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METACOLLECTING AND USE OF "COLLECTION-OBJECTS" IN PROSOPOGRAPHICAL STUDIES OF METEORITE COLLECTIONS

Arnaud MIGNAN[1]

[1] Swiss Federal Institute of Technology, Institute of Geophysics, Sonneggstrasse 5, 8092 Zurich, Switzerland

Abstract: This essay examines the concept of metacollecting in the context of prosopographical studies. Using meteorite collection as a study case, it demonstrates the need for the development of a comprehensive collection attribute database, which does not only include collectors' names but also forensic information, such as the handwriting style and printing process used in the production of labels, inventory numbers, etc. After a description of a pilot prosopography study on the history of meteorite collecting, the concept of "collection-objects" is introduced and a socio-historical collection index (*SHCI*) is proposed to help curators determine the socio-historical *a priori* value of a meteorite specimen in disregard of its scientific or monetary value. A high *SHCI* often represents a factual chain-of-custody, which can be used as input in prosopography.
Keywords: collection, prosopography, history, curation, forensics.

INTRODUCTION

Meteorites are fascinating objects, they may be valued for their high scientific value, aesthetic qualities, historic impact and other intangible qualities that make them highly collectable. The history of meteoritics is closely coupled to the one of meteorite collecting and while much work has already been done on this connection (e.g., McCall et al., 2006), no systematic analysis has ever been made. Two different collecting behaviours exist, relating to the processes of curating or possessing. The curator, a scientist or historian, can be seen as the gatherer and protector of the information, or facts, contained in a collection or set of objects, such as meteorites. The collector is anyone passionate about his collection or more exactly about the idea of completing a set of objects (e.g., Baudrillard, 1994).

Metacollecting refers to the act of systematically collecting interactions between different collection-objects. In this case, the collection becomes a higher-level object. The concept of metacollecting thus yields a focus shift from objects of intrinsic scientific value to objects of extrinsic socio-historical value. The "collection-object" is defined by its attributes of being one specific collection prepared by one specific collector, i.e. by the information associated to the lower-level objects (or specimens) the collection contains. In order to better focus this pilot study, only the curating aspects are considered with the collection of collection-objects becoming a source of information on the socio-historical aspects of the collector's world, hence relating to object biography and more generally to prosopography and material culture (Allen, 1990; Alberti, 2005; Miller, 1987). Prosopography, an example of which will be given in the next section, can be defined as the collective study of people's lives through history, or, in the case of meteorite collections, the study of the socio-historical aspects of meteoritics and planetary science. This includes the analysis of the interactions between researchers and institutions via meteorite exchanges through history.

The use of collections in historical research on natural history, science, or technology is well established with collections referred to as non-printed biographical sources, at the same level as non-published documents such as letters or diaries (Williams, 1990; Wyse

Corresponding author: Arnaud MIGNAN, arnaud.mignan@sed.ethz.ch

Jackson, 1999). Prosopographical studies that use collection attributes are relatively rare and often consist in using the information about the collector inscribed, among other things, on specimen labels (Allen, 1990; Groom et al., 2014). This process relates to the explicit information about the source of the specimen while more information may be available, for example on anonymous labels or on cryptic (inventory) numbers or references. This potential information is rarely exploited. Worse, curators and private collectors alike may discard, alter or cut old labels, and alter painted (inventory) numbers or references on the meteorite specimen itself at the time of accession, deaccession, or re-cataloguing (an act of "cultural barbarism" as coined by P. Medawar (Wyse Jackson, 1999)). The present essay seeks therefore to inform curators on the potential socio-historical value of their meteorite specimens.

The term "metacollecting" is used to emphasize the socio-historical importance of the collection-object in comparison to the scientific importance of the collection specimen (i.e., the focus shift promoted in this essay). The term generally refers to the production of (large) databases (or "collections of collections") in a way where the specimen remains the principal object of interest (e.g., Joseph, 2011; Balke et al., 2013; Wiedenmann et al., 2014). Studies referring to metacollecting to describe the collecting process (within a socio-historical context) are far more rare (e.g., Samson, 2003). This study is concerned with the collecting process only to define collection-object attributes. The aim of metacollecting is then to describe the interactions between different collection-objects.

This study is divided into two sections. First, it provides background on prosopography and shows its value with an example of application in the history of meteorite collecting (pilot study). To the best of the author's knowledge, this study represents the first time such a tool is being used in this collection theme. Second, it conceptualises and describes the metacollecting process including defining collection-object attributes with the help of forensic analysis methods and then in defining a socio-historical collection index (*SHCI*) to evaluate the *a priori* value of collection specimens in terms of collection-objects. Meteorite specimens from the author's personal collection (The Tricottet Collection) are used for illustration purposes. Applicability to other collection themes is discussed at the end of this essay.

