 %	from 1 g made-up g
			total: 0.1635 g Ø rec. fact. 1.70 %	

D. Reciprocal percentage of 6 individual separations of the heavy minerals (the total weight of all 6 separations of heavy miner. 0.1635 g = 100 %).

a)	fr. 0.04 —0.05 mm:	0.0315 g = 19.27 %	from total weight of 6 sep.
b)	fr. 0.05 —0.063 mm:	0.0325 g = 19.88 %	from total weight of 6 sep.
c)	fr. 0.063—0.10 mm:	0.0222 g = 13.58 %	from total weight of 6 sep.
d)	fr. 0.10 —0.16 mm:	0.0364 g = 22.26 %	from total weight of 6 sep.
e)	fr. 0.16 —0.20 mm:	0.0243 g = 14.86 %	from total weight of 6 sep.
f)	fr. 0.20 —0.25 mm:	0.0166 g = 10.15 %	from total weight of 6 sep.
		total: 100.00 %	

III. Napajedla — locality No. 3

Sample No. 1

A. Percentages of all the size fractions from the loess sample primary weight of 500 g.

a) undersize (= remains under the sieve 0.04 mm after unsieving 47.95 g) + powder (partly) and clayish decantated fractions (in all 246.20 g) = 294.15 g = 58.83 %.

b)	fr. 0.04 —0.05 mm:	82.62 g = 16.52 %	from prim. weight 500 g
c)	fr. 0.05 —0.063 mm:	47.20 g = 9.44 %	from prim. weight 500 g
d)	fr. 0.063—0.10 mm:	43.86 g = 8.77 %	from prim. weight 500 g
e)	fr. 0.10 —0.16 mm:	11.05 g = 2.21 %	from prim. weight 500 g
f)	fr. 0.16 —0.20 mm:	5.02 g = 1.00 %	from prim. weight 500 g
g)	fr. 0.20 —0.25 mm:	4.64 g = 0.93 %	from prim. weight 500 g
h)	oversize (over 0.25 mm):	11.46 g = 2.29 %	from prim. weight 500 g
		total: 99.99 %	

B. Reciprocal percentage of the individual 6 size fractions (used for the heavy minerals separations): their total weight is 194.39 g = 100 %.

a)	fr. 0.04 —0.05 mm:	82.62 g = 42.50 %	from prim. 194.39 g
b)	fr. 0.05 —0.063 mm:	47.20 g = 24.28 %	from prim. 194.39 g
c)	fr. 0.063—0.10 mm:	43.86 g = 22.56 %	from prim. 194.39 g
d)	fr. 0.10 —0.16 mm:	11.05 g = 5.68 %	from prim. 194.39 g
e)	fr. 0.16 —0.20 mm:	5.02 g = 2.58 %	from prim. 194.39 g
f)	fr. 0.20 —0.25 mm:	4.64 g = 2.39 %	from prim. 194.39 g
		total: 99.99 %	

C. Percentages of the unseparated heavy minerals (recovery factor) from 2 g made-up grounds of the unsieved fractions.

a)	fr. 0.04 —0.05 mm:	unseparated	0.0325 g = 1.63 %	from 2 g made-up g
b)	fr. 0.05 —0.063 mm:	unseparated	0.0328 g = 1.64 %	from 2 g made-up g
c)	fr. 0.063—0.10 mm:	unseparated	0.0359 g = 1.79 %	from 2 g made-up g
d)	fr. 0.10 —0.16 mm:	unseparated	0.0349 g = 1.74 %	from 2 g made-up g
e)	fr. 0.16 —0.20 mm:	unseparated	0.0380 g = 1.90 %	from 2 g made-up g
f)	fr. 0.20 —0.25 mm:	unseparated	0.0228 g = 1.14 %	from 2 g made-up g
			total: 0.1969 g Ø rec. fact. 1.64 %	

D. Reciprocal percentage of 6 individual separations of the heavy minerals (the total weight of all 6 separations of heavy miner. 0.1969 g = 100 %).

a)	fr. 0.04 —0.05 mm:	0.0325 g =	16.51 %	from total weight of 6 sep.
b)	fr. 0.05 —0.063 mm:	0.0328 g =	16.66 %	from total weight of 6 sep.
c)	fr. 0.063—0.10 mm:	0.0359 g =	18.23 %	from total weight of 6 sep.
d)	fr. 0.10 —0.16 mm:	0.0349 g =	17.72 %	from total weight of 6 sep.
e)	fr. 0.16 —0.20 mm:	0.0380 g =	19.30 %	from total weight of 6 sep.
f)	fr. 0.20 —0.25 mm:	0.0228 g =	11.58 %	from total weight of 6 sep.
		total:	100.00 %	

Sample No. 2

A. Percentages of all the size fractions from the loess sample primary weight of 500 g.

a) undersize (= remains under the sieve 0.04 mm after unsieving 49.19 g) + powder (partly) and clayish decantated fractions (in all 272.88 g) = 322.07 g = 64.41 %.

b)	fr. 0.04 —0.05 mm:	78.79 g =	15.76 %	from prim. weight 500 g
c)	fr. 0.05 —0.063 mm:	40.97 g =	8.19 %	from prim. weight 500 g
d)	fr. 0.063—0.10 mm:	35.57 g =	7.11 %	from prim. weight 500 g
e)	fr. 0.10 —0.16 mm:	6.99 g =	1.40 %	from prim. weight 500 g
f)	fr. 0.16 —0.20 mm:	3.20 g =	0.64 %	from prim. weight 500 g
g)	fr. 0.20 —0.25 mm:	3.23 g =	0.65 %	from prim. weight 500 g
h)	oversize (over sieve 0.25 mm):	9.18 g =	1.84 %	from prim. weight 500 g
		total:	100.00 %	

B. Reciprocal percentage of the individual 6 size fractions (used for the heavy minerals separations): their total weight is 168.75 g = 100 %.

a)	fr. 0.04 —0.05 mm:	78.79 g =	46.69 %	from prim. 168.75 g
b)	fr. 0.05 —0.063 mm:	40.97 g =	24.28 %	from prim. 168.75 g
c)	fr. 0.063—0.10 mm:	35.57 g =	21.08 %	from prim. 168.75 g
d)	fr. 0.10 —0.16 mm:	6.99 g =	4.14 %	from prim. 168.75 g
e)	fr. 0.16 —0.20 mm:	3.20 g =	1.90 %	from prim. 168.75 g
f)	fr. 0.20 —0.25 mm:	3.23 g =	1.91 %	from prim. 168.75 g
		total:	100.00 %	

C. Percentages of the unseparated heavy minerals (recovery factor) from 2 g made-up grounds of the unsieved fractions.

a)	fr. 0.04 —0.05 mm:	unseparated	0.0332 g = 1.66 %	from 2 g made-up g
b)	fr. 0.05 —0.063 mm:	unseparated	0.0293 g = 1.47 %	from 2 g made-up g
c)	fr. 0.063—0.10 mm:	unseparated	0.0217 g = 1.08 %	from 2 g made-up g
d)	fr. 0.10 —0.16 mm:	unseparated	0.0256 g = 1.28 %	from 2 g made-up g
e)	fr. 0.16 —0.20 mm:	unseparated	0.0321 g = 1.61 %	from 2 g made-up g
f)	fr. 0.20 —0.25 mm:	unseparated	0.0272 g = 1.36 %	from 2 g made-up g
			total: 0.1691 g Ø rec. fact. 1.41 %	

D. Reciprocal percentage of 6 individual separations of the heavy minerals (the total weight of all 6 separations of heavy min. 0.1691 g = 100 %).

a)	fr. 0.04 —0.05 mm:	0.0332 g = 19.63 %	from total weight of 6 sep.
b)	fr. 0.05 —0.063 mm:	0.0293 g = 17.33 %	from total weight of 6 sep.
c)	fr. 0.063—0.10 mm:	0.0217 g = 12.83 %	from total weight of 6 sep.
d)	fr. 0.10 —0.16 mm:	0.0256 g = 15.14 %	from total weight of 6 sep.
e)	fr. 0.16 —0.20 mm:	0.0321 g = 18.98 %	from total weight of 6 sep.
f)	fr. 0.20 —0.25 mm:	0.0272 g = 16.09 %	from total weight of 6 sep.
		total: 100.00 %	

Sample No. 3

A. Percentages of all the size fractions from the loess sample primary weight of 500 g.

a) undersize (= remains under the sieve 0.04 mm after unsieving 33.32 g) + powder (partly) and clayish decantated fractions (in all 345.50 g) = 378.82 g = 75.76 %.

b)	fr. 0.04 —0.05 mm:	56.58 g = 11.32 %	from prim. weight 500 g
c)	fr. 0.05 —0.063 mm:	32.05 g = 6.41 %	from prim. weight 500 g
d)	fr. 0.063—0.10 mm:	21.80 g = 4.36 %	from prim. weight 500 g
e)	fr. 0.10 —0.16 mm:	4.18 g = 0.84 %	from prim. weight 500 g
f)	fr. 0.16 —0.20 mm:	1.21 g = 0.24 %	from prim. weight 500 g
g)	fr. 0.20 —0.25 mm:	1.01 g = 0.20 %	from prim. weight 500 g
h)	oversize (over sieve 0.25 mm):	4.35 g = 0.87 %	from prim. weight 500 g
		total: 100.00 %	

B. Reciprocal percentage of the individual 6 size fractions (used for the heavy minerals separations): their total weight is 116.83 g = 100 %.

a)	fr. 0.04 —0.05 mm:	56.58 g = 48.43 %	from prim. 116.83 g
b)	fr. 0.05 —0.063 mm:	32.05 g = 27.43 %	from prim. 116.83 g
c)	fr. 0.063—0.10 mm:	21.80 g = 18.66 %	from prim. 116.83 g
d)	fr. 0.10 —0.16 mm:	4.18 g = 3.58 %	from prim. 116.83 g
e)	fr. 0.16 —0.20 mm:	1.21 g = 1.04 %	from prim. 116.83 g
f)	fr. 0.20 —0.25 mm:	1.01 g = 0.86 %	from prim. 116.83 g
		total: 100.00 %	

C. Percentages of the unseparated heavy minerals (recovery factor) from 2 g made-up grounds of the unsieved fractions (except fr. 0.16—0.20 mm and 0.20—0.25 mm with it there was only 1 g of made-up grounds used because of its small amount).

a)	fr. 0.04 —0.05 mm:	unseparated	0.0360 g = 1.80 %	from 2 g made-up g
b)	fr. 0.05 —0.063 mm:	unseparated	0.0301 g = 1.51 %	from 2 g made-up g
c)	fr. 0.063—0.10 mm:	unseparated	0.0256 g = 1.28 %	from 2 g made-up g
d)	fr. 0.10 —0.16 mm:	unseparated	0.0207 g = 1.03 %	from 2 g made-up g
e)	fr. 0.16 —0.20 mm:	unseparated	0.0106 g = 1.06 %	from 1 g made-up g
f)	fr. 0.20 —0.25 mm:	unseparated	0.0101 g = 1.01 %	from 1 g made-up g
			total: 0.1331 g Ø rec. fact. 1.28 %	

D. Reciprocal percentage of 6 individual separations of the heavy minerals (the total weight of all 6 separations of heavy min. 0.1331 g = 100 %).

a)	fr. 0.04 —0.05 mm:	0.0360 g = 27.05 %	from total weight of 6 sep.
b)	fr. 0.05 —0.063 mm:	0.0301 g = 22.61 %	from total weight of 6 sep.
c)	fr. 0.063—0.10 mm:	0.0256 g = 19.23 %	from total weight of 6 sep.
d)	fr. 0.10 —0.16 mm:	0.0207 g = 15.55 %	from total weight of 6 sep.
e)	fr. 0.16 —0.20 mm:	0.0106 g = 7.96 %	from total weight of 6 sep.
f)	fr. 0.20 —0.25 mm:	0.0101 g = 7.59 %	from total weight of 6 sep.
		total: 99.99 %	

IV. Napajedla — locality No. 4

Sample No. 1

A. Percentages of all the size fractions from the loess sample primary weight of 1000 g.

a) undersize (= remains under sieve 0.04 mm after unsieving 5.97 g) + powder (partly) and clayish decantated fractions, (in all 551.98 g) = 557.95 g = 55.80 %.

b)	fr. 0.04 —0.05 mm:	97.47 g =	9.75 %	from prim. weight 1000 g
c)	fr. 0.05 —0.063 mm:	6.94 g =	0.69 %	from prim. weight 1000 g
d)	fr. 0.063—0.10 mm:	132.86 g =	13.29 %	from prim. weight 1000 g
e)	fr. 0.10 —0.16 mm:	42.69 g =	4.27 %	from prim. weight 1000 g
f)	fr. 0.16 —0.20 mm:	42.79 g =	4.28 %	from prim. weight 1000 g
g)	fr. 0.20 —0.25 mm:	40.57 g =	4.06 %	from prim. weight 1000 g
h)	oversize (over sieve 0.25 mm):	78.73 g =	7.87 %	from prim. weight 1000 g
		total:	100.01 %	

B. Reciprocal percentage of the individual 6 size fractions (used for the heavy minerals separations): their total weight is 363.32 g = 100 %.

a)	fr. 0.04 —0.05 mm:	97.47 g =	26.83 %	from prim. 363.32 g
b)	fr. 0.05 —0.063 mm:	6.94 g =	1.91 %	from prim. 363.32 g
c)	fr. 0.063—0.10 mm:	132.86 g =	36.57 %	from prim. 363.32 g
d)	fr. 0.10 —0.16 mm:	42.69 g =	11.75 %	from prim. 363.32 g
e)	fr. 0.16 —0.20 mm:	42.79 g =	11.78 %	from prim. 363.32 g
f)	fr. 0.20 —0.25 mm:	40.57 g =	11.17 %	from prim. 363.32 g
		total:	100.01 %	

C. Percentage of the unseparated heavy minerals (recovery factor) from 2 g made-up grounds of the unsieved fractions.

a)	fr. 0.04 —0.05 mm:	unseparated	0.0191 g = 0.96 %	from 2 g made-up g
b)	fr. 0.05 —0.063 mm:	unseparated	0.0335 g = 1.67 %	from 2 g made-up g
c)	fr. 0.063—0.10 mm:	unseparated	0.0293 g = 1.47 %	from 2 g made-up g
d)	fr. 0.10 —0.16 mm:	unseparated	0.0392 g = 1.96 %	from 2 g made-up g
e)	fr. 0.16 —0.20 mm:	unseparated	0.0303 g = 1.52 %	from 2 g made-up g
f)	fr. 0.20 —0.25 mm:	unseparated	0.0112 g = 0.56 %	from 2 g made-up g
			total: 0.1626 g Ø rec. fact. 1.36 %	

D. Reciprocal percentage of 6 individual separations of the heavy minerals (the total weight of all 6 separations of heavy miner. 0.1626 g = 100 %).

