

Textural and mineralogical data of Sannio, a new Italian meteorite from Southern Italy

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Abstract

Several ancient meteorites, both falls and finds are on deposit in naturalistic and geo-mineralogical museum collections. Here we present the results of an historical and scientific research on a new Italian meteorite recently rediscovered in the collections of the Royal Mineralogical Museum of Naples.

1. Introduction

Due to physiographic factors, Italian meteorites are extremely rare and particularly sought-after in the collector's market due to their rarity. Historical and well-documented findings, like the case here described, are therefore particularly appreciated by the scientific community. Up to date only 41 Italian meteorites, both finds and falls, have been officially approved by the Meteoritical Society. Amongst these 25 are ordinary chondrites and 15 are H-type. The study of Italian meteorites has long been the subject of intense historiographic and theoretical debates, like the case of the shower of stones that fell at Siena on 16th June 1794.

2. The rediscovery of the Sannio meteorite

In 2018, a new research into the Meteorite Collection of the Royal Mineralogical Museum of Naples, which encompasses 40 historically significant meteorites, has brought to light a chondrite belonging to the cabinet of the naturalist and geologist, Teodoro Monticelli (1759–1845), who recorded a meteorite that fell or was found in the Campanian area of Sannio, in 1810 and was purchased by the Royal Mineralogical Museum in 1857. This sample has been recently rediscovered within the Meteorite Collection of the Royal Mineralogical Museum of Naples.

Name	Year	Place	Type	Mass
Narni	921	Umbria	Stone-unclassified	-
Rivolta de Bassi	1491	Lombardia	Stone-unclassified	103.3 g
Valdinocce	1496	Emilia-Romagna	Stone-unclassified	-
Castrovilliari	1583	Calabria	Stone-unclassified	15 kg
Vago	1668 or 1688	Veneto	H6	40 g
Albureto	1766	Emilia-Romagna	L/LL4	2 kg
Castel Berardenga	1791	Tuscany	Stone-unclassified	-
Siena	1794	Tuscany	LL5	3.7 kg
Borgo San Donino	1808	Emilia-Romagna	LL6	1676 g
Renazzo	1824	Emilia-Romagna	CR2	1000 g
Mineo	1826	Sicily	Pallasite	42 kg
Cereseto	1840	Piemonte	H5	6.46 kg
Monte Milone	1846	Marche	L5	3.13 kg
Girgenti	1853	Sicily	L6	18 kg
Trenzano	1856	Lombardia	H3/4	11.8 kg
Alessandria	1860	Piemonte	H5	908 g
Motta di Conti	1868	Piemonte	H4	9.15 kg
Orvine	1872	Lazio	H6	3.4 kg
Alfianello	1883	Lombardia	L6	228 kg
Assisi	1886	Umbria	H5	2 kg
Colle Scipoli	1890	Umbria	H5	5 kg
Valdinizza	1903	Lombardia	L6	1004 g
Bagnone	1904	Tuscany	Iron, IIAB	48 kg
Vigarano	1910	Emilia-Romagna	CV3	15 kg
Patti	1922	Sicily	Iron	12 g
Barcis	1950	Veneto	Pallasite, PMG	87 g
Messina	1955	Sicily	L5	2.41 kg
Sinrai	1956	Sardegna	H6	2 kg
Barbianello	1960	Lombardia	Iron, ungrouped	860 g
Masua	1967	Sardinia	Iron, IAB-sLL	1460 g
Piancaldoli	1968	Emilia-Romagna	LL3.4	13.1 g
Castiglione del Lago	1970	Umbria	Iron, IAB-MG	667 g
Noventa Vicentina	1971	Veneto	H4	177 g
Entrèves	1987	Valle d'Aosta	Iron, IAB-MG	17.3 kg
Torino	1988	Piemonte	H6	977 g
Lago Valscura	1995	Piemonte	H5	200 g
Fermo	1996	Marche	H3-5	10.2 kg
Tessera	2000	Veneto	H4	51.3 g
San Michele	2002	Marche	L6	237 g
Castelvecchio	2015	Tuscany	Iron, IIAB	37 g
Hocheppan	2016	Trentino-Alto Adige	H5	1236 g

Table 1. List of the 41 approved Italian meteorites by the Meteoritical Society to date.