PROSOPOGRAPHY OF METEORITE COLLECTIONS (A PILOT STUDY)

Prosopography, or the collective study of people's lives through history, requires large amounts of data to display the complexity of the social interactions and to remain statistically significant. This data is often found in the form of biographical texts, correspondence letters, catalogues, specimen cards and more rarely collection specimens themselves. Network analysis is nowadays commonly used to visualize social groupings in prosopography (Groom et al., 2014; Spary, 2008).

To emphasize the promise of prosopography in the history of meteoritics and meteorite collecting, a correspondence network analysis is made from one collection catalogue. The author selected the 1885 catalogue of the meteorite collection (Koch, 1885) of today the Mineralogical Museum of the Babes-Bolyai University (UBB), Cluj-Napoca, Romania. Note that the museum was created by uniting in 1900 the mineralogical collections of the Transylvanian Museum Society with the collections of the Department of Mineralogy and Geology of the "Franz Joseph" University, founded in 1872. The collections of the Society were in fact curated by the university professors, such as Prof. Antal Koch, and used for teaching purposes since the founding of the university (pers. comm., L. Zaharia, 2015).

Figure 1 shows the prosopographical network of institutional meteorite exchange reconstructed from Koch (1885) (see also Table 1). Due to the limited data available, it should be considered as a pilot study. One may infer from Figure 1 that the UBB meteorite collection had a regional interaction sphere in the late nineteenth century with institutional connections exclusively with the Western European countries. Its main sources of specimens were the Vienna Court mineral collection (22 meteorites / of 87 meteorites obtained from institutions), followed by the Berlin University (18/87) and the British museum (15/87). Although the UBB collection contained some meteorites from the Russian Empire, no link with any specific Russian institution is visible. Interactions with the Paris Natural History Museum also appear limited compared to the number of French meteorites in the UBB collection. Figure 2 shows that the UBB collection managed to obtain meteorites from most parts of the world by the intermediary of other European institutions, which had a more global interaction sphere. This second prosopographical network assumes that the various collections obtained their specimens directly from the countries where they were recovered. One should refrain from matching these observations

Fig. 1. Regional prosopographical network of institutional meteorite exchanges in a geographical map view, reconstructed using the UBB collection catalogue from 1885 (see Table 1). The thickness of the connection lines represents the relative number of exchanges

with the historical context of this period since the data is far too limited to obtain a complete view.

The aim of this pilot study is to illustrate how information contained in meteorite collection catalogues could be combined to build more or less complex prosopographical networks. Most collection catalogues are published, making them highly valuable for research purposes. However, not all provide information on the provenance of their specimens, and the ones that do only give access to a limited fraction of the specimen history (while most institutions also have "inventory books" containing much more detailed information than reported in published catalogues, their access remains limited). To complete the story, one must track the path of specific specimens, which leads to the main section of this study, the definition of the collection-object and of its use.

METEORITE METACOLLECTING

The collection-object

The term collection-object is here introduced as an abstract object that can be represented by the specimen or subset of specimens that epitomizes the entire collection. It is described by its attributes of being one specific collection prepared by one specific collector (or curator within a specific period of time), i.e. by the information associated to the specimens the collection contains. Those are related to the way the specimens are collected, catalogued, stored and displayed, corresponding to the objective part of the collecting process. Collection themes and filtering processes related to psychological aspects (the subjective part of collecting) are not considered.

The two main attributes considered for this study are inventory numbers and specimen labels. Additional attributes could also include specimen containers (jars, vials, pill boxes, clamshell boxes, *etc.*), speci-