a)	fr. 0.04 —0.05 mm:	0.0191 g =	11.75 %	from total weight of 6 sep.
b)	fr. 0.05 —0.063 mm:	0.0335 g =	20.60 %	from total weight of 6 sep.
c)	fr. 0.063—0.10 mm:	0.0293 g =	18.02 %	from total weight of 6 sep.
d)	fr. 0.10 —0.16 mm:	0.0392 g =	24.11 %	from total weight of 6 sep.
e)	fr. 0.16 —0.20 mm:	0.0303 g =	18.63 %	from total weight of 6 sep.
f)	fr. 0.20 —0.25 mm:	0.0112 g =	6.89 %	from total weight of 6 sep.
		total:	100.00 %	

Sample No. 2

A. Percentages of all the size fractions from the loess sample primary weight of 1000 g.

a) undersize (= remains under sieve 0.04 mm after unsieving 7.88 g) + powder (partly) and clayish decantated fractions (in all 547.24 g) = 555.12 g i. e. 55.51 %.

b)	fr. 0.04 —0.05 mm:	102.94 g =	10.29 %	from prim. weight 1000 g
c)	fr. 0.05 —0.063 mm:	5.61 g =	0.56 %	from prim. weight 1000 g
d)	fr. 0.063—0.10 mm:	131.83 g =	13.18 %	from prim. weight 1000 g
e)	fr. 0.10 —0.16 mm:	40.91 g =	4.09 %	from prim. weight 1000 g
f)	fr. 0.16 —0.20 mm:	41.11 g =	4.11 %	from prim. weight 1000 g
g)	fr. 0.20 —0.25 mm:	42.30 g =	4.23 %	from prim. weight 1000 g
h)	oversize (over sieve 0.25 mm):	80.18 g =	8.02 %	from prim. weight 1000 g
		total:	99.99 %	

B. Reciprocal percentage of the individual 6 size fractions (used for the heavy minerals separations): their total weight is 364.70 g = 100 %.

a)	fr. 0.04 —0.05 mm:	102.94 g = 28.23 %	from prim. 364.70 g
b)	fr. 0.05 —0.063 mm:	5.61 g = 1.54 %	from prim. 364.70 g
c)	fr. 0.063—0.10 mm:	131.83 g = 36.15 %	from prim. 364.70 g
d)	fr. 0.10 —0.16 mm:	40.91 g = 11.22 %	from prim. 364.70 g
e)	fr. 0.16 —0.20 mm:	41.11 g = 11.27 %	from prim. 364.70 g
f)	fr. 0.20 —0.25 mm:	42.30 g = 11.60 %	from prim. 364.70 g
		total: 100.01 %	

C. Percentages of the unseparated heavy minerals (recovery factor) from 2 g made-up grounds of the unsieved fractions.

a)	fr. 0.04 —0.05 mm:	unseparated	0.0105 g = 0.53 %	from 2 g made-up g
b)	fr. 0.05 —0.063 mm:	unseparated	0.0382 g = 1.91 %	from 2 g made-up g
c)	fr. 0.063—0.10 mm:	unseparated	0.0337 g = 1.68 %	from 2 g made-up g
d)	fr. 0.10 —0.16 mm:	unseparated	0.0322 g = 1.61 %	from 2 g made-up g
e)	fr. 0.16 —0.20 mm:	unseparated	0.0351 g = 1.76 %	from 2 g made-up g
f)	fr. 0.20 —0.25 mm:	unseparated	0.0109 g = 0.55 %	from 2 g made-up g
			total 0.1606 g Ø rec. fact. 1.34 %	

D. Reciprocal percentage of 6 individual separations of the heavy minerals (the total weight of all 6 separations of heavy miner. 0.1606 g = 100 %).

a)	fr. 0.04 —0.05 mm:	0.0105 g = 6.54 %	from total weight of 6 separ.
b)	fr. 0.05 —0.063 mm:	0.0382 g = 23.79 %	from total weight of 6 separ.
c)	fr. 0.063—0.10 mm:	0.0337 g = 20.98 %	from total weight of 6 separ.
d)	fr. 0.10 —0.16 mm:	0.0322 g = 20.05 %	from total weight of 6 separ.
e)	fr. 0.16 —0.20 mm:	0.0351 g = 21.85 %	from total weight of 6 separ.
f)	fr. 0.20 —0.25 mm:	0.0109 g = 6.79 %	from total weight of 6 separ.
		total: 100.00 %	

Sample No. 3

A. Percentages of all the size fractions from the loess sample primary weight of 1000 g.

a) undersize (= remains under sieve 0.04 mm after unsieving 12.18 g) + powder (partly) and clayish decantated fractions (in all 513.84 g) = 526.02 g i. e. 52.60 %.

b)	fr. 0.04 —0.05 mm:	106.10 g = 10.61 %	from prim. weight 1000 g
c)	fr. 0.05 —0.063 mm:	7.31 g = 0.73 %	from prim. weight 1000 g
d)	fr. 0.063—0.10 mm:	142.87 g = 14.29 %	from prim. weight 1000 g
e)	fr. 0.10 —0.16 mm:	45.59 g = 4.56 %	from prim. weight 1000 g
f)	fr. 0.16 —0.20 mm:	47.71 g = 4.77 %	from prim. weight 1000 g
g)	fr. 0.20 —0.25 mm:	41.02 g = 4.10 %	from prim. weight 1000 g
h)	oversize (over sieve 0.25 mm):	83.38 g = 8.34 %	from prim. weight 1000 g
		total: 100.00 %	

B. Reciprocal percentage of the individual 6 size fractions (used for the heavy minerals separations): their total weight is 390.60 g = 100 %.

a)	fr. 0.04 —0.05 mm:	106.10 g = 27.16 %	from prim. 390.60 g
b)	fr. 0.05 —0.063 mm:	7.31 g = 1.87 %	from prim. 390.60 g
c)	fr. 0.063—0.10 mm:	142.87 g = 36.58 %	from prim. 390.60 g
d)	fr. 0.10 —0.16 mm:	45.59 g = 11.67 %	from prim. 390.60 g
e)	fr. 0.16 —0.20 mm:	47.71 g = 12.21 %	from prim. 390.60 g
f)	fr. 0.20 —0.25 mm:	41.02 g = 10.50 %	from prim. 390.60 g
		total: 99.99 %	

C. Percentages of the unseparated heavy minerals (recovery factor) from 2 g made-up grounds of the unsieved fractions.

a)	fr. 0.04 —0.05 mm:	unseparated	0.0260 g = 1.30 %	from 2 g made-up g
b)	fr. 0.05 —0.063 mm:	unseparated	0.0373 g = 1.87 %	from 2 g made-up g
c)	fr. 0.063—0.10 mm:	unseparated	0.0396 g = 1.98 %	from 2 g made-up g
d)	fr. 0.10 —0.16 mm:	unseparated	0.0487 g = 2.43 %	from 2 g made-up g
e)	fr. 0.16 —0.20 mm:	unseparated	0.0271 g = 1.36 %	from 2 g made-up g
f)	fr. 0.20 —0.25 mm:	unseparated	0.0215 g = 1.07 %	from 2 g made-up g
			total: 0.2002 g ∅ rec. fact. 1.67 %	

D. Reciprocal percentage of 6 individual separations of the heavy minerals (the total weight of all 6 separations of heavy miner. 0.2002 g = 100 %).

a)	fr. 0.04 —0.05 mm:	0.0260 g =	12.99 %	from total weight of 6 separ
b)	fr. 0.05 —0.063 mm:	0.0373 g =	18.63 %	from total weight of 6 separ
c)	fr. 0.063—0.10 mm:	0.0396 g =	19.78 %	from total weight of 6 separ
d)	fr. 0.10 —0.16 mm:	0.0487 g =	24.33 %	from total weight of 6 separ
e)	fr. 0.16 —0.20 mm:	0.0271 g =	13.54 %	from total weight of 6 separ
f)	fr. 0.20 —0.25 mm:	0.0215 g =	10.74 %	from total weight of 6 separ
		total:	100.01 %	

The average percentages of the size fractions:

A. From the individual localities:

1. Locality — Napajedla (the desolated large brickworks)

a) fr. 0.04—0.05 mm:
sm. No. 1: 13.81 %
sm. No. 2: 21.81 %
sm. No. 3: 18.08 %
sm. No. 4: 17.73 %
sm. No. 5: 16.69 %
total: 88.12 % : 5 = 17.62 %

b) fr. 0.05—0.063 mm:
sm. No. 1: 11.41 %
sm. No. 2: 12.56 %
sm. No. 3: 7.64 %
sm. No. 4: 7.31 %
sm. No. 5: 8.49 %
total: 47.41 % : 5 = 9.48 %

c) fr. 0.063—0.10 mm:
sm. No. 1: 12.17 %
sm. No. 2: 6.94 %
sm. No. 3: 7.15 %
sm. No. 4: 5.67 %
sm. No. 5: 6.31 %
total: 38.24 % : 5 = 7.65 %

d) fr. 0.10—0.16 mm:
sm. No. 1: 1.29 %
sm. No. 2: 0.70 %
sm. No. 3: 1.43 %
sm. No. 4: 1.06 %
sm. No. 5: 0.84 %
total: 5.32 % : 5 = 1.06 %

e) fr. 0.16—0.20 mm:
sm. No. 1: 0.21 %
sm. No. 2: 0.12 %
sm. No. 3: 0.08 %
sm. No. 4: 0.21 %
sm. No. 5: 0.13 %
total: 0.75 % : 5 = 0.15 %

f) fr. 0.20—0.25 mm:
sm. No. 1: 0.10 %
sm. No. 2: 0.04 %
sm. No. 3: 0.03 %
sm. No. 4: 0.08 %
sm. No. 5: 0.08 %
total: 0.33 % : 5 = 0.07 %

2. Locality — Napajedla (the past private brickworks):

a) fr. 0.04—0.05 mm:
sm. No. 1: 15.95 %
sm. No. 2: 16.15 %
sm. No. 3: 11.30 %
total: 43.40 % : 3 = 14.47 %

b) fr. 0.05—0.063 mm:
sm. No. 1: 9.05 %
sm. No. 2: 10.02 %
sm. No. 3: 6.04 %
total: 25.11 % : 3 = 8.37 %

c) fr. 0.063—0.10 mm:
sm. No. 1: 7.34 %
sm. No. 2: 9.83 %
sm. No. 3: 4.98 %
total: 22.15 % : 3 = 7,38 %

d) fr. 0.10—0.16 mm:
sm. No. 1: 1.89 %
sm. No. 2: 2.90 %
sm. No. 3: 0.93 %
total: 5.72 % : 3 = 1.91 %

e) fr. 0.16—0.20 mm:
sm. No. 1: 0.82 %
sm. No. 2: 1.46 %
sm. No. 3: 0.40 %

total: 2.68 % : 3 = 0.89 %

f) fr. 0.20—0.25 mm:
sm. No. 1: 0.85 %
sm. No. 2: 1.06 %
sm. No. 3: 0.38 %

total: 2.29 % : 3 = 0.76 %

3. Locality — Napajedla (the exposure at the past facilities of UFC):

a) fr. 0.04—0.05 mm:
sm. No. 1: 16.52 %
sm. No. 2: 15.76 %
sm. No. 3: 11.32 %

total: 43.60 % : 3 = 14.53 %

b) fr. 0.05—0.063 mm:
sm. No. 1: 9.44 %
sm. No. 2: 8.19 %
sm. No. 3: 6.41 %

total: 24.04 % : 3 = 8.01 %

c) fr. 0.063—0.10 mm:
sm. No. 1: 8.77 %
sm. No. 2: 7.11 %
sm. No. 3: 4.36 %

total: 20.24 % : 3 = 6.75 %

d) fr. 0.10—0.16 mm:
sm. No. 1: 2.21 %
sm. No. 2: 1.40 %
sm. No. 3: 0.84 %

total: 4.45 % : 3 = 1.48 %

e) fr. 0.16—0.20 mm:
sm. No. 1: 1.00 %
sm. No. 2: 0.64 %
sm. No. 3: 0.24 %

total: 1.88 % : 3 = 0.63 %

f) fr. 0.20—0.25 mm:
sm. No. 1: 0.93 %
sm. No. 2: 0.65 %
sm. No. 3: 0.20 %

total: 1.78 % : 3 = 0.59 %

4. Locality — Napajedla (the field way cut):

a) fr. 0.04—0.05 mm:
sm. No. 1: 9.75 %
sm. No. 2: 10.29 %
sm. No. 3: 10.61 %

total: 30.65 % : 3 = 10.22 %

b) fr. 0.05—0.063 mm:
sm. No. 1: 0.69 %
sm. No. 2: 0.56 %
sm. No. 3: 0.73 %

total: 1.98 % : 3 = 0.66 %

c) fr. 0.063—0.10 mm:
sm. No. 1: 13.29 %
sm. No. 2: 13.18 %
sm. No. 3: 14.29 %

total: 40.76 % : 3 = 13.59 %

d) fr. 0.10—0.16 mm:
sm. No. 1: 4.27 %
sm. No. 2: 4.09 %
sm. No. 3: 4.56 %

total: 12.92 % : 3 = 4.31 %

e) fr. 0.16—0.20 mm:
sm. No. 1: 4.28 %
sm. No. 2: 4.11 %
sm. No. 3: 4.77 %

total: 13.16 % : 3 = 4.39 %

f) fr. 0.20—0.25 mm:
sm. No. 1: 4.06 %
sm. No. 2: 4.23 %
sm. No. 3: 4.10 %

total: 12.39 % : 3 = 4.13 %

B. The average of all 14 samples of 4 localities:

a) fr. 0.04—0.05 mm:
total sum % : 205.77 % : 14 = 14.70 %
b) fr. 0.05—0.063 mm:
total sum % : 98.54 % : 14 = 7.04 %
c) fr. 0.063—0.10 mm:
total sum % : 121.39 % : 14 = 8.67 %
d) fr. 0.10—0.16 mm:
total sum % : 28.41 % : 14 = 2.03 %
e) fr. 0.16—0.20 mm:
total sum % : 18.47 % : 14 = 1.32 %
f) fr. 0.20—0.25 mm:
total sum % : 16.79 % : 14 = 1.20 %

The average going to one fractions (the individual fractions averages sums): 14.70 % + 7.04 % + 8.67 % + 2.03 % + 1.32 % + + 1.20 % = the total sum of all the fractions 34.96 % : 6 = 5.84 %.

The heavy minerals average percentages (recovery factor) from the individual fractions and localities:

1. Locality — Napajedla (the desolated large brickworks by the road to Halenkovice).

a) fr. 0.04—0.05 mm:
total sum % : 3.20 % : 5 = 0.64 %
b) fr. 0.05—0.063 mm:
total sum % : 3.85 % : 5 = 0.77 %
c) fr. 0.063—0.10 mm:
total sum % : 4.46 % : 5 = 0.89 %
d) fr. 0.10—0.16 mm:
total sum % : 3.33 % : 5 = 0.67 %
e) fr. 0.16—0.20 mm:
total sum % : 3.74 % : 5 = 0.75 %
f) fr. 0.20—0.25 mm:
total sum % : 1.75 % : 5 = 0.35 %

The all fractions averages from all 5 samples: s % i. e. 20.33 % : 30 = 0.68 % (= Ø to 1 fraction).
Note: the sums of the individual averages of the percentages representation are marked by the letter "s".

