CI-LIKE MICROMETEORITES FROM CAP PRUDHOMME, ANTARCTICA. G. Kurat, T. Presper, and F. Brandstätter, Naturhistorisches Museum, Postfach 417, A-1014 Vienna, Austria, M. Maurette, C.S.N.S.M., Batiment 108, F-91405 Campus-Orsay, France, and C. Koeberl, Institut für Geochemie, Universität Wien, A-1010 Vienna, Austria.

Introduction: The micrometeorite (MM) population from the Antarctica ice appears to be dominated by a rock type similar to CM chondrites [1] as are the interplanetary dust particles (IDPs) [2]. Both categories contain minor contributions of non-hydrous rocks which for the MMs resemble the non-hydrous constituents of CM chondrites (or portions of other non-hydrous chondrites) whereas for the IDPs they seem to represent a new rock type, not represented among meteorites, and probably of cometary heritage. Since both MMs and IDPs are clearly dominated by carbonaceous chondritic matter one should expect other carbonaceous chondrites beside CMs to be present. According to fall statistics [3] about 50% of MMs and IDPs should be of a non-CM rock type. This, however, is clearly not the case.

Without attempting to solve that particular abundance problem we report in this contribution the identification and a preliminary characterization of particles resembling CI chondrites found among a recent (1991) collection of MMs from Cap Prudhomme, Antarctica. CI-type particles have sofar not been reported neither from MM nor IDP collections. Just one SEM picture of a particle containing characteristic framboidal magnetite got widely distributed [3] but no description nor analysis could be traced in the literature available to us.

Results: A selection of non-spherical particles of the 50−100μm size fraction of the 1991 EUROMET micrometeorite collection [5] from the Antarctic ice near Cap Prudhomme (polished sections, 91/1, 91/2, 91/3) has been investigated by optical microscopy, scanning electron microscopy, and electron microprobe analysis. The particles were selected according to previously applied criteria in order to optimize the selection of unmelted cosmic particles [1]. The three polished sections contained 337 particles of which 252 (≈75%) turned out to be of extraterrestrial origin. Of these 110 (≈44%) were unmelted particles. Among them were seven (≈6%) which consist of phyllosilicates and magnetite closely resembling the phyllosilicate-magnetite association of CI carbonaceous chondrites (Fig. 1). One additional sample was found among unmelted MMs from the 1988 collection of magnetic particles mounted on the 91/3 section (91/3-108).

Characteristic of all samples is a dense phyllosilicate matrix of mostly smectite composition which encloses magnetites of typical CI morphology: aggregates of magnetite spheres (well sorted within a given aggregate but of different grain size in different aggregates) and platy magnetite (stacks of platy magnetite as described in [5]). In addition, some particles contain a previously not described magnetite, the *Swiss Cheese magnetite*. It is typically coarse-grained (up to 10μm) with irregular to rectangular outlines and numerous rounded voids. In one case such a magnetite grades into an unidentified phase containing just "FeO" (≈50 wt.%) and MgO (≈27 wt.%) and minor SiO_2 and MnO (the low sum suggests a OH-and/or H_2O-bearing phase). Quite common are Fe-rich phyllosilicates, rare are finely disseminated Ni-poor and Ni-rich sulfides.

Bulk major and minor element contents of CI-like MMs have been determined by broad beam electron microprobe analysis. The results are given in the table and compared to the composition of Orgueil [6] in Fig. 2.

Table 1: EMP bulk analyses of CI-like MMs from Cap Prudhomme (sample 91)

Part. No.	1-113	2-24	2-73	3-22	3-31	3-38	3-108
SiO_2	24.2	28.2	30.1	37.9	33.8	32.9	24.4
TiO_2	0.05	0.08	0.07	0.13	0.07	0.07	0.10
Al_2O_3	1.48	1.71	1.35	2.05	1.92	1,70	2.04
Cr_2O_3	0.38	0.32	0.28	0.53	0.35	0.50	0.60
FeO	41.6	45.4	30.4	25.0	33.8	30.9	31.4
MnO	0.02	0.06	0.55	0.06	0.15	0.20	0.18
MgO	6.2	3.0	16.4	17.3	15.9	18.3	9.6
NiO	0.03	0.04	0.17	0.11	0.18	0.44	0.64
CaO	0.23	0.12	0.66	0.34	0.12	0.17	0.24
Na_2O	0.06	0.23	0.21	0.26	0.17	0.28	0.26
K_2O	0.33	0.91	0.21	0.42	0.17	0.19	0.78
SO_3	1.27	1.29	0.94	6.81	2.02	2.97	7.04
Total	75.85	81.36	81.34	90.91	88.65	88.62	77.28

CI-LIKE MICROMETEORITES: Kurat G. et al.

