HOW WE USED THE ANTARCTIC METEORITE THIN SECTION SET OF NIPR TO A SYNTHESIS OF THE THERMAL EVOLUTION OF A CHONDRITIC BODY. B. Lukács[1], S. Józsa[2], Zs. Kovács[3], Gy. Szakmány[2], Sz. Bérczi[4], [1]Central Research Institute for Physics, RMKI, H-1525 Budapest-114. P. O. Box 49. Hungary, [2]Eötvös University, Faculty of Science, Department of Petrology and Geochemistry, H-1117 Budapest, Pázmány Péter sétány 1/c, Hungary, [3]Berzsenyi College, Department of Technology, H-9700 Szombathely, Károlyi G. tér 4, Hungary, [4]Eötvös University, Faculty of Science, Department of General Physics, Cosmic Materials Space Research Group, H-1117 Budapest, Pázmány Péter sétány 1/a, Hungary, (bercziszani@ludens.elte.hu),

Introduction: We studied the Antarctic Meteorite Thin Section Educational Set prepared by the National Institute of Polar Research (NIPR), Tokyo, Japan. We reconstructed a synthesis of an evolutionary path of regions (belts) in the chondritic parent body arranging the chondritic set members according to the degree of thermal metamorphism and the deduced crust and core region set members after the differentiation of the parent body. We discuss the extraordinary possibility of the synthetic overview of the thermal evolution of the chondritic parent body by this NIPR Antarctic meteorite set which also has basic importance in space science and planetary materials education. The synthesis on the basis of the NIPR set can be divided into two main periods. First one is the metamorphism in the parent body which is slowly heated up by the short living radionuclidesThis process results in an onion-layered body with higher temperatures in the core regions and lower temperatures at the margin of the body. The second period is the differentiation when partial melting of metallic and somewhat later the basaltic assemblages results in migration and volcanism in the chondritic parent body.

Thermal methamorhism stages: First key event we know from chondrite studies that the metamorphic events started from parent bodies with different initial compositions. Their mineralogy and chemistry [1] and groups were named by their total iron content to H and L, which system was later extended to the E, H, L, LL, and C main groups of chondrites. The textural sequence of the thermal metamorphism was formulated first by [2]. (Fig. 1.)

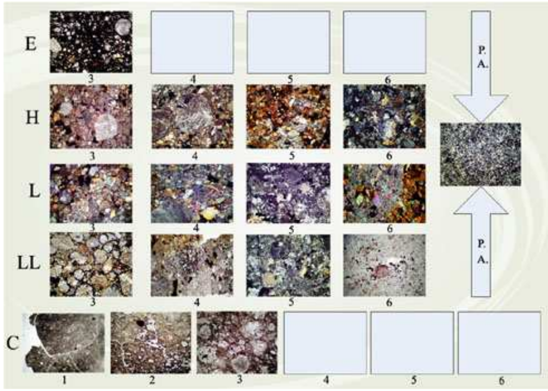


Fig. 1. Thin section details arranged in the VSW table. The corresponding thin section specimens are from the NIPR educational set.

The thermal evolutionary paths of these parent bodies are only slightly different and the NIPR SET allows comparisons of the H, L and LL sequences because they are all represented by thin sections from 3 to 6 petrologic types. They are represented by the 15, 16, 17 and 18 thin sections for H3 to H6 (Fig. 2.) [3], by the 19, 20, 21 and 22 thin sections for L3 to L6, and by the 23, 24, 25 and 26 thin sections for LL3 to LL6 metamorphic chondritic stages. To these stages various peak temperatures were corresponded.