2. Locality — Napajedla (the past private brickworks).

a) fr. 0.04—0.05 mm:
total sum % : 4.17 % : 3 = 1.39 %
b) fr. 0.05—0.063 mm:
total sum % : 4.00 % : 3 = 1.33 %
c) fr. 0.063—0.10 mm:
total sum % : 4.13 % : 3 = 1.38 %
d) fr. 0.10—0.16 mm:
total sum % : 5.03 % : 3 = 1.68 %
e) fr. 0.16—0.20 mm:
total sum % : 5.47 % : 3 = 1.82 %
f) fr. 0.20—0.25 mm:
total sum % : 3.40 % : 3 = 1.13 %

The all fractions average from all 3 samples: s % i. e. 26.20 % : 18 = 1.46 % (= Ø to one fraction).

3. Locality — Napajedla (in the past facilities of UFC).

a) fr. 0.04—0.05 mm:
total sum % : 5.09 % : 3 = 1.70 %
b) fr. 0.05—0.063 mm:
total sum % : 4.62 % : 3 = 1.54 %
c) fr. 0.063—0.10 mm:
total sum % : 4.15 % : 3 = 1.38 %
d) fr. 0.10—0.16 mm:
total sum % : 4.05 % : 3 = 1.35 %
e) fr. 0.16—0.20 mm:
total sum % : 4.57 % : 3 = 1.52 %
f) fr. 0.20—0.25 mm:
total sum % : 3.51 % : 3 = 1.17 %

The all fractions average from all 3 samples: s % : 25.99 % i. e. the average to 1 fr. 1.44 %.

4. Locality — Napajedla (the field way cut).

a) fr. 0.04—0.05 mm:
total sum % : 2.79 % : 3 = 0.93 %
b) fr. 0.05—0.063 mm:
total sum % : 5.45 % : 3 = 1.82 %
c) fr. 0.063—0.10 mm:
total sum % : 5.13 % : 3 = 1.71 %
d) fr. 0.10—0.16 mm:
total sum % : 6.00 % : 3 = 2.00 %
e) fr. 0.16—0.20 mm:
total sum % : 4.64 % : 3 = 1.55 %
f) fr. 0.20—0.25 mm:
total sum % : 2.18 % : 3 = 0.73 %

The all fractions average from all 3 samples: s % : 26.19 % i. e. the average to 1 fr. 1.46 %.

The whole averages of the heavy minerals percentages (recovery factor) from all 14 samples of the individual fractions.

a) fr. 0.04—0.05 mm:
s 3.20 % + s 4.17 % + s 5.09 % + s 2.79 % = total
s 15.25 % : 14 = 1.09 %
b) fr. 0.05—0.063 mm:
s 3.85 % + s 4.00 % + s 4.62 % + s 5.45 % = total
s 17.92 % : 14 = 1.28 %
c) fr. 0.063—0.10 mm:
s 4.46 % + s 4.13 % + s 4.15 % + s 5.13 % = total
s 17.87 % : 14 = 1.27 %
d) fr. 0.10—0.16 mm:
s 3.33 % + s 5.03 % + s 4.05 % + s 6.00 % = total
s 18.41 % : 14 = 1.32 %
e) fr. 0.16—0.20 mm:
s 3.74 % + s 5.47 % + s 4.57 % + s 4.64 % = total
s 18.42 % : 14 = 1.32 %
f) fr. 0.20—0.25 mm:
s 1.75 % + s 3.40 % + s 3.51 % + s 2.18 % = total
s 10.84 % : 14 = 0.77 %

The total heavy minerals average (recovery factor) of all 14 samples from all 6 fractions (about 84 fractions):

fr.: 0.04 —0.05 mm:	s 15.25 %
fr.: 0.05 —0.063 mm:	s 17.92 %
fr.: 0.063—0.10 mm:	s 17.87 %
fr.: 0.10 —0.16 mm:	s 18.41 %
fr.: 0.16 —0.20 mm:	s 18.42 %
fr.: 0.20 —0.25 mm:	s 10.84 %
total s % :	98.71 % : 84 = 1.18 %

Conclusions of the sieve analyses results:

1) Within all processed 14 loess samples the largest share always goes to the elutriated size fractions with the grain size under 0.04 mm which are formed by both powder and clayish fractions and morover even smaller shares of the so called undersize ones (= the remains after the unsieving into the 6 basic fractions) must be added to them. These 2 shares of the size fractions that come to waste ranged from 51.45 to 75.76 %. The finding out of the accurate share of the actual powder fractions (from 0.01—0.04 mm) in this waste would demand the use of a further set of still finer sieves than the so far used sieves with the mesh diameter 0.04 mm are but such ones are not commonly at the disposal (not even in the Geological Central Institution).

2) In accordance with the data about loess and loess loems of Czechoslovakia contained in the work of J. Pelíšek (1972) was the finding out that the finest examined size fractions namely 0.04—0.05 mm are mostly represented in the loess samples. The values of this size fraction percentage representation (as an average of all samples) are with the locality No. 1: 17.62 %, with the locality No. 2: 14.47 % and with the locality No. 3 it is 14.53 %. Only with the locality No. 4 this average from 3 samples is with the fraction 0.04—0.05 mm only 10.22 % but with the fraction 0.063—0.10 mm reaches the higher value i. e. 13.59 %. There is not typical loess with the locality No. 4 and it caused this atypic rate of the percentage representation (and thus weight), (see part: Landscape Survey Results).

3) The values of the average percentage representation of individual 6 examined size fractions are drawn into 4 graphs for 4 loess localities. In the graph No. 1 the average values from all 5 samples of the locality No. 1 are marked (the loam pit of the past brickworks by the road to Halenkovice). The graph No. 2 contains the average values from all 3 samples of the locality No. 2 (the loam pit of the past private brickworks), the graph No. 3 has the average values from 3 samples of the locality No. 3 (the exposure at the past facilities of UFC) and the graph No. 4 contains the average values from 3 samples of the locality No. 4 (the field way cut). The regular falls curves of the percentage representation from the finest fraction 0.04—0.05 mm to the coarsest 0.20—0.25 mm are very much alike on the graphs No. 1—3 and thus entirely accords with already above mentioned conclusions of J. Pelíšek (1972) where the author writes that loess is formed on the average by 30—60 % parts with the size 0.01—0.05 mm but 5—15 % of silty sands (fr. 0.05—0.1 mm) is contained in our loess and as for the sand there is only 1—3 % in the average.

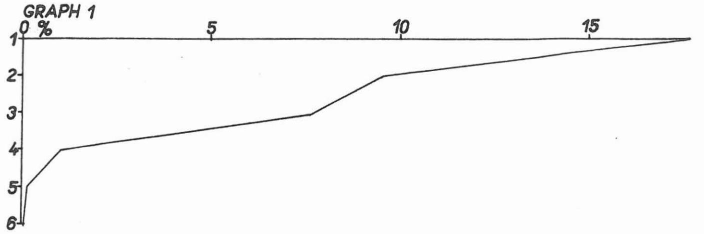
The value curve in the graph No. 4 shows fairly different development compared to the curves in the graphs No. 1—3. From the value 10.22 % in the fraction 0.04—0.05 there is an extreme fall to the value 0.66 % in the fraction 0.05—0.063 mm and then on the contrary an extreme rise to the max. value 13.59 % in the fraction 0.063—0.10 mm. Only then the fall of the value 4.31 % in the fraction 0.10—0.16 mm starts and in the next 2 fractions (0.16—0.20 mm and 0.20—0.25 mm) the value of the percentage representation keeps slightly over 4 %. The entire reliability of such a development of size fractions percentage representation as it is in the graph No. 4 from the 4th locality could be likely verify only by an examination of larger number of the samples from that place.

4) From the average values of the size fractions percentage representation of all 11 samples of the localities No. 1—3 the graph No. 5 was drawn up which with its regular fall of the value curve from 15.92 % (the fr. 0.20—0.25 mm) resembles most to the ideal course of the grain-size curve of the 6 examined fractions of all these 3 localities. Such an average curve valid for the mentioned 3 localities can be drawn because there is the same type of loess evidently also of the same age.

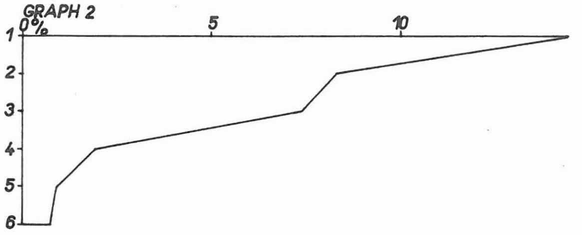
Conclusions from Heavy Minerals Separations Results:

1) As for the average values of the gained heavy minerals (recovery factor) from the individual fractions and localities — in 1th locality the average was: 0.64 % in the fr. 0.04—0.05 mm, 0.77 % in

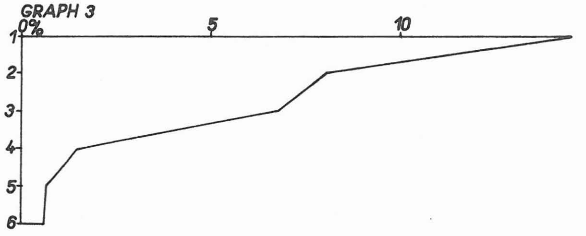
GRAPH 1



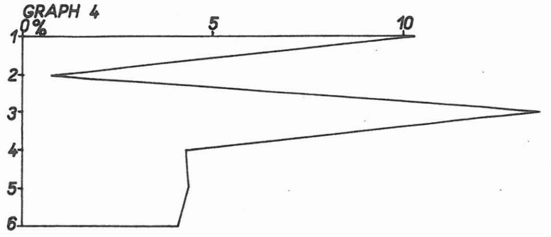
GRAPH 2



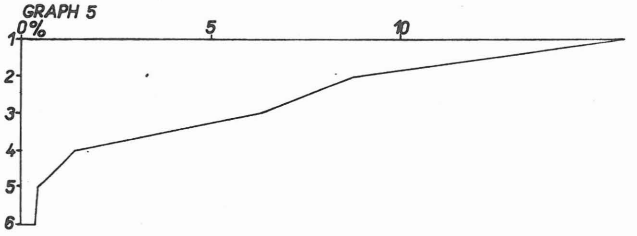
GRAPH 3



GRAPH 4



GRAPH 5



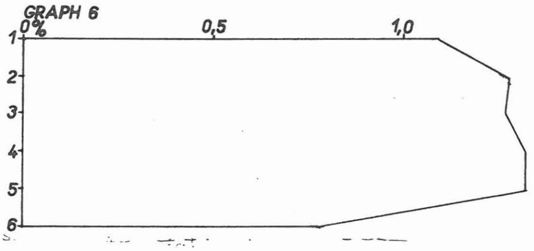


Fig. 19 = Graph No. 1—6
Fraction: 1 — 0.04 —0.05 mm
2 — 0.05 —0.063 mm
3 — 0.063—0.10 mm
4 — 0.10—0.16 mm
5 — 0.16—0.20 mm
6 — 0.20—0.25 mm

the fr. 0.05—0.063 mm, 0.89 % in the fr. 0.063—0.10 mm, 0.67 % in the fr. 0.10—0.16 mm, 0.75 % in the fr. 0.16—0.20 mm, 0.35 % in the fr. 0.20—0.25 mm. The total recovery factor average of all 1th locality reached 0.68 % which is at the same time the lowest value from all 4 localities.

In 2nd locality the recovery factor averages were: 1.39 % (fr. 0.04—0.05 mm), 1.33 % (fr. 0.05—0.063 mm), 1.38 % (fr. 0.063—0.10 mm), 1.68 % (fr. 0.10—0.16 mm), 1.82 % (fr. 0.16—0.20 mm), and 1.13 % in the coarsest fr. 0.20—0.25 mm. Compared to 1st locality there is an important rise of recovery factor. The total heavy minerals recovery factor average for all fractions of this locality is 1.46 % which is at the same time the highest average value for one locality.

In 3rd locality the recovera factor averages were: 1.70 % (fr. 0.04—0.05 mm), 1.54 % (fr. 0.05—0.063 mm), 1.38 % (fr. 0.063—0.10 mm), 1.35 % (fr. 0.10—0.16 mm), 1.52 % (fr. 0.16—0.20 mm), and 1.17 % in the fr. 0.20—0.25 mm. The total recovery factor average for all fractions of the 3 samples of this locality is 1.44 %.

In 4th locality the recovery factor averages were: 0.93 % (fr. 0.04—0.05 mm), 1.82 % (fr. 0.05—0.063 mm), 1.71 % (fr. 0.063—0.10 mm), 2.00 % (fr. 0.10—0.16 mm), 1.55 % (fr. 0.16—0.20 mm) and 0.73 % in the fr. 0.20—0.25 mm. The total recovery factor average of all fractions and samples of this locality reached the value 1.46 % i. e. max. height as in 2nd locality.

2) From all 14 samples of the localities the total average values of heavy minerals percentage shares (recovery factor) for the individual 6 size fractions were counted and from these average values the graph No. 6 was drawn up. The course of its curve shows that the max. recovery factor average is in the fraction 0.10—0.16 mm and 0.16—0.20 mm — in both fractions this average is 1.32 %. Even the max. weights of heavy minerals in both mentioned fractions i. e. 0.0405 g = 2.03 %, 0.0487 g = = 2.43 % and from 1 g made-up ground gained the heavy minerals weight 0.0243 g = 2.43 % accord with this geigh average. In the fr. 0.05—0.063 mm to 0.16—0.20 mm there are only small recovery factor differences (1.28—1.32 %) but in the finest fraction 0.04—0.05 mm the recovery factor is suprisingly only 1.09 %. This fact can be explained only in a difficult way because with 2 localities the recovery factor averages were quite high (1.39 % with the locality No. 2 and 1.70 % with the locality No. 3) but on the contrary with the othes 2 localities (0.64 % with the locality No. 1 and 0.94 % with the locality No. 4) the recovery factors were very low. The lowest heavy minerals recovery factor value is nevertheless from the coarsest fraction 0.20—0.25 mm namely 0.77 % which at the same time accords with the sieve analyses results about the lowest percentage representation of the size fraction.

3) The total recovery factor average (from the all analysed 84 fractions) 1.18 % is relatively rather high provided this results is compared with the values mentioned e. g. in the report on the research of the loess and loess clays heavy minerals of the well V 013 in Šlapanice and the well V 4 in Tvarožná near Brno in 1969. This partial report was the part of the Final Report of the brickmake materials research Šlapanice (Report No. 52800845 — in the Geofond Prague Reviews Archives). The author of this report on the heavy minerals research from the both wells — J. Krist carried out the research in a similar way as the research of loess in Napajedla surroundings were carried. During heavy minerals research for the partial report from this brickmake material research the procedure when wipping the deposited heavy minerals layers off the funnels' sides of the separation columns (see part: Loess Samples Laboratory Processing) was not kept which then might rather lower the total heavy minerals recovery factors. The heavy minerals separations from the mentioned report in 1969 were carried out by the laboratory workers of GP Brno using the method commonly used at that time.