Bulk compositions of the CI-like MMs are basically chondritic but several elements appear to have fractionated abundances similar to what has been found for most MMs [1,7]: Ca is depleted in all particles with factors down to 0.1, Na is depleted in all but one of the CI MMs, and Ni and S are depleted in all of them. In addition to these depletions apparently common to most MMs, half of the CI MMs are also depleted in Mg and many also in Mn. Surprisingly, all CI MMs are enriched in K, a feature previously not observed in MMs but known from IDPs albeit on a clearly smaller scale [8].

Conclusions: Micrometeorites texturally resembling CI carbonaceous chondrites are present among the $50-100\mu m$ size fraction collected from the Antarctic ice near Cap Prudhomme with an abundance of about 6% of the unmelted MMs. Their bulk chemical compositions and mineralogy, however, do not exactly match the CI carbonaceous chondrites. There is no consensus so far among students of MMs as to wether the omnipresent depletions of MMs in Ca, Na, Ni, and S do have terrestrial causes or are of pre-terrestrial origin. Comparison of these compositions with those of cosmic spheres, however, suggests that most of these depletions are pre-terrestrial [7]. The K-enrichment observed for the first time in MMs cannot be considered being of pre-terrestrial origin but rather to belong to the long list of terrestrial contaminations [7,8].

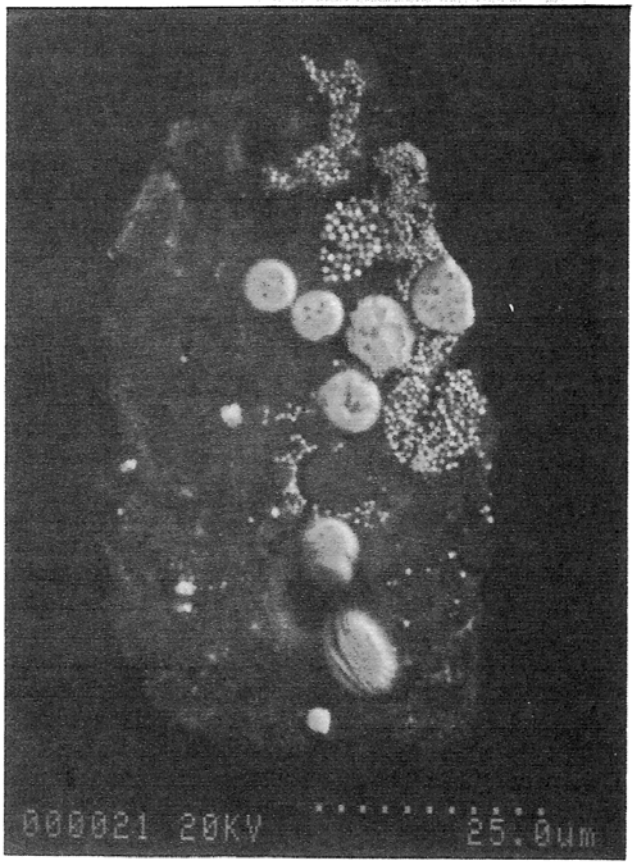

Figure 1: SEM picture of particle 91/3-108

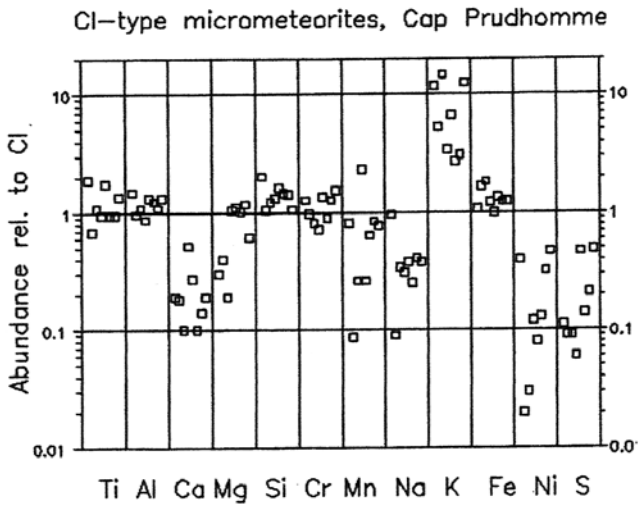

Figure 2: CI-normalized major and minor element abundances in CI-like MMs.

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