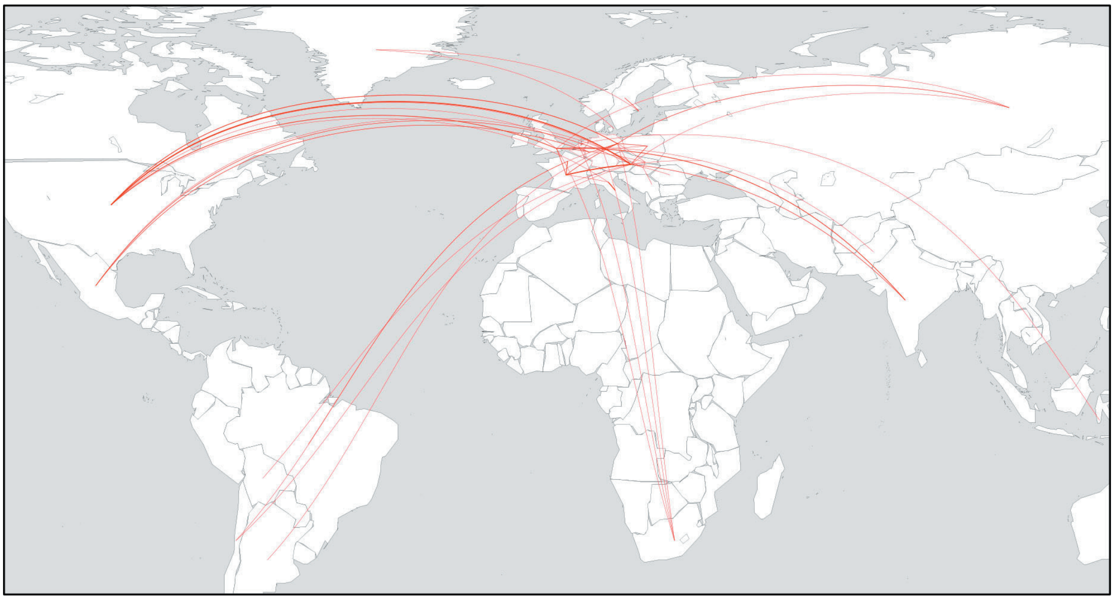

Fig. 2. Global prosopographical network of meteorite exchanges derived from the UBB catalogue from 1885 (and assuming that the various institutions have obtained the meteorite specimens directly from the country where they were recovered; see Table 1). The thickness of the connection lines represents the relative number of exchanges

men stands and any other characteristics not specific to the specimen but to the collection itself. As a first example, Figure 3 shows some meteorite specimens deaccessioned from the UBB collection within the last 10 years and presently part of The Tricottet Collection. They all carry a UBB inventory number and are accompanied by a modern UBB label. The labels provide obvious information about the provenance of the specimens and help targeting the right catalogue where the match between inventory number and specimen is given (here, Bedelean et al., 1979). If the labels were missing, an erudite investigator (and evidently the UBB collection curator) could still recognize the typical style of the UBB inventory number made of white, relatively bulky paint, starting with an "I." for stony meteorites and an "II." for iron and stony-iron meteorites. This numbering style epitomizes the UBB cataloguing system used from the late 1970's onward. Another example is shown in Figure 4. In this case, the meteorite specimen is accompanied by a Friedrich Wöhler (1800-1882) label and carries a small piece of paint. Close examination indicates that it is made of two layers of different colours, white over red. This style is characteristic of stony specimens in the J. Law-

Fig. 3. Three meteorite specimens deaccessioned from the UBB collection in last 10 years, each with painted inventory number and modern label. From left to right: Krasnojarsk (SHCI = 2+2+2+2 (sketch and trade document) = 8), Mocs (SHCI = 1+1+1+1 (trade document) = 4), and Stannern, incorrectly catalogued as Mocs in the late 1970's (SHCI = 1+1+1+3 (trade document, porcelain plate and numbered glass vial) = 6). All samples and documents from The Tricottet Collection

rence Smith's (1818-1883) collection as proved by the match with a complete painted number observed on a meteorite specimen known to originate from the Smith collection (see Fig. 4) (note that Smith used a different inventory system for irons (Cressy, 2008) – the Smith collecting system is described in Marvin (1884)). Returning to the three meteorites shown in Figure 3, the UBB collection-object can be any of these specimens since each one of those carry the UBB characteristic marking. The fact that they represent three different locations and meteorite types (Krasnojarsk pallasite, Mocs chondrite, Stannern achondrite) does not matter.

Tracking the historical chain-of-custody of natural history specimens may require years of experience and the development of a personal database where all the collection objective attributes are stored. The collection identification process could be significantly improved by the development of a comprehensive digital database, which would contain inventory numbers, labels and additional information characteristic of different collections. This differs considerably from existing databases that focus on the collection specimens themselves and in which labels contain some auxiliary information where only the provenance name is used (note that Allen (1990) considered specimen labels as an "unorthodox source" of information for prosopography). The example of Figure 4 already proved the potential of forensic analysis. In this context, here is a non-exhaustive list of properties that should be considered to describe a collection-object:

1) Text:
   a) Meaning: Language, names, inventory numbers, etc.
   b) Handwritten or typed.
   c) Lettering and numbering characteristics: Uppercase vs. lowercase, cursive vs. non-cursive, font, proportion, slant and spacing, punctuation, etc.
   d) Physical characteristics: Colour, size, etc.
   e) Additional characteristics: Drawings, signatures, acronyms, symbols, etc.
   f) Author: Name, title, association with collection, etc.
2) Medium:
   a) Method: Writing, printing, hard stamping, gluing, etc.
   b) Material: Ink, paint, paper, stamp, fabric, etc.
   c) Additional characteristics: Paint thickness, paper quality, etc.
   d) Combinations of methods and materials.