QUALITATIVE AND QUANTITATIVE MICROSCOPICAL EVALUATION OF HEAVY MINERALS ASSOCIATION

Final results of microscopical qualitative and quantitative evaluation of heavy minerals association of all 6 chosen size fractions of all 14 processed loess samples of 4 localities of Napajedla surroundings are summed up into the tables No. 1—5.

In a polarising microscope Meopta the heavy minerals were evaluated qualitatively and quantitatively by means of accessible optical methods — mainly by using Petrographical tables by A. DUDEK, F. FEDIUK and M. PALIVCOVÁ from the year 1962 and also by perforating definite tables of heavy minerals which are enclosed in the book Heavy Minerals by R. ROST (1956).

The heavy minerals were mainly specified in constantly fixed microscopical powder preparations embedded in Canada balsam and in some cases (see part: Loess Samples Laboratory Processing) were also specified only as loose little grains in little drop of imersion liquid (bromoform was used).

From every fraction 300—500 grains in all (the whole number of grains 100 %) were qualitatively and quantitatively evaluated except several cases in which there was not sufficient number of little grains — there was evaluated even from 200—300 little grains there. The limit of 200 little grains for 1 spectrum analysis of the heavy minerals is in general used for example in GCI but according to my experience the results of percentuel analyses of the heavy minerals from the number of 300—500 grains are more reliable. In spite of that in 3 cases it was not possible to carry out the quantitative-qualitative evaluation even from 200 grains (it always concerns the fraction 0.20—0.25 mm) and that's why only the calculation of orientation of percentage — in the tables No. 1 and 2 these valuese are mentioned in brackets. In some further cases it was possible to attain for the quantity more than 300 grains — both a part of the appurtenant fraction was evaluated in the constantly fixed powder preparation and further grains of this fraction could be evaluated in already mentioned imersion liquid (because with the majority of fractions there are still quite large reserves of quantity of the heavy minerals in paper storage bins put aside).

From the transparent heavy minerals following minerals (or groups of minerals) were evaluted: grenats, zircon, apatite, delphinite group, $\alpha + \beta$ zoisite, monoclinic (including rhombic) amphiboles, monoclinic pyroxenes, diopside — hedenbergite (isomorphous range), tourmaline, edisonite, kyanite, sillimanite, titanite, tremolite, staurolite, andalusite, dumortierite, actinolite, topaz, anatose, ?spinels, strongly tarnished minerals, metalliferous and the other opaque minerals. Among the heavy minerals there were except these from time to time also biotite, muscovite and chlorites but there are minerals occurring both in light and heavy fractions (specific weight fluctuates from 2.7 to 3.1 eventually to 3.6) that's why it was more suitable not to comprehend these minerals to the tables and to add by their number to evaluation analyses of other heavy minerals of relevant size fraction. Similarly calcite which occures rarely in associations of the heavy minerals (probably owing to the ingredients of higher density) was not include into the tables (when pure its specific weight is 2.714).

A protozon carapace from foraminifer in the powder thin section of the fraction 0.10—0.16 mm from the sample No. 1 from the loampit of the former private brickworks in Napajedla (locality No. 2) was found. Primarily the carapace chambers were likely stuffed with pyrite which changed into iron hydroxide and thus weighted the carapace down so that it could get into heavy fraction. It is evidently exeptional example of the occurrence of such an organic carapace among the heavy minerals. According to the preliminary opinion of Dr. St. Svoboda (from Natural Historical Department of Regional Museum of south-eastern Moravia in Gottwaldov-Lešná) from 25. 3. 1983 it is probably Spiroplectamina genus from Textularidae family.

BRIEF DESCRIPTION OF THE EXAMINED HEAVY MINERALS

1) Grenats belong to low soluble relic minerals of mother rocks. They mostly occur as irregular angular fragments up to isometric forms (very rarely with a trace of crystal planes) which are transparent of slightly rosy coloured and optically they are isotropic. From the fraction 0.20—0.25 mm from the sample No. 2 of 4^{th} locality 2 grenats were chosen out of the loose grains and the analysis was carried out by the electron microprobe analyzer method (see part: Results of Special Analyses of the Heavy Minerals from Other Institutions) which documented that one grain is formed mostly by almandine component and in the other grain there is mostly pyrope component. Grenats' percentage representation in the examined spectrum of the heavy minerals of the individual fractions ranged from 0.78 % to 20.46 % (except one fraction in which there was found not even one grenat grain but it was one of the 3 fractions containing only less than 200 grains and that's why the other heavy minerals from this fraction are mentioned in the table only for orientation — in bracket). The total average of grenats group percentage representation from all 84 fractions is 8.59 %.

2) Zircon is formed by both long and short column forms but also by irregular ones (including the fragments of various shapes and the variously made round grains forming originally crystal columns). Some zircon grains are nearly perfectly round — from the time of sand grinding. In some crystal columns and their fragments you can distinguish various darker enclosures as well as little chaps otherwise zircon grains are mostly pure and are of high relief. Zircon column forms have the parallel extinction with the direction of the elongation, the zone character is positive. The percentage representation in the examined 6 fractions of every sample ranged from 0.25—9.14 % but in many fractions not even one grain was founded. The total average of zircon percentage representation in all 84 fractions is 1.48 %.

3) Apatite occurs most often in short column forms which are pure or a little whitish tarnished. Apatite grains have very low colours of interfraction (mostly greyish to nearly black), have the parallel extinction and the zone character is negative. Many times there are various little black enclosures in the apatite grains. Its grains occur in the examined fractions only rarely, it was determinated only in half of them (in 42 fractions) where its percentage representation ranged from 0.14—1.69 %. The total average in all 84 fractions reached only 0.29 %.

4) In delphinite group except $\alpha + \beta$ zoisite the individual types of minerals as delphinite, clinozoisite, piemontite eventually orthite could not be separated because other special methods of the determination already going beyond the frame of this research would have to be used. Nevertheless it is quite probable that the most frequent mineral of this group is that of delphinite, its extinction angle is usually to — 5°. The delphinite group minerals were yellowish-greenish and only slightly yellowish to nearly pure, they often have irregular forms (they also used to be more elongated) and anomally various colours of interfraction, they extinct irregulary in one grain, often occur there. The various dark enclosures and little chaps occur somewhere in their grains. This group minerals were in most size fractions relatively fairly represented namely from 0.88 to 18.13 % (again except one fraction in which this group grains were not found out but it is the fraction with the unsufficient number of

grains, under 200 i. e. only with the heavy minerals percentage values of orientation). The total average of the grain percentage representation of the delphinite group from all 84 examined fractions is 10.44 %.

5) Zoisite (α and β — without differentiation) from the delphinite group was evaluated separately. It forms mainly short column and band forms which are mostly nearly pure (provided they have not any inner enclosures), have the parallel extinction and the zone character is both negative (in α type) or positive (in β type). In most part of the examined fractions zoisite grains occur though, but only in small number — from 0.23 to 5.08 %. The total percentage representation of zoisite in all 84 fractions reaches only 1.07 %.

6) Amphiboles group (except tremolite and actinolite) contains both monoclinic and rhombic amphiboles, great numbers of them exist, it is most likely that common amphibole is the most often among them, it has the inclined extinction with the extinction angle to 28°. This group minerals are from the column but also various irregular (apparently they are mainly fragments of the former columns) grains, which are pleochroical — their colour changes when revolving the object stage of the polarising microscope from the light greenish or yellow-greenish to dark greenish and blue-greenish colour. The smaller part of amphiboles has pleochroical colours yellow-brownish (to yellowish) which change when revolving to brownish and brown-greenish. The amphibol group is also besides the metallic minerals and the other opaque minerals the most frequently presented group of the heavy minerals in all fractions. The percentage representation of amphiboles ranges from 0.74 to 56.44 %. More than 50 % representation of amphiboles was found out only in 2 cases (in both it was the size fraction 0.063—0.10 mm). The total average of amphibole percentage representation from all 84 fractions reached the value of 28.65 %.

7) Monoclinic pyroxenes (except isomorphous range diopside — hedenbergite) were in evaluated associalions of the heavy minerals observed only in 2 cases (0.26 and 0.27 %) so that their average percentage representation in all 84 fractions is only 0.006 %. Pyroxenes are here greenish fragments from short column forms which have the inclined extinction with the extinction angle of about 50°.

8) Diopside — hedenbergite isomorphous range is in the examined spectra of the heavy minerals again represented only very rarely and that only in 6 individual fractions (3× it was the fraction 0.04 to 0.05, 2× the fraction 0.05—0.063 mm and once it was presented in the fraction 0.20—0.25 mm). The percentage representation of the minerals of this isomorphous range ranged only from 0.22 % to 0.42 % and the total percentage representation from all 84 fractions reached only the values of 0.02 %. The grains of this range are greenish and nearly colourless, of short coloumn form, they have the inclined extinction with the extinction angle of about 40°.

9) Tourmaline occurs in the form of conspicuously pleochroical column grains — its colour changes when revolving the object stage of microscope from the nearly pure to dark yellow-brownish eventually from olive green and yellow-green to dark brown to black-brown shades. Its grains have the parallel extinction and the zone character is negative. In smaller part of the examined fractions it does not occur at all and its values of percentage representation range from 0.14 to 2.96 %. The total average of the percentage representation from all 84 fractions reached 0.83 %.

10) Edisonite makes mainly elongated oval (sometimes even long column) forms which are of outstanding red-brownish and brown-yellowish colour with high outjutting relief, they have the parallel extinction and are of the positive zone character. Occasionally you can see even typical knee compound crystals. It is quite absent in some size fractions and its percentage representation ranges from 0.12 to 5.08 %. The total average percentage representation from all 84 fractions is 1.03 %.

11) Kyanite (disthene) occurs still more rarely than edisonite. It makes mostly colourless (pure) slab-like and band-like forms or their fragments, they have the inclined extinction with the extinction

angle from — 30° to 7° and they are of the negative zone character. On these forms you can often see perpendicular divisional planes (to the direction of elongation) and little cracks — they partly look like several little boxes mutually put in to each other. The percentage representation of disthene ranges from 0.12 to 1.47 % and the total average percentage representation from all 84 fractions reaches only 0.17 %.

12) Sillimanite is already very rare mineral in the examined associations of the heavy minerals. It usually forms slightly fibrous and slightly tarnished (greyish) aggregates which used to have even varied (gay) interference colours. Sillimanite has the parallel extinction with the direction of the elongation of fibrous forms and the zone character is positive. Its percentage representation ranged from 0.13 to 0.60 % and its total average percentage representation is only 0.04 %.

13) Titanite is already more often present mineral among the examined fractions of the heavy minerals. It is usually colourless to slightly yellowish and many times even tarnished to whitish (leukoxen variety). Its grains have mostly isometric form and high relief, they have the inclined extinction with the extinction angle about 50°. It is seldom absent in the examined fractions and its percentage representation ranges from 0.23 to 10.66 %. Its highest volumes are in both finest fractions (0.04 to 0.05 mm and 0.05—0.063 mm). The total percentage representation from all 84 fractions is 1.73 %.

14) Tremolite (as well as actinolite) was separately analysed but in the examined fractions occured only in the number a bit larger than a half of all fractions. It makes long basalt-like to spicular and mostly colourless (pure) forms which have the inclined extinction with the extinction angle about 20° and the zone character is positive. The percentage representation in the present fractions ranged from 0.25 to 2.51 %. The total average percentage representation from all 84 fractions was 0.38 %.

15) Staurolite occured as well only a bit more than in half of fractions. It makes short basalt-like forms but often even variously confined fragments from the formly more elongated forms and its grains have conspicuous pleochroismus from light yellowish (near colourless) changing to orange yellowish when revolving the object stage. With basalt-like staurolite forms you can see the parallel extinction and the zone character is positive. The staurolite volumes usually rose passing from finer to more course grained fractions. Its percentage representation ranged from 0.24 to 3.93 %. The total average volume found out by the reckoning from all 84 fractions is 0.57 %.

16) Andalusite already belongs to rather precious minerals in all examined associations of the heavy minerals, it was noticed only in 8 separate fractions and its percentage volumes ranged only from 0.25 to 0.33 %. It makes grains of prismatic forms which base slighter pleochroismus — when revolving on the object stage they change from pure to pinkish. The grains have the parallel extinction with the direction of elongation and the zone character is negative. The total average volume of andalusite in all 84 fractions was only 0.03 %.

17) Dumortierite was noticed only in 5 separate fractions from their whole number. This mineral forms pleochroical basalt-like grains. When revolving on the microscopic stage its colour changes from light blueish to deep darkblue (nearly black), the brains have the parallel extinction with the direction of elongation and the zone character is negative. Its volume ranged in the 5 fractions from 0.26 to 0.45 % and its total average converted to all 84 fractions was only 0.02 %.

18) Actinolite (forms isomorphous range with tremolite) was present only in less than one half of all examined fractions and that in the volumes from 0.21 to 1.69 %. It forms long basalt-like nearly spicular forms which are usually light greenish or yellowish-greenish, with the inclined extinction with the extinction angle about 15° and the zone character is positive. The total average percentage volume of all 84 fractions was 0.24 %.

19) Topaz also belongs to only rarely present heavy minerals, it was noticed only in 5 separate

fractions where its percentage representation ranged from 0.25 to 0.37 %. It makes basalt-like forms of slightly yellowish colour on which you can sometimes see cleavable little cracks oriented vertically to the direction of the grain elongation. Its grains have the parallel extinction with the direction of elongation and the zone character is positive.

20) Anatose is the rarest of all examined heavy minerals, it was noticed only in 1 size fraction (0.04 to 0.05 mm from the sample No. 4 of 1st locality) where it forms 2 grains of rhombic cross section of brown yellowish colour which had high relief. Its percentage volume was 0.53 % and the total average percentage volume converted to all 84 fractions was only 0.006 %.

21) To the group of tarnished heavy minerals variously innerly tarnished and soiled anisotropic minerals were ranged which cannot be specified on the basis of the main optical characteristics needed for the differentiation of the individual types or groups of minerals. The percentage representation of this group ranged in the examined size fractions from 0.88 to 16.28 % while over than 10 % this group was represented only in 1 case and that was only the oriental value from the fractions where the number of grains was lower than 200 demanded. The total average of percentage representatiòn of this group among all 84 fractions was 4.27 %.

22) As ? spinels various mostly round light and yellowish greenish isotropic grains were ranged, which may possibly belong to pleonaste or hercynite but even grenat (uvarovite) may not be eliminated. Entirely reliable specification of this group could be realized probably after carrying out the multiple measuring of these grains using the electron microprobe analyzer method. The percentage representation of this group ranged in all examined size fractions from 0.23 to 10.67 % and the total average from 84 fractions was 1.96 %.