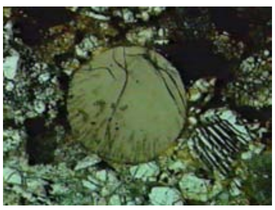
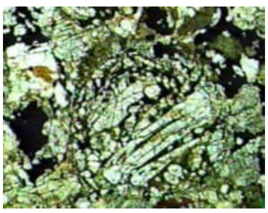
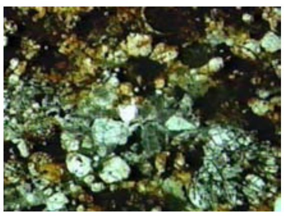
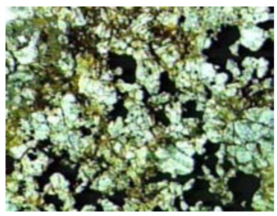
			
H-3, Yamato 791428	H-4, ALHA 77233	H-5, Yamato 74079	H-6, Yamato 74014

Fig. 2. The H sequences represented by thin sections in the NIPR Set from 3 to 6 petrologic types: the 15, 16, 17 and 18 thin sections for H3 to H6.

After thermal metamorphism the chondritic meteorites lost their chondritic texture, (chemistry witnesses that they preserved chondritic ratios of main elements: primitive achondritic stage). Recognition and formulation of textural characteristics of further transformations caused by the partial melting and the consequent differentiation inside the parent chondritic body gives a transitional and a differentiational stage. Acapulcoite, lodranite, winonaite may be considered members of this transitional stage. Yanai asserted that there are two types of textures of the primitive (Stage A) achondrites. The small grain size characterizes mostly the acapulcoites, while the larger grain size is characteristic to the lodranites [4]. However, the two lithologies together can be found in the E-H range late stage chondrites, too. In the NIPR Tokyo collection we (Sz. B.) could observe that Yamato-74036, an H6 chondrite (with composition at the E-H boundary) and Yamato-75300, an E6 chondrite also contained the two lithologies in the same sample.

Mesosiderite may also represent this transitional stage where iron gradually assemblages into larger grains. Veined texture also may represent such kind of transitional meteorites (Rose City, Netschaevo, Watson, Techado and the Portales Valley meteorites were found as such types) from chondritic stage toward the achondritic stages. Veined meteorites preserving some remnants of the chondritic texture. Fissures formed by the migrating iron represent also a step of the migration of the metallic components [5] It is important to note that ureilites can also be considered as veined primitive achondrites.

Layers of differentiation: There are two main groups of segregating materials. First is the metallic/sulfide melt which migrates toward the depths to form a core (or to collect into great blocks). Second is the melt of lower melting point silicates, which form basaltic melts which migrate toward the surface [5]. So partial melting and outflow of iron+iron-sulfide assemblage from the primitive achondritic source begins differentiation period.

The second part of differentiation is characterized by the later partial melting of a basaltic like component and its outflow toward the surface. This second process produces the basaltic achondrites on the surfaces visible only in the evolved asteroidal body of Vesta and on some Vesta-like fragmented asteroids [6] We note again that although ureilites sometimes have lost basaltic components as partial melts, they also contain iron veins between the large clinopyroxene and olivine grains, so they are representative of the outmigrating processes of both outflowing components.

Summary: The Antarctic Meteorite Thin Section Educational Set (NIPR), Tokyo, Japan, is a valuable source for synthesis studies of a chondritic parent body. Several books [7-9] and studies help its use for universities and researchers.

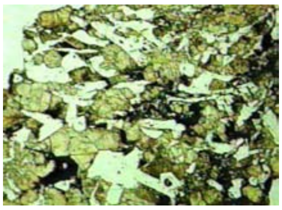
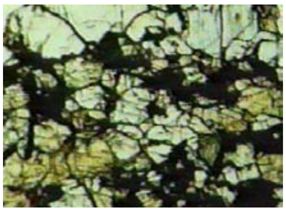
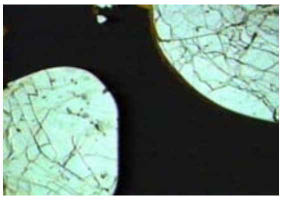
	Eukrite, Yamato 791195
	Ureilite, ALHA-77257
	Pallasite, Yamato 8451

Fig. 1. Thin section details arranged in the main layers of a differentiated chondritic parent body: basaltic achondrite (crust), ureilite (mantle layer) and pallasite (transitional to the iron-ironsulfide core): the corresponding thin section specimens are from the NIPR educational set.

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