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The Torino Meteorite: Classification and Cosmogenic Effects. N. Bhandari,[1,2] G. Bonino,[1] E. Callegari[3] and G. Cini Castagnoli.[1] [1]Istituto di Cosmo-geofisca del CNR e di Fisica Generale dell'Università di Torino, Italy. [2]Physical Research Laboratory, Ahmedabad, India. [3]Dipartimento di Scienze della Terra dell'Università, Torino, Italy.

A meteorite shower fell in Torino on 18 May 1988 at about 1400 hours. Due to a thunder storm, the fireball was not observed. One fragment estimated to be over 0.6 kg fell in the Aeritalia parking lot, making a 10 cm wide × 3 cm deep crater on the tar road. Other smaller fragments were recovered from Pianezza, Leuman and Collegno. Due to the courtesy of Dr. F. Bevilacqua of GSS, Aeritalia, fragment A, weighing 452 g, was loaned to us within two days of the fall. The results of the study conducted on this fragment are reported here.

Study of thin sections revealed that it is a highly metamorphosed medium to fine grained H6 chondrite. The meteorite has a heterogeneous granular texture.

Chondrules are rare and partly altered. Relics of chondrules are easily detectable. Orthopyroxenes and olivines are abundant and occur in about equal proportions. Plagioclase, clinopyroxene and other meteoritic minerals are present in trace abundances. Fluid inclusions in olivines and spinel in orthopyroxenes are also observed. Cracking and fracturing are extensive and the meteorite has features of interstitial melting and recrystallisation. Long and thin veins, possibly a consequence of a severe shock, are seen to cross the fragments and the thin section. The petrography confirms metamorphic grade 6 (1). The shock features indicate that the meteorite belongs to a moderate to strongly shocked group of chondrites.

Cosmic ray tracks were studied in orthopyroxenes in two fragments using standard procedures (2) and they yield a density of about 5×10^5 tracks/cm^2. No gradient of track density has so far been observed.

Twelve radioisotopes produced due to nuclear interactions of galactic cosmic rays with the meteoritic material have been measured using a low level HP Ge detector located in an 18 cm thick lead shield under the Monte dei Cappuccini providing 70 mwe of additional shielding. Preliminary estimates of their activities are given in Table 1.

TABLE 1. Activity levels of various cosmogenic radioisotopes at the time of fall.

Radio-isotope	Half life	Activity dpm/kg	Radio-isotope	Half life	Activity dpm/kg
^{52}Mn	5.6 d	20 ± 2	^{46}SC	83.9 d	10.4 ± 2
^{48}V	16 d	21 ± 1	^{57}Co	272 d	17 ± 1.2
^{51}Cr	27.8 d	77 ± 8	^{54}Mn	303 d	126 ± 2
^{7}Be	53.6 d	59 ± 6	^{22}Na	2.6 a	78 ± 1.5
^{58}Co	70.1 d	11 ± 1	^{60}Co	5.26 a	2.8 ± 0.7
^{56}Co	77.3 d	7.7 ± 1	^{26}Al	7.3×10^5 a	55 ± 1.3

The meteorite fell during the beginning of the rising phase of the solar cycle 22. The activity levels of various isotopes, the ratios ^{54}Mn/^{52}Mn = 6.3 and ^{22}Na/^{26}Al = 1.42 are similar to the values expected from our model (3) using the cosmic ray fluxes calculated since 1953 till the time of fall based on the Climax neutron monitor data. Comparison of the activity of ^{26}Al, and of neutron capture isotope ^{60}Co with the calculations (3) indicate that it had a preatmospheric radius of ~20 cm. Measurements of other cosmogenic isotopes, rare gases and chemical analyses are in progress. References: (1) Van Schmus W. R. and Wood J. A. (1967) *Geochim. Cosmochim. Acta* **31,** 747–765. (2) Bhandari N., Goswami J. N., Lal D., Macdougall D. and Tamhane A. S. (1972) *Proc. Indian Acad. Sci.* **A76,** 27. (3) Bhandari N. (1981) *Proc. Indian Acad. Sci. (Earth Planet. Sci.)* **90,** 359.