23) All metalliferous minerals (they are mainly magnetie, titanomagnetite, titanic iron ore, hematite and limonite) and then other in a difficult way specified opague minerals (even mineral grains with the accumulation of graphite substantive etc. may also belong here) are included in the group of metalliferous and the other opaque minerals. The mineral specification of these rather numerous group would demand further special research which however was not the purpose of this described research (oriented just to transparent heavy minerals). The percentage representation of this group in all 84 examined fractions ranged from 13.66 to 93.39 % while the total average of these fractions reached 38.14 %.

Table No. 1 — Locality No. 1 (the past brickworks loam jet by the road to Halenkovice)
Sample No. 1

Fractions: a = 0.04—0.05 mm; b = 0.05—0.063 mm; c = 0.063—0.10 mm; d = 0.10—0.16 mm; e = 0.16—0.20 mm; f = 0.20 to 0.25 mm. Numerical values in the tables mean % representation of the individual minerals.

fractions	grenats	zircon	apatite	delphinite group	$\alpha + \beta$ zoizite	monoclinic amphiboles	monoclinic pyroxenes	diopside — hedenbergite	tourmaline	edisonite	kyanite	sillimanite	titanite	tremolite	staurolite	andalusite	dumortierite	actinolite	topaz	anatose	tarnished minerals	? spinels	metalliferous and the others opaque minerals	controle sum
a	4.24	5.51	—	13.56	5.08	6.78	—	0.42	2.12	5.08	1.27	—	6.36	—	—	—	—	—	—	—	9.75	—	39.83	100.00
b	5.55	2.63	0.44	13.14	4.38	8.18	—	0.29	1.75	2.92	0.29	0.29	4.09	—	0.29	—	0.29	—	—	—	6.42	0.88	48.18	100.01
c	5.10	1.46	0.24	9.96	2.43	12.15	—	—	0.49	1.46	0.12	—	2.43	—	0.73	—	—	—	—	—	5.10	0.24	58.08	99.99
d	1.02	0.34	—	3.75	0.34	6.83	—	—	—	1.02	0.34	—	—	—	—	—	—	—	—	—	5.80	1.71	78.84	99.99
e	1.89	—	—	5.97	0.31	11.64	—	—	—	0.31	—	—	0.63	—	—	—	—	—	—	—	6.29	—	72.96	100.00
f	(0.78)	—	—	(2.33)	—	(1.56)	—	—	—	(0.39)	—	—	—	—	—	—	—	—	—	—	(1.56)	—	(93.39)	100.01
Sample No. 2																								
a	2.94	8.09	0.37	12.13	3.31	0.74	—	0.36	1.47	4.04	1.47	—	10.66	—	—	—	—	—	0.37	—	7.72	0.37	45.96	100.00
b	4.49	6.22	—	11.05	2.42	1.73	—	0.35	0.52	4.84	0.35	—	4.49	—	—	—	—	—	—	—	7.94	0.35	55.27	100.02
c	3.93	0.79	0.26	10.99	2.88	15.71	0.26	—	0.52	0.26	0.26	—	0.78	0.78	—	—	—	—	—	—	4.45	1.05	57.07	99.99
d	1.00	0.25	—	6.02	0.25	10.28	—	—	0.50	—	—	—	0.75	0,25	—	—	—	—	—	—	5.51	—	75.19	100.00
e	1.35	—	—	3.14	—	10.31	—	—	0.90	—	0.45	—	0.90	—	—	—	0.45	—	—	—	4.03	0.90	77.58	100.01
f	—	—	—	—	—	(4.65)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(16.28)	—	(79.07)	100.00
Sample No. 3																								
a	14.89	9.14	1.02	12.18	3.05	7.44	—	—	0.17	4.74	0.34	—	6.43	—	—	—	—	—	—	—	6.77	—	33.84	100.01
b	11.49	2.30	0.99	15.76	4.27	24.63	—	—	2.96	3.61	0.49	—	5.58	0.66	0.33	—	—	0.33	0.33	—	5.58	1.31	19.38	100.00
c	9.02	1.25	1.00	9.77	2.26	40.85	—	—	2.26	0.75	0.50	0.25	2.51	1.00	0.50	—	—	—	—	—	3.51	1.25	23.31	99.99
d	0.89	0.30	0.30	4.15	1.19	28.74	—	—	1.19	0.30	0.15	0.29	0.30	0.59	—	—	—	—	—	—	1.78	10.67	49.19	100.03
e	1.24	—	—	2.48	—	7.45	—	—	—	—	—	0.31	0.31	—	—	0.31	—	—	—	—	3.11	2.48	82.30	99.99
f	0.94	—	—	1.42	0.47	1.89	—	—	—	—	0.47	—	0.47	—	—	—	—	—	—	—	1.42	0.94	91.98	100.00

Table No. 2 — Locality No. 1 (the past brickworks loam jet by the road to Halenkovice)
Sample No. 4

Fractions: a = 0.04—0.05 mm; b = 0.05—0.063 mm; c = 0.063—0.10 mm; d = 0.10—0.16 mm; e = 0.16—0.20 mm; f = 0.20 to 0.25 mm. Numerical values in the tables mean % representation of the individual minerals.

fractions	grenats	zircon	apatite	delphinite group	$\alpha + \beta$ zoizite	monoclinic amphiboles	monoclinic pyroxenes	diopside — hedenbergite	tourmaline	edisonite	kyanite	sillimanite	titanite	tremolite	staurolite	andalusite	dumortierite	actinolite	topaz	anatose	tarnished minerals	? spinels	metalliferous and the others opaque minerals	controle sum
a	19.63	3.71	1.06	13.53	1.86	11.14	—	0.27	1.33	2.65	0.27	—	5.57	—	0.27	—	—	0.53	—	0.53	7.43	1.06	29.18	100.02
b	17.38	3.66	0.91	13.11	1.83	20.12	—	—	1.22	3.05	—	—	2.74	—	0.30	—	—	—	0.30	—	3.35	0.61	31.40	99.98
c	11.26	1.95	0.22	12.12	0.87	32.03	—	—	0.65	1.08	0.22	—	1.95	0.87	0.65	—	—	—	—	—	2.38	2.38	31.39	100.02
d	2.65	0.29	0.29	11.50	0.59	31.86	—	—	1.18	—	—	—	—	1.47	0.29	—	—	—	—	—	1.47	3.54	44.84	99.97
e	4.01	—	—	4.58	—	12.61	—	—	—	—	0.29	—	0.57	0.29	0.86	—	—	—	—	—	2.87	1.43	72.49	100.00
f	2.64	—	—	0.88	—	5.73	—	—	0.44	—	—	—	—	—	0.44	—	—	—	—	—	0.88	0.44	88.55	100.00
Sample No. 5																								
a	13.65	4.15	0.89	16.62	2.97	12.17	—	—	1.48	2.08	0.59	—	3.86	0.29	—	—	—	0.89	—	—	3.56	1.19	35.61	100.00
b	12.10	2.23	0.16	14.33	2.23	28.34	—	—	1.27	1.59	0.16	—	3.50	1.27	—	—	—	0.32	—	—	1.91	4.78	25.80	99.99
c	11.79	0.26	0.77	11.54	1.03	40.77	—	—	1.03	0.77	—	0.26	1.03	—	—	—	0.26	0.51	—	—	1.79	3.59	24.62	100.02
d	1.70	—	—	8.52	0.57	33.81	—	—	0.14	—	—	0.14	0.57	0.85	0.57	—	—	0.57	—	—	2.56	7.95	42.05	100.00
e	3.15	—	—	3.41	—	7.61	—	—	0.52	0.26	—	—	—	—	0.26	—	—	—	—	—	3.67	0.52	80.58	99.98
f	(4.82)	—	—	(1.20)	—	(4.82)	—	—	—	(1.20)	—	—	(2.41)	—	(1.20)	—	—	—	—	—	(1.20)	(3.61)	(79.52)	99.98
Locality No. 2 (the desolated private brickworks) Sample No. 1																								
a	20.46	5.18	0.55	13.10	2.18	9.28	0.27	—	0.55	2.73	0.14	—	4.09	0.55	0.27	—	—	0.27	—	—	4.64	1.09	34.65	100.00
b	16.07	1.49	0.60	10.71	1.19	24.40	—	—	1.19	1.49	—	—	3.87	0.30	—	—	—	0.30	—	—	2.98	1.78	33.63	100.00
c	8.41	1.74	0.29	11.01	0.87	36.81	—	—	0.58	—	0.29	—	2.32	0.29	0.29	—	—	—	—	—	2.03	1.45	33.62	100.00
d	4.36	0.31	—	10.28	—	45.17	—	—	1.25	—	—	—	0.31	0.31	—	—	—	—	—	—	3.43	4.36	30.22	100.00
e	3.53	0.32	—	11.54	0.32	36.22	—	—	0.32	—	—	—	1.28	—	0.96	—	—	—	—	—	6.41	0.64	38.46	100.00
f	11.06	—	—	12.17	—	29.42	—	0.22	0.22	—	—	—	0.88	—	0.66	—	—	—	—	—	5.97	0.66	38.72	99.98

Table No. 3 — Locality No. 2 (the desolated private brickworks)
Sample No. 2

Fractions: a = 0.04—0.05 mm; b = 0.05—0.063 mm; c = 0.063—0.10 mm; d = 0.10—0.16 mm; e = 0.16—0.20 mm; f = 0.20 to 0.25 mm. Numerical values in the tables mean % representation of the individual minerals.

fractions	grenats	zircon	apatite	delphinite group	$\alpha + \beta$ zoizite	monoclinic amphiboles	monoclinic pyroxenes	diopside — hedenbergite	tourmaline	edisonite	kyanite	sillimanite	titanite	tremolite	staurolite	andalusite	dumortierite	actinolite	topaz	anatose	tarnished minerals	? spinels	metalliferous and the others opaque minerals	controle sum
a	10.06	1.96	0.56	16.76	1.68	18.72	—	—	1.40	1.96	0.28	—	4.75	2.51	—	—	—	0.28	—	—	2.79	1.40	34.92	100.03
b	15.70	2.62	1.45	12.21	2.33	37.80	—	—	2.03	0.29	—	—	2.91	0.58	—	—	0.29	0.87	—	—	2.91	0.87	17.15	100.01
c	8.39	0.97	0.32	7.74	0.65	50.65	—	—	0.64	0.65	—	—	1.29	—	—	—	—	0.32	—	—	1.29	4.19	22.90	100.00
d	10.75	0.27	0.27	8.87	—	44.09	—	—	—	0.81	—	—	0.27	0.81	—	—	—	0.27	—	—	3.49	3.49	26.61	100.00
e	9.00	—	—	11.58	—	44.37	—	—	—	—	—	—	0.32	—	—	—	—	0.32	—	—	3.54	1.61	29.26	100.00
f	5.67	—	—	9.85	—	32.24	—	—	—	—	0.30	—	0.30	—	0.60	—	—	—	—	—	4.18	0.90	45.97	100.01
Sample No. 3																								
a	11.92	4.40	0.78	18.19	1.29	24.09	—	—	2.33	2.85	0.26	—	3.89	1.55	—	—	—	—	—	—	5.18	1.55	21.76	99.98
b	12.29	1.68	0.14	11.17	0.84	43.85	—	—	1.68	1.40	0.84	0.14	3.35	0.56	—	—	—	0.56	—	—	1.96	2.79	16.76	100.01
c	7.76	0.30	—	9.85	0.60	48.96	—	—	0.90	0.60	—	—	0.30	0.60	—	—	—	0.90	—	—	1.49	5.07	22.69	100.02
d	12.17	0.50	—	14.66	0.25	36.52	—	—	0.50	0.37	—	—	0.25	0.49	0.25	—	—	0.25	—	—	1.99	1.99	29.81	100.00
e	13.13	—	—	14.03	0.30	31.34	—	—	0.30	0.30	—	—	0.30	—	0.90	—	—	—	—	—	4.18	0.30	34.92	100.00
f	16.25	—	—	13.50	0.28	28.10	—	—	—	—	—	—	1.10	—	2.75	0.28	—	—	—	—	4.68	0.28	32.78	100.00
Locality No. 3 (the wall loess exposure near the past UFC propertly) Sample No. 1																								
a	8.43	3.78	0.87	13.66	1.74	31.69	—	—	1.45	2.03	0.29	—	3.20	0.87	—	—	—	0.29	—	—	4.94	2.91	23.84	99.99
b	10.45	1.16	0.58	10.16	2.03	38.03	—	—	1.45	1.16	0.29	0.15	2.32	0.58	—	0.29	—	0.29	—	—	3.48	2.03	25.54	99.99
c	8.13	0.68	0.45	8.80	1.81	46.05	—	—	0.90	1.58	—	—	1.13	0.45	—	—	—	0.23	—	—	2.71	3.16	23.93	100.01
d	10.12	0.60	—	9.52	0.30	42.26	—	—	0.60	—	—	0.60	0.89	—	—	—	—	—	—	—	3.57	5.06	26.49	100.01
e	8.12	—	—	10.90	0.23	44.55	—	—	0.35	0.12	—	—	0.23	0.46	0.70	—	—	—	—	—	5.80	0.23	28.31	100.00
f	6.83	0.28	—	11.10	0.28	34.14	—	—	0.14	—	—	—	—	—	2.56	0.28	—	—	—	—	5.12	0.28	38.98	99.99

Table No. 4 — Locality No. 3 (the wall loess exposure near the past UFC propertly)
Sample No. 2

Fractions: a = 0.04—0.05 mm; b = 0.05—0.063 mm; c = 0.063—0.10 mm; d = 0.10—0.16 mm; e = 0.16—0.20 mm; f = 0.20 to 0.25 mm. Numerical values in the tables mean % representation of the individual minerals.