The specimen consists of two small pieces totally weighing 15 grams and displaying a partial fusion crust covering a gray, microgranular texture, still preserved in their original glass jar together with the original label, which describes the samples as "Aerolite Sannio 1810" (inventory number 16433 - E 4972). Since no meteorite with such name appears neither in the Meteoritical Bulletin database nor in the Catalogue of Meteorites, the specimen has to be considered a new Italian meteorite.

1. Experimental results

A chip of the specimen (catalogue number RI-3346) has been sent to the Natural History Museum of the University of Florence for detailed minero-chemical analyses.



Figure 1: Photograph of the Sannio meteorite and its original label.

Optical analysis on the thin section of the sample showed a chondritic texture consisting of chondrules belonging to various types (poikilitic PO, POP, BO, RP, C, GO) and ranging in size from 300 to 450 microns set in a fine grained matrix consisting of olivine and orthopyroxene.

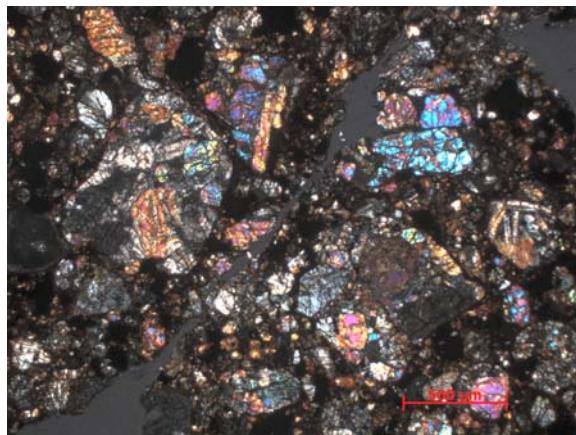


Figure 2: Polarizing optical microscope image of a thin section of the Sannio meteorite; transmitted light; plane polarars;

Electron microscopy allowed to confirm the chondritic texture as well as the presence of three Fe-Ni alloys containing various amounts of nickel, namely taenite, kamacite and tetrataenite, along with other minor phases like chromite and Cl-apatite. Detailed EMPA minerochemical analyses determined an unequilibrated composition of olivine which ranges from $Fa_{0.6}$ in porphyritic olivine chondrules to $Fa_{19.6}$ in the matrix. Weathering grade is very low, in agreement with the possible nature as “fall” of the sample. Shock stage is low (S2). Based on textural and minerochemical data the meteorite can be assigned to the H3.8 group of chondrites.

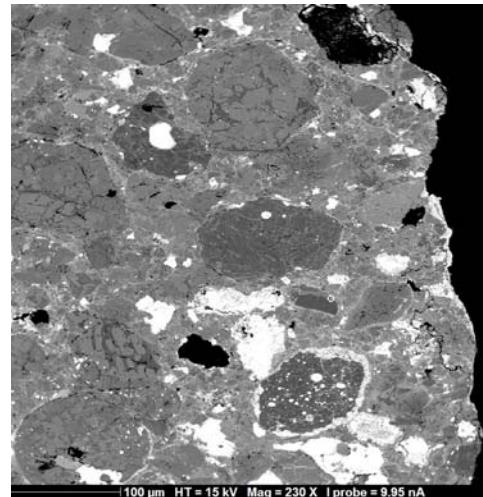


Figure 3: SEM-BSE image of the Sannio meteorite

2. Summary and Conclusions

According to the information described above and the results of the analyses performed on the samples, the meteorite, provisionally named Sannio, can be considered the 42nd Italian meteorite. A detailed report is in preparation and will be submitted to the Nomenclature Committee of the Meteoritical Society for the official approval.

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