fractions	grenats	zircon	apatite	delphinite group	$\alpha + \beta$ zoizite	monoclinic amphiboles	monoclinic pyroxenes	diopside — hedenbergite	tourmaline	edisonite	kyanite	sillimanite	titanite	tremolite	staurolite	andalusite	dumortierite	actinolite	topaz	anatose	tarnished minerals	? spinels	metalliferous and the others opaque minerals	controle sum
a	9.44	2.66	0.48	16.95	4.12	29.78	—	—	0.48	1.94	0.24	—	2.18	1.45	0.24	—	—	0.24	—	—	5.08	3.63	21.07	99.98
b	11.87	1.77	1.01	9.85	2.27	38.38	—	—	0.51	1.77	—	—	2.02	0.50	—	—	—	1.01	—	—	3.03	5.30	20.70	99.99
c	4.00	0.25	—	9.75	0.75	49.50	—	—	0.50	0.75	—	—	0.75	0.75	—	0.25	—	0.50	0.25	—	2.50	6.75	22.75	100.00
d	8.46	0.25	0.75	9.45	0.25	44.28	—	—	0.75	0.25	—	0.25	1.00	—	0.50	—	—	—	—	—	2.99	7.21	23.63	100.02
e	11.08	—	0.29	13.70	—	38.19	—	—	0.58	0.29	—	—	0.58	—	0.87	—	—	—	—	—	4.68	2.33	27.41	99.98
f	5.99	—	—	16.62	0.27	31.88	—	—	—	—	—	—	0.27	—	3.27	0.27	—	—	—	—	8.17	0.27	32.97	99.98
Sample No. 3																								
a	8.98	1.70	0.49	17.23	1.21	33.50	—	—	1.46	2.43	0.49	—	1.46	0.49	0.25	—	—	0.25	—	—	5.58	4.37	20.15	100.00
b	7.06	1.41	1.69	9.60	2.26	47.74	—	—	2.26	1.69	0.28	—	1.41	1.41	0.28	—	0.28	0.56	—	—	1.69	4.80	15.54	99.96
c	6.54	0.79	—	10.47	1.05	48.95	—	—	0.79	0.52	—	—	0.52	0.52	0.26	—	—	—	—	—	2.09	8.38	19.11	99.99
d	8.00	0.29	0.29	9.43	0.57	49.14	—	—	0.29	—	—	—	0.29	—	1.43	—	—	0.86	—	—	3.43	8.86	17.14	100.02
e	12.60	0.27	—	15.34	1.10	38.63	—	—	0.27	0.27	—	—	0.27	—	2.47	—	—	0.27	—	—	5.48	1.10	21.92	99.99
f	17.50	—	—	12.50	—	36.07	—	—	0.36	—	—	—	0.36	0.71	3.93	—	—	—	—	—	8.57	0.71	19.29	100.00
Locality No. 4 (the field way cut) Sample No. 1																								
a	8.80	1.96	0.24	12.71	2.44	28.36	—	—	2.69	1.47	0.49	—	2.93	1.22	—	—	—	0.24	—	—	5.38	0.98	30.07	99.98
b	10.97	5.61	1.02	9.18	0.51	31.12	—	—	2.04	2.55	0.26	—	3.57	0.51	—	—	—	0.77	—	—	4.34	0.51	27.04	100.00
c	12.14	1.90	0.24	11.43	0.24	39.52	—	—	0.95	0.71	—	—	0.71	0.24	0.24	—	—	0.24	—	—	2.14	—	29.29	99.99
d	10.20	—	—	11.90	—	47.59	—	—	0.28	0.28	—	—	0.85	0.57	0.57	—	—	—	—	—	2.27	0.28	25.21	100.00
e	13.07	—	—	10.64	—	35.26	—	—	—	—	—	—	—	0.30	1.52	—	—	—	—	—	3.34	0.30	35.56	99.99
f	7.89	—	—	11.18	0.33	23.36	—	—	0.66	—	—	—	0.33	—	2.30	0.33	—	0.33	—	—	6.91	—	46.38	100.00

Table No. 5 — Locality No. 4 (the field way cut)
Sample No. 2

Fractions: a = 0.04—0.05 mm; b = 0.05—0.063 mm; c = 0.063—0.10 mm; d = 0.10—0.16 mm; e = 0.16—0.20 mm; f = 0.20 to 0.25 mm. Numerical values in the tables mean % representation of the individual minerals.

fractions	grenats	zircon	apatite	delphinite group	$\alpha + \beta$ zoizite	monoclinic amphiboles	monoclinic pyroxenes	diopside — hedenbergite	tourmaline	edisonite	kyanite	sillimanite	titanite	tremolite	staurolite	andalusite	dumortierite	actinolite	topaz	anatose	tarnished minerals	? spinels	metalliferous and the others opaque minerals	controle sum
a	11.95	4.84	0.28	10.53	1.71	16.50	—	—	0.43	3.13	—	—	3.41	—	—	—	—	0.57	—	—	4.27	0.28	42.11	100.01
b	11.71	5.43	0.57	12.00	1.14	35.43	—	—	0.86	2.00	0.57	—	2.86	0.29	—	—	—	—	—	—	4.86	0.86	21.43	100.01
c	14.71	3.20	—	10.66	0.64	37.53	—	—	0.43	0.64	—	—	0.85	0.64	0.64	—	—	0.21	—	—	2.13	0.42	27.29	99.99
d	15.97	—	0.48	12.16	0.48	39.09	—	—	1.91	—	0.12	0.24	1.43	0.48	1.67	—	—	0.48	—	—	2.86	0.24	22.41	100.02
e	9.97	—	—	11.21	0.31	42.06	—	—	0.62	0.31	—	0.31	0.62	0.31	1.87	—	—	—	—	—	5.92	0.31	26.17	99.99
f	4.43	—	—	7.91	0.32	27.85	—	—	0.32	—	—	0.32	—	—	2.53	—	—	—	—	—	8.54	0.32	47.47	100.01
Sample No. 3																								
a	8.73	2.82	0.14	13.80	1.13	24.23	—	—	1.41	1.41	0.14	—	3.38	0.56	—	—	—	1.69	—	—	5.35	1.13	34.08	100.00
b	7.76	4.01	0.50	10.76	1.25	39.55	—	—	2.50	2.50	0.25	0.13	1.75	0.25	—	—	—	1.50	—	—	3.50	1.00	22.53	99.99
c	6.49	1.57	—	10.30	1.12	56.44	—	—	1.68	0.90	0.22	—	0.67	1.12	0.45	—	—	0.67	—	—	2.69	2.02	13.66	100.00
d	14.45	0.25	—	10.39	—	35.23	—	—	0.38	0.25	0.25	—	1.01	—	1.52	—	—	1.01	—	—	3.55	0.25	31.43	99.97
e	8.82	0.25	—	10.54	0.25	33.58	—	—	0.74	—	—	—	0.49	0.49	1.72	—	—	0.25	0.25	—	5.15	0.25	37.25	100.03
f	7.50	0.31	—	8.44	0.31	26.87	—	—	0.31	—	—	—	0.94	—	3.12	0.31	—	0.63	—	—	7.19	0.31	43.75	99.99

CONCLUSIONS OF THE CHANGES OF QUANTITATIVE REPRESENTATION OF THE HEAVY MINERALS (SELECTED) IN DEPENDANCE ON SIZE FRACTION CHANGES:

The found changes of quantitative representation of the heavy minerals can be compared to already formely found out similar changes and that both at the heavy minerals researches from the loess of the Trnavská loess Hills (within the framework of the diploma work by J. Krist at the Faculty of Natural Science at the Komenský University in 1967) and then compared to the results of the heavy minerals percentage evaluation from 2 wells of GP Ostrava in Brno surroundings (mentioned in the partial report on the heavy minerals research within the framework of the Final Report on Research of Brick Materials from the year 1969 which is deposited in Prague Geofond). For mutual comparison of changes of the heavy minerals percentage representation which quite objectively and directly depend on the proper numbers of size fractions these 7 characteristic types and groups of the heavy minerals were again chosen (like in the works from 1967 and 1969): grenats, zircon, apatite, delphinite group, monoclinic amphiboles group, edisonite and metalliferous and the other opaque minerals. For the purpose of watching the mentioned changes the average percentage contents from all 14 samples for every individual size fraction were reckoned for each of these chosen heavy minerals. It is possible to make averages from all 14 loess samples because it is loess of the same type and age (see part: Sieve Analyses Conclusions).

The average percentage values of all 14 samples are following:

1) Grenats:

a)	fr. 0.04 —0.05 mm:	11.01 %
b)	fr. 0.05 —0.063 mm:	11.06 %
c)	fr. 0.063—0.10 mm:	8.41 %
d)	fr. 0.10 —0.16 mm:	7.27 %
e)	fr. 0.16 —0.20 mm:	7.21 %
f)	fr. 0.20 —0.25 mm:	6.59 %

2) Zircon:

a)	fr. 0.04 —0.05 mm:	4.28 %
b)	fr. 0.05 —0.063 mm:	3.02 %
c)	fr. 0.063—0.10 mm:	1.22 %
d)	fr. 0.10 —0.16 mm:	0.26 %
e)	fr. 0.16 —0.20 mm:	0.06 %
f)	fr. 0.20 —0.25 mm:	0.04 %

3) Apatite:

a)	fr. 0.04 —0.05 mm:	0.55 %
b)	fr. 0.05 —0.063 mm:	0.72 %
c)	fr. 0.063—0.10 mm:	0.27 %
d)	fr. 0.10 —0.16 mm:	0.17 %
e)	fr. 0.16 —0.20 mm:	0.02 %
f)	fr. 0.20 —0.25 mm:	apatite was not represented

4) Delphinite group:

a)	fr. 0.04 —0.05 mm:	14.35 %
b)	fr. 0.05 —0.063 mm:	11.64 %
c)	fr. 0.063—0.10 mm:	10.31 %
d)	fr. 0.10 —0.16 mm:	9.33 %
e)	fr. 0.16 —0.20 mm:	9.22 %
f)	fr. 0.20 —0.25 mm:	7.79 %

5) Amphiboles group:

a)	fr. 0.04 —0.05 mm:	18.17 %
b)	fr. 0.05 —0.063 mm:	29.95 %
c)	fr. 0.063—0.10 mm:	39.71 %
d)	fr. 0.10 —0.16 mm:	35.35 %
e)	fr. 0.16 —0.20 mm:	28.13 %
f)	fr. 0.20 —0.25 mm:	20.61 %

6) Edisonite:

a)	fr. 0.04 —0.05 mm:	2.75 %
b)	fr. 0.05 —0.063 mm:	2.20 %
c)	fr. 0.063—0.10 mm:	0.76 %
d)	fr. 0.10 —0.16 mm:	0.23 %
e)	fr. 0.16 —0.20 mm:	0.13 %
f)	fr. 0.20 —0.25 mm:	0.11 %

7) Metal. and the other opaque minerals group:

a)	fr. 0.04 —0.05 mm:	31.93 %
b)	fr. 0.05 —0.063 mm:	27.17 %
c)	fr. 0.063—0.10 mm:	29.26 %
d)	fr. 0.10 —0.16 mm:	37.36 %
e)	fr. 0.16 —0.20 mm:	47.51 %
f)	fr. 0.20 —0.25 mm:	55.63 %

ad 1) Grenats

The results of the changes of the percentage representation from the finest fractions (max. is in the fraction 0.05—0.063 mm: 11.06 %) to the coarsest (min. 6.59 % in the fr. 0.20—0.25 mm) show regular fall of the percentage representation. This tendency of fall is in accordance with similar tendencies of fall found out both at the heavy minerals research in 1967 and in 1969. Smaller deviation of this development was with the percentage representation values in 2[nd] well (V4 Tvarožná) from fhe research in 1969. There is not any difference in the way of change of grenats percentage representation regarding the size fraction's size not even there are 3 different loess areas. The difference between them is rooted only in the fact that the grenats percentage shares were at the research in 1967 and 1969 a bit higher on the average but it is connected with the question of likely higher presentation of grenats in primary areas of their occurrences from where the loess was blown out.

ad 2) Zircon

The average percentage contents of this mineral fall regularly from the finest fraction 0.04—0.05 mm (with max. 4.38 %) to the coarsest i. e. 0.20—0.25 mm (with min. 0.04 %). This falling tendency can be compared with similar falls of the percentage representation found out by both older heavy minerals researches. Subtle differentiation is rooted in the fact that zircon percentage contents were at the researches from 1967 and 1969 a bit higher in the fraction 0.05 to 0.063 mm compared to the fraction 0.04—0.05 mm. Otherwise the zircon average percentage contents from the researches 1967 and 1969 are also a bit higher than from the contemporary research.

ad 3) Apatite

As follows from the table the highest representation of its average percentage contents has in the fraction 0.05—0.063 mm i. e. 0.72 % and the fraction 0.04—0.05 mm with 0.55 % is only on 2[nd] place. From the fraction 0.05—0.063 mm its average content falls but only to the fraction 0.16—0.20 mm because apatite was never noticed in the fraction 0.20—0.25 mm. This way of fall of apatite percentage representation from fine fractions to coarser ones is also more or less similar to falling values of apatite percentage representation from the researches 1967 and 1969. Smaller difference is made by the fact that the highest contents of apatite were found already in the finest fraction 0.04 to 0.05 mm at the researches of that time. As for the average percentage contents they were a bit higher at that time as well.

ad 4) Delphinite group
Also with this group similar development of changes of quantitative representation according to size fractions sizes was found out — as was mentioned in items ad 1, ad 3. In delphinite group there is also a fall of percentage representation from the finest fraction 0.04—0.05 mm (with max. 14.35 %) continuously to the coarsest fraction 0.20.—0.25 mm (with min. 7.79 %). When comparing this development of the percentage representation changes with the results found out at the heavy minerals research in 1967 you find out that at that time the development was quite opposite (the percentage content of delphinite group was rising from the finest to the coarsest size fraction). On the contrary to this antidirective development the mutual accordance of the contemporary research result with the research result of both wells from 1969 therefore falling of the percentage content of delphinite group is of the same direction.

ad 5) Monoclinic amphiboles group
The changes of the percentage representation of this group minerals show different development compared to the previous 4 minerals and groups. There the maximum average percentage content is concentrated into the fraction 0.063—0.10 mm — approximately in the half of 6 examined size fractions extent. In the direction of the finest and even on the contrary of the coarser fractions falls of the average percentage contents occur there and at the same time minimum belongs to the finest fraction 0.04 to 0.05 mm (18.17 %) but 2nd smallest content is on the contrary in the coarsest fraction 0.20.—0.25 mm i. e. 20.61 %. Provided these results are compared with the facts found out at both older researches there are again greater differences (the research from 1967) but when comparing the contemporary research and the research from 1969 you can already conclude greater similarity. Maximum of the amphiboles percentage representation was at the research of the both wells from Brno surroundings concentrated into the fraction 0.09—0.16 mm. The extent of at that time used fraction covers only by small part the contemporary fraction 0.063—0.10 mm and by larger part is in accordance with the next fraction 0.10—0.16 mm. For the use of the mutual comparison of both researches it does not matter very much because in the contemporary fraction 0.10—0.16 mm there is 2nd highest percentage content of amphiboles group (35.35 %). Very similar development of amphiboles percentage representation changes in the contemporary research and the research from 1969 are shown by falls of their contents to finer and even coarser fractions as well which are accepted for both researches.

ad 6) Edisonite
This mineral has regular development of the average percentage content from maximum value 2.75 % in the finest fraction 0.04—0.05 mm to minimum value 0.11 % in the coarsest fraction 0.20 to 0.25 mm. Its practically equable fall from the finest to the coarsest fraction is also in full accordance with the results of the loess heavy minerals researches from 1967 and 1969.

ad 7) Metalliferous and the other opaque minerals
This group minerals also show continous development of the percentage representation changes on the whole till subtle deviation at 2 finest fractions 0.04—0.05 mm and 0.05—0.063 mm. Minimum of the average percentage content of this group is in the fraction 0.05—0.063 mm (27.17 %), 2nd minimum average amount is in the fraction 0.063—0.10 mm and only on 3rd place there is the finest fraction 0.04—0.05 mm (31.93 %). From the fraction 0.05—0.063 mm then the average percentage content regularly rises to the coarsest fraction 0.20—0.25 mm where there is also maximum 55.63 %. Provided these results are compared with both older heavy minerals researches relatively consider-

able accordance can be seen again. From 4 examined localities at the research in 1967 (marked as Báhoň II and Báhoň III) 2 were of the entirely same development of the percentage representation changes as at the contemporary research i. e. first less fall of the percentage values of metalliferous (and the other minerals) minerals from fraction 0.04—0.05 mm to the fraction 0.05—0.063 mm and then continuous rise of their share till the coarsest fraction 0.20—0.25 mm. When comparing the contemporary research with the research carried out in 1969 there is only the deviation concerning the lowest content of this group minerals already in the finest fraction 0.04—0.05 mm (at the research 1969) and hence to the coarser fractions the contents already rise in both cases.

The consequence of the above mentioned conclusions concerning the changes of quantitative representation of 7 selected heavy minerals is that they form 3 different groups:
a) grenats, zircones, aphatites, delphinite group and edisonite concentrated mainly in finer size fractions (their maximum contents are the most frequent in the finest fraction 0.04—0.05 mm),
b) metalliferous and the other opaque minerals group concentrated on the contrary in coarser fractions (maximum content is just in the coarsest fraction 0.20—0.25 mm),
c) to this 3rd group the whole monoclinic (including rhombic) amphiboles group can be ranged having the highest percentage representation in the middle size fractions 0.063—0.10 mm and 0.10 to 0.16 mm.

Such division of the selected heavy minerals will apparently have more general validity because very similar results were found out already at the heavy minerals researches from the loess of the Trnavská Loess Hills in 1967 as well as at the heavy minerals research from drill samples from loess of Brno surroundings in 1969.

THE RESULTS OF THE HEAVY MINERALS SPECIAL ANALYSES FROM OTHER RESEARCH INSTITUTIONS:

A) Laser microanalyses of the selected little grains of the heavy minerals in Mineral Institution in Kutná Hora

In December 1982 Mr Horáček, laboratory worker, prepared (with my own co-operation) 15 beforehand selected little grains of the heavy minerals for making plexiglass preparation (from the fractions 0.10—0.16 mm and 0.16—0.20 mm) in the spectral analysis laboratory of Mineral Institution in Kutná Hora. First a test triplex shoot by laser ray was made to one grenat grain and also photographic plate with the spectrum of this grain was developed. When watching it on a reading device of negatives the appurtenant spectrum lines belonging to grenat could be confirm but with regard to very small amount of materials and as well limited analytical feasibility of laser (minimu theoretical limit of diameter of laser ray ranges about 0.07 mm on the average according to the workers ot this laboratory), the spectrum lines were very faint and readed off with difficulty. It was also confirmed as soon as the results of the laser analysis of the mentioned 15 grains of the heavy minerals were delivered from Mineral Instit. in February 1983. The aim of the carried laser analysis should be determination of the composition of 6 grains of the heavy minerals mainly (from 15 examined) which should be determined by means of the polarising microscope. 5 of them, however, could not be determined by laser microanalysis at all and that because of shortage of the sample amount which is given by the beforehand fixed size fraction which is typical for loess material. There were the results of the analyses at the other grains but because the quantitative analyses are not the matter, their interpretation is very difficult (for every grain about 20 elements were settled). From all these reasons the mentioned laboratory workers of Mineral Instit. then recommended to carry out the analysis of further grains (selected out of the reserves in the paper bins) on the electron microprobe analyzer.

B) The Results of 2 grenat grains analysis using the method of electron microprobe analyzer in the laboratory of joint instrumental analysis of GCI Prague:

In February 1985 the analysis of 2 grenat grains from the fraction 0.20—0.25 mm of sample No. 2 of the locality IV (fieldway cut) was carried out. These 2 grains should be placed to the preparation determined for the analysis in the microprobe analyzer together with 4 other grains which, however, could not be reliably found out before the beginning of the own analyses (I was not involved in the making of the preparation) and that's why they were not analysed. The measuring by the microprobe analyzer was carried out on 2 mentioned grenat grains by ing. Rybka (with my attendance) from the mentioned laboratory and that always on 2 chosen points of both grains — 4 measurings were carried out.

1) The results of 1[st] grenat grain measuring (copy of the report by printer of the microprobe analyzer computer on the original perforated paper web):

a) the measurement in 1. point:

DATA POINT NO. 1

	% CONC.	K RATIO	STD. DEV.	ATOM. PROP.
Ti	.05	.0004	.01	.02
Mn	4.68	.0428	.04	2.62
Si	39.16	.3228	.29	25.22
Fe	27.93	.2555	.14	15.44
K	0	0	0	0
Na	0	0	0	0
Mg	3.69	.0282	.04	3.63
Ca	3.21	.0316	.03	2.28
Al	21.85	.1829	.12	17.03
TOTAL	99.57 %			

b) the measurement in 2. point:

DATA POINT NO. 2

	% CONC.	K RATIO	STD. DEV.	ATOM. PROP.
Ti	.04	.0003	0	.02
Mn	5.08	.0464	.05	2.82
Si	38.58	.3264	.29	25.35
Fe	28.31	.2592	.14	15.56
K	0	0	0	0
Na	.01	.0001	0	.02
Mg	3.71	.0284	.04	3.64
Ca	2.63	.0259	.03	1.85
Al	21.84	.1825	.12	16.92
TOTAL	100.2 %			

2) The results of 2[nd] grenat grain:

a) the measurement in 1. point:

DATA POINT NO. 1

	% CONC.	K RATIO	STD. DEV.	ATOM. PROP.
Ti	0	0	0	0
Mn	.32	.0028	.01	.16
Si	39.86	.3321	.3	24.54
Fe	21.23	.191	.12	10.93
K	.02	.0001	0	.01
Na	0	0	0	0
Mg	12.86	.1052	.09	11.8
Ca	3.17	.0306	.03	2.09
Al	23.81	.1985	.12	17.29
TOTAL	101.26 %			

b) the measurement in 2. point:

DATA POINT NO. 2

	% CONC.	K RATIO	STD. DEV.	ATOM. PROP.
Ti	.05	.0005	.01	.02
Mn	.31	.0028	.01	.16
Si	41.72	.3486	.31	25.07
Fe	21.51	.1935	.12	10.81
K	0	0	0	0
Na	.03	.0002	0	.03
Mg	12.8	.1048	.09	11.46
Ca	3.13	.0302	.03	2.01
Al	23.85	.1992	.12	16.9
TOTAL	103.39 %			

With the co-operation of Dr. M. Novák from the Morava Museum in Brno the selection by one measurement from every grenat grain was carried out both for the computation of crystal-chemical formula of the mineral and at the same time for the computation of the individual grenat components contained in one grain.

For these computations the data of the measurements in 1st points of grains were always best suitable. The process of both computations was carried out according to the methodology stated in chapter on chemical crystallography from the Mineralogy by F. SLAVÍK, J. NOVÁK and J. KOKTA (issued in 1974).

The computation process from the result of the measurement of 1 point on 1st grenat grain:

1) The analysis conclusion from GCI Prague (= the percentage of the concentration) is recorded for 9 individual elements but it means the percentage of oxides of these elements (according to the explanation of Ing. Rybka). That's why this transfer was made:

$Ti = TiO_2$	$Fe^{2+} = FeO$	$Mg = MgO$
$Mn = MnO$	$K = K_2O$	$Ca = CaO$
$Si = SiO_2$	$Na = Na_2O$	$Al = Al_2O_3$

2) The inappreciable amount of the element (here $TiO_2 = 0.05$ %) can be left out and because the concentration sum (total) was here 99.52 % their trasfer to 100 % will be made (conversion factor is $\frac{100}{99.52}$ i. e. 1.00482).

3) The molecular quotient of oxides will be reckoned in such a way that the percentage shares of oxides are devided by their molecular weight.

4) The computation of the atomic quotients of oxygen and metals (by multiplication of the molecular quotients of the relevant oxides by numbers of atoms of the elements in oxide) will be made.

5) By multiplication of the atom quotients of the metals by factor f the numbers of metal atoms in grenat formula are gained. Factor f is found out in such a way that the sum of the atom quotients of oxygen is devided by number 12. Number 12 means here according to the structure of presumptive 12 oxygen atoms in 1/8 of basic grenat prism — almandine.

Table of the proper computation for 1 points from 1st grenat grain (oxides with null or negligible percentage concentration are left out i. e. TiO_2, K_2O, Na_2O):

oxid.	% conc.	% trans to 100 %	molec. quot.	atom. quot. oxygen	atom. quot. metal	number of metal atoms
MnO	4.68	4.70	0.0663	0.0663	0.0663	0.31
SiO_2	38.16	38.34	0.6380	1.276	0.6380	3.03
FeO	27.93	28.06	0.3905	0.3905	0.3905	1.85
MgO	3.69	3.71	0.0920	0.0920	0.0920	0.44
CaO	3.21	3.23	0.0576	0.0576	0.0576	0.27
Al_2O_3	21.85	21.96	0.2154	0.6462	0.4308	2.04
total	99.52	cca 100.00	total	2.5286		

$$\text{factor } f = \frac{12}{2.5286} = 4.7457$$

This crystal-chemical grenat formula is formed from the number of metal atoms:

$(Fe^{2+}_{1.85}Mg_{0.44}Mn_{0.31}Ca_{0.27})_{2.87}\, Al_{2.04}\, Si_{3.03}\, O_{12}$

The computation of this grenat compounds:

$$\text{Fe} : \frac{1.85 \,.\, 100}{2.87} = 64.3\ \%\ \text{almandine compound}$$

$$\text{Mg} : \frac{0.44 \,.\, 100}{2.87} = 15.3\ \%\ \text{pyrope compound}$$

$$\text{Mn} : \frac{0.31 \,.\, 100}{2.87} = 10.8\ \%\ \text{spessartite compound}$$

$$\text{Ca} : \frac{0.27 \,.\, 100}{2.87} = 9.4\ \%\ \text{grossularite compound}$$

total 99.8 %

The computation of grenat compounds was then compared with the data about the composition of grenats in some rocks of the Rought Ash Mountains from the work "New Knowledge of Geology of the Ash Mountains" by E. Fediuková, M. Fišera, J. Cháb, V. Konečný, M. Opletal and R. Rybka. This work was issued by Geological Research Ostrava 1984. There are abstracts from the reports given at 2nd work seminar on the results of the researches in the Ash Mountains in the years 1981—1983. The mentioned seminar took place at the Faculty of Natural Science of the Palacký University in Olomouc on 7. 2. 1984. The authors of this work mention that according to the composition all grenats can be divided into 2 groups:

1) almandine ones with 50—70 % content of almandine compound and variable shares of the other compounds (spessartite ones 4—38 %, pyrope ones 5—20 % and grossularite 0.7—16 %),
2) almandine-grossularite-spessartite with lower content of almandine share.

The reckoned parts of the grenat grain from sample No. 2 locality IV Napajedla consequently fall to the almandine group from the quoated work.

On the basis of the mentioned computations and comparison with this work about the Rought Ash Mountains we can concluded with great probability as to the grenat origin and other loess heavy minerals by blowing out from the alluvia of the Morava river which were transported here and which have their origin in old enclosing rocks of the Rought Ash Mountains crystalline complex.

The actual computation for 1st point from 2nd grenat grain:

oxid.	% conc.	% trans to 100 %	molec. quot.	atom. quot. oxygen	atom quot. metal	number of metal atoms
MnO	0.32	0.31	0.0044	0.0044	0.0044	0.02
SiO_2	39.86	39.37	0.6552	1.3104	0.6552	2.95
FeO	21.23	20.97	0.2919	0.2919	0.2919	1.31
MgO	12.86	12.70	0.3150	0.3150	0.3150	1.42
CaO	3.17	3.13	0.0558	0.0558	0.0558	0.25
Al_2O_3	23.81	23.52	0.2307	0.6921	0.4614	2.07
total	101.25	cca 100.00	total	2.6696		

$$\text{Factor } f = \frac{12}{2.6696} = 4.4951$$

The crystal-chemical formula of grenat subsequently is:
$(Mg_{1.42}Fe_{1.31}Ca_{0.25}Mn_{0.02})_{3.00}\ Al_{2.07}\ Si_{2.95}\ O_{12}$

The computation of this grenat compounds:

$$Mg : \frac{1.42 . 100}{3.00} = 47.3\ \%\ \text{pyrope compound}$$

$$Fe : \frac{1.31 . 100}{3.00} = 43.7\ \%\ \text{almandine compound}$$

$$Ca : \frac{0.25 . 100}{3.00} = 8.3\ \%\ \text{grossularite compound}$$

$$Mn : \frac{0.02 . 100}{3.00} = 0.7\ \%\ \text{spessartite compound}$$

total 100.0 %

This computation of 2nd grenat grain compounds was then compared with 2 grenat analyses which are mentioned in the book "Porodoobrazujuščije mineraly" by U. A. DIRA, R. A. CHAUI and DŽ. ZUSMAN (1st part issued in 1965 in Moscow). Both these analyses resemble most to the analyses measured ba the microprobe analyzer on this grenat grain. 1st analysis mentioned in the book by DIRA, CHAUI and ZUSMAN under No. 6 there is grenat originated in grenatplagioclase rocks (eclogite gabbro) and in the case of 2nd analysis mentioned under No. 7 there are pseudophenocrysts of gabbro grenats near to injected syenite.
Both grenat grains which were chosen from the loose grains of the same fraction (0.20—0.25 mm) and of the same sample No. 2 from locality IV have mutually different representation of the individual grenat compounds, but it is likely that both originated in enclosing crystalline complex in the Rought Ash Mountains. Reliable evidence that this is a fact can be given after greater number of the analyses on more grenat grains is carried.

THE VALORIZATION OF THE RELEVANCY OF THE RESEARCH ATTAINED RESULTS

The heavy minerals research of the loess complexes is very important part of the general geological research of these quaternary sedimentary rocks. The questions of stratigraphy, genetics, etc. cannot be quite reliably explained only on the basis of the determination of the paleontology material as it is used to be with older systems. That's why the study of loess and sedimentography which is based on the heavy minerals study is one of the important geological branch. This research task engaged in the most important part of the heavy minerals and that in all trasparent isotropic and anisotropic minerals in spite of proving again that according to the quantitative representation even metalliferous minerals (including other appurtenant opaque minerals) are represented there quite enough. These metalliferous minerals occur in generally most imperceptible amount though — the maximum contents of the recovery factor from already assorted size fractions reached a little over 2 % (from which only less than 40 % of ores and other opaque minerals were presented on the average though. That's why any industrial use cannot be considered at all in this case. On the contrary number of important indices can be followed with the selected 7 types of the transparent heavy minerals — as these problems were discussed in detail in the part "Conclusions of the changes of quantitative representation of the heavy minerals in dependance on size fraction changes". The transparent heavy minerals research in the examined exposures in Napajedla surroundings could bring still many other information provided e. g. even older loess layers than here presented youngest loess W 3 could be documented but it would obviously require the excerting of less research work as shallower wells, probes and trenches which can be carried out only by a research geological corporation. As far as the comparison of the so called sensible heavy minerals from the different loess horizons is possible (as L. Krystková mentions in her work from 1975) you can draw conclusions as to the intensity of weathering processes and so even the character of the occuring climate changes during the period of loess sedimentation — e. g. amphibole was such a "sensitive" heavy mineral. There are still great numbers of possibilities of the use of the transparent heavy minerals study. That's why many other ways of the loess research carrying out by means of the heavy minerals study can be found (particularly also by perfection of the sieve analyses with the sieves of 0.01—0.04 mm mesh diameters, by use of the accurate analytical methods as by means of the electron microprobe, etc.).

Translated by J. BOUDJAOUIOVÁ

BIBLIOGRAPHY

CZUDEK, T. et al. (1972): Geomorfologické členění ČSR. Studia geographica 23, ČSAV a Geografický ústav, Brno.

DIR, U. A., CHAUI, R. A., ZUSMAN, DŽ. (1965): Porodoobrazujuščije mineraly. Mir, Moskva.

DUDEK, A., FEDIUK, F., PALIVCOVÁ, M. (1962): Petrografické tabulky. ČSAV, Praha.

FEDIUKOVÁ, E., FIŠER, M., CHÁB, J., KONEČNÝ, V., OPLETAL, M., RYBKA, R., (1984): Nové poznatky o geologii Jeseníku. Geologický průzkum Ostrava (abstrakta referátů o výsledcích výzkumu v Jeseníkách — semináře na přírodovědecké fakultě UP v Olomouci 7. 2. 1984).

GUENTHER, E. W. (1961): Sedimentpetrografische Untersuchung von Lössen. Teil 1. Metodische Grundlagen mit Erläuterung an Profilen. Fundamenta, Ruhe B, Band 1, Köln—Graz.

KRIST, J. (1967): Petrografické složení spraší Trnavské pahorkatiny. Diplomová práce MS, archív katedry petrografie PFUK v Bratislavě.

KRIST, J. (1969): Zpráva o výzkumu těžkých minerálů spraší a sprašových hlín ve vrtu V 013 ze Šlapanic a ve vrtu V 4 z Tvarožné. Vyhledávací průzkum Nerudy — jih III. archív posudků Geofondu Praha (č. zprávy 52800845).

KRYSTKOVÁ, L. (1975): Petrografický výzkum spraší na střední Moravě. Kandidátská práce MS Geografický ústav ČSAV Brno a Geotest, n. p., Brno.

MINAŘÍKOVÁ, D. (1983): Petrografie kvartérních sedimentů v území mezi: Hrušovany nad Jevišovkou a Břeclaví. — Sborník geologických věd Antropozoikum 15, Praha.

PELÍŠEK, J. (1972): Spraše a sprašové hlíny ČSSR. Geologický průzkum **14**, 9, Praha.

PESLOVÁ, H. (1979): Zhodnocení sedimentů na základě asociací průhledných těžkých minerálů na území listu Gottwaldov. Základní geologická mapa 1:25 000 list 25—323 Gottwaldov, MS. ÚÚG Praha.

PESLOVÁ, H. (1981): Zhodnocení sedimentů na základě asociací průhledných těžkých minerálů na území listu 25—324 Vizovice. Základní geologická mapa 1:25 000 list 25—324 Vizovice, MS, ÚÚG Praha.

ROST, R. (1956): Těžké minerály. ČSAV, Praha.

SLAVÍK, F., NOVÁK, J., KOKTA, J. (1974): Mineralogie. Academia, Praha.

ŠAJGALÍK, J., KRIST, J. (1969): Změny kvantitativního zastoupení těžkých minerálů spraší v závislosti na zrnitosti sedimentů. Geologický průzkum **11**, 2, Praha.

ZEMAN, A., HAVLÍČEK, P., MINAŘÍKOVÁ, D., RŮŽIČKA, M., FEJFAR, O. (1980): Kvartérní sedimenty střední Moravy — Sborník geologických věd Antropozoikum 13, Praha.

JIŘÍ KRIST

PRŮHLEDNÉ TĚŽKÉ MINERÁLY SPRAŠÍ OKOLÍ NAPAJEDEL

Prací byl řešen resortní výzkumný geologický úkol (stanovený v rámci resortních výzkumných úkolů Ministerstva kultury na období 7. pětiletky) o průhledných těžkých minerálech ze sprašových odkryvů, které se nacházely na západním okraji Napajedel.

Celý výzkumný úkol byl rozvržen do 4 hlavních etap: terénní části, laboratorního zpracování odebraných sprašových vzorků, kvalitativního a kvantitativního vyhodnocování asociací těžkých minerálů v polarizačním mikroskopu a poslední částí úkolu bylo vypracování závěrečné zprávy o průběhu a výsledcích výzkumu.

Hlavní náplň celé práce spočívala právě ve stanovení kvalitativního a kvantitativního zastoupení určených druhů (nebo skupin druhů) těžkých minerálů ve zkoumaných spektrech TM ze 6 postupně na sebe navazujících zrnitostních frakcí: 0.04—0.05 mm, 0.05—0.063 mm, 0.063—0.10 mm, 0.10 až 0.16 mm, 0.16—0.20 mm a 0.20—0.25 mm. Tyto zrnitostní frakce byly získány ze 14 sprašových vzorků na 4 lokalitách — celkem tedy bylo zpracováno 84 jednotlivých frakcí. Z takto získaných analýz spekter TM potom mohly být vyvozené patrně všeobecně platné závěry týkající se problematiky změn kvantitativního zastoupení 7 zvlášť vybraných těžkých minerálů (granátů, zirkonu, apatitu, sk. epidotu, sk. monokl. a romb. amfibolů, rutilu a sk. rudních a ostatních opak. minerálů) a to v závislosti na změnách velikosti zrnitostní frakce. Těchto 7 vybraných druhů těžkých minerálů (byly vybrané záměrně, protože se mohly porovnávat se obdobnými výzkumy TM z let 1967 a 1969) vytváří 3 rozdílné skupiny (ověřené rovněž už při výzkumech z r. 1967 a 1969) z nichž první zahrnuje granáty, zirkon, apatit, sk. epidotu a rutil. Jsou to těžké minerály koncentrující se hlavně v jemnozrnitějších frakcích (maxima % zastoupení mají právě v nejjemnější frakci 0.04—0.05 mm). Druhou skupinu vytvářejí rudní a ostatní opakní minerály, které se naopak nejvíce soustřeďují do hrubozrnitých frakcí (maxima % zastoupení jsou v nejhrubší frakci 0.20—0.25 mm). Třetí skupinu tvoří monokl. a romb. amfiboly u nichž je největší % zastoupení ve středních zrnitostních frakcích (0.063—0.10 a 0.10—0.16 mm).

Dále byly v tomto výzkumném úkolu studovány také vztahy vyplývající z výsledků podrobných sítových analýz a separací těžkých minerálů pomocí těžké kapaliny (průměrná výtěžnost TM vypočítaná ze všech 84 frakcí má hodnotu 1.18 %). Na závěr celého výzkumu potom byly provedeny speciální analýzy 2 zvlášť vybraných zrnek granátů pomocí metody elektronové mikrosondy (v laboratoři ÚÚG v Praze). Analýzami bylo zjištěno, že jedno granátové zrnko má velkou převahu almandinové složky a druhé zrnko má nejvíce složky pyropové a jen o něco méně almandinové. Porovnáním těchto výsledků z mikrosondy se údaji uveřejněnými ve speciálních příspěvcích (zabývajících se primárními zdroji granátů) je pravděpodobné, že zdrojovou oblastí analyzovaných granátů bylo původní krystalinikum Hrubého Jeseníku. Na potvrzení tototo zjištění by ovšem musela být provedená celá řada analýz elektronovou mikrosondou (to platí i pro přesné určení TM zařazených do skupiny ? spinelidy). Problematika zabývající se přesným stanovením primárních zdrojových oblastí těžkých minerálů ze spraší okolí Napajedel jakož i vyřešení otázek přesného stáří vzniku spraší již nebylo záměrem tohoto výzkumného úkolu.

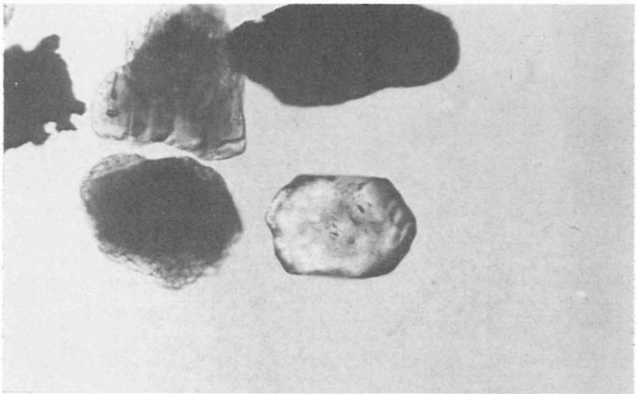


Fig. 1. Grenat — the elongated grain of about sixangle shape, slightly rosy (nearly pure). Amfibole is on its left. From the fraction 0.10—0.16 mm of sample No. 1 from 2nd locality Napajedla. 200× (12.5×16) enlarged.

Fig. 2. Zircon — the columnar crystal with outstanding relief. From the fraction 0.063—0.10 mm of sample No. 1 from 2nd locality Napajedla. 200× (12.5×16) enlarged.

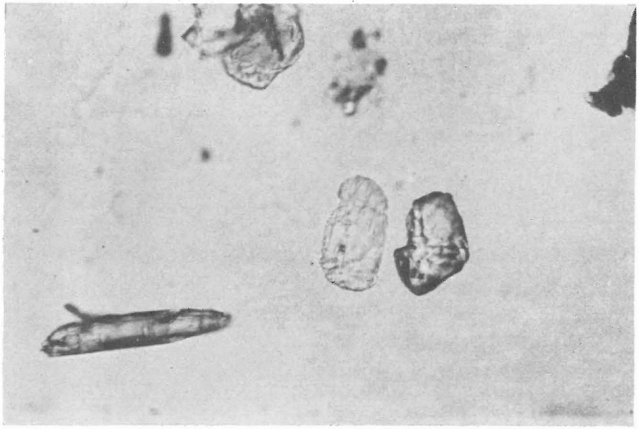


Fig. 3. Apatite — the columnar grain with low relief, pure. Zircon grain with high relief is on its right (of about rhombus shape with a smaller piece broken off). From the fraction 0.05—0.063 mm of sample No. 3 from 1st locality Napajedla. 312× (12.5×25) enlarged.

Fig. 4. Edisonite — the knee compound crystals of red — brownish colour. From the fraction 0.04—0.05 mm of sample No. 3 from 1th locality Napajedla. 500× (12.5×40) enlarged.

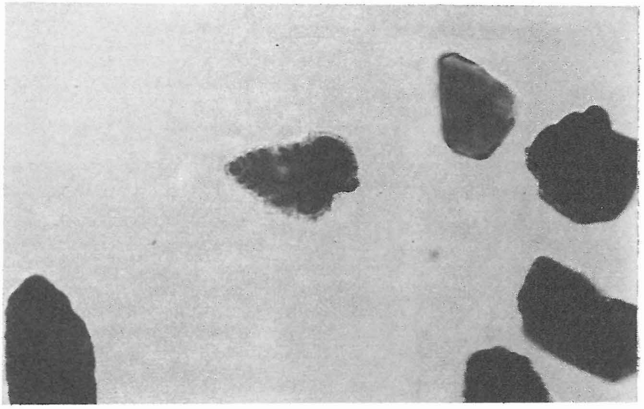


Fig. 5. Tourmaline — the columnar grain broken off crosswise with expressive pleochroismus. On its left there is a test secondarily filled with hydroxide Fe, which belongs to foraminifers (probably Spiroplectamina family). From the fraction 0.10—0.16 mm of sample No. 1 from 2nd locality Napajedla. 200× (12.5×16) enlarged.

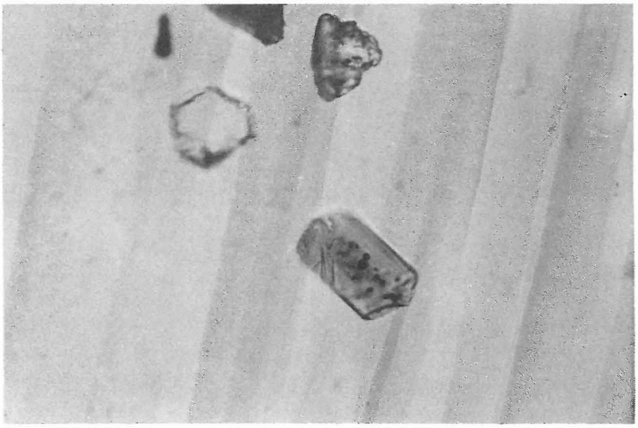


Fig. 6. Tourmaline — the columnar grain with black inner enclosures. The grain is situated in about middle of the bottom of the picture. From the fraction 0.05—0.063 mm of sample No. 3 from 1st locality Napajedla. 312× (12.5×25) enlarged.

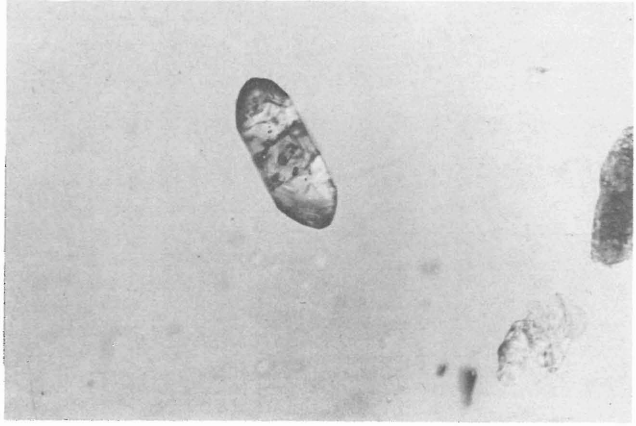


Fig. 7. Zircon — the columnar crystal with outstanding relief (and with enclosures). From the fraction 0.063—0.10 mm of sample No. 1 from 2nd locality Napajedla. 200× (12.5×16) enlarged.

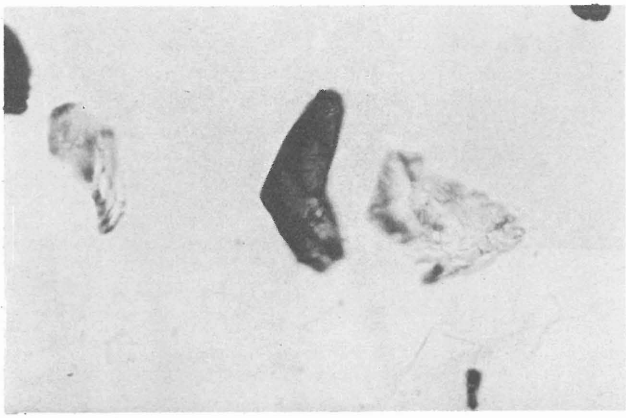


Fig. 8. Edisonite — the knee compound crystals of red — brownish colour. From the fraction 0.04—0.05 mm of sample No. 3 from 1th locality Napajedla. 500× (12.5×40) enlarged.