These properties should be illustrated from a selection of collection-objects listed in a database to facilitate future comparisons and collection identifications. So far, interest in these attributes is only found in journals with limited or no peer-review (e.g., Cressy, 2008; Mignan & Reed, 2012).

A collection of collection-objects is similar to any other type of collection, except for its more abstract higher-level meaning. A meteoriticist studies meteorites. Analysis of their properties, such as their mineralogy and composition, tells him what type of meteorite it is. The larger set of specimens in the collection he is in charge of may provide him with some insight into various planetary processes. In comparison, a metacollector (possibly a historian of science or of material culture) would study collection-objects. Analysis of their attributes using forensic analysis methods would tell him what collection it is. The larger set of collection-objects may provide him with some insight into the socio-historical aspects of collecting. To extend the analogy, while a meteoriticist can differentiate between troilite and cohenite minerals, a scholar in metacollection can differentiate between UBB and J. L. Smith inventory numbers.

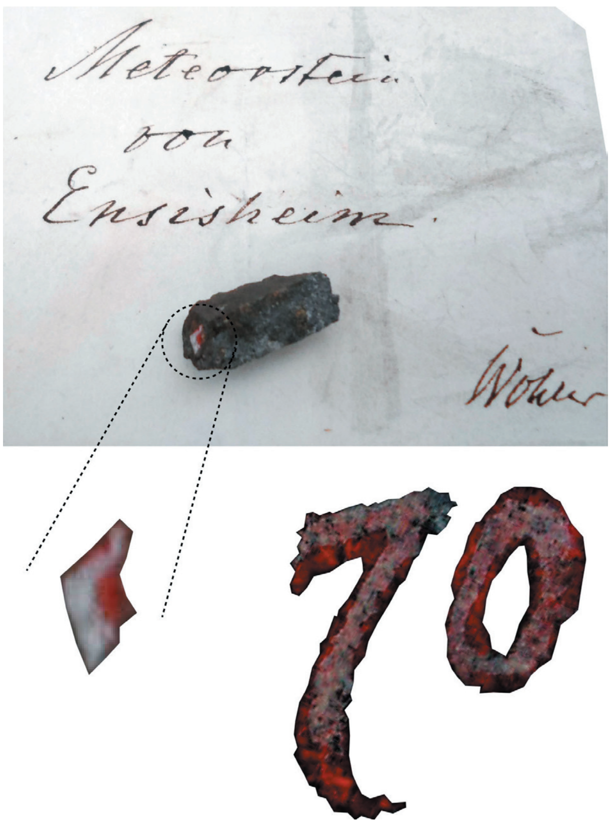

Fig. 4. Forensic paint analysis on a fragment of the Ensisheim meteorite (SHCI = 3+1+1+0 = 5). The patch of paint is compared to the inventory number 70 painted on a Pultusk meteorite specimen known to be part of the J. Lawrence Smith collection (see e.g., figure 5 in Mignan (2011); Smith collection catalogue in Marvin (1884)). Sample and label from The Tricottet Collection

Fig. 5. Meteorite specimens with multiple (painted) inventory numbers. Left: Pultusk (SHCI = 3 (H. A. Ward, Field Natural History Museum, R. D. Evans) +0+3+0 = 6). Right: Forest City (SHCI = 4 (H. A. Ward, Field Natural History Museum, G. Huss/American Meteorite Laboratory, University of New Mexico) +1 (UNM) +3+0 = 8). Samples from The Tricottet Collection

Socio-Historical Collection Index (*SHCI*)

The goal of metacollecting, which is to identify and analyse, from collection specimens, the links between different individuals including museum curators, researchers, dealers and others, is not new. Object biography, promoted by Alberti (2005), emphasizes the importance of object history tracking to reconstruct histories of science by embedding the study of scientific practice in material culture. The specimen loses in this process its intrinsic value by acting as a medium for relationships between individuals (and to a certain extent, between institutions). Objects are likely to pass through the hands of a number of people, from unknown finders and collectors (e.g., farmers) to well-known institutions via private collectors and dealers (Wyse Jackson, 1999; Samson, 2003; Alberti, 2005; Bennett, 2005).

The concepts of metacollection and collection-object formalize the idea of object biography by providing some explicit descriptive rules (see list of properties given above). Now a tool is presented to help evaluating the a priori socio-historical value of collection specimens from a collection-object perspective. It is referred to as the socio-historical collection index or *SHCI*. It applies to any given collection specimen and is defined as follows:

$$SHCI = N_{prov} + N_{lab} + N_{num} + N_{misc} \qquad (1)$$

with N_{prov} the number of verified provenances, N_{lab} the number of labels, N_{num} the number of different inventory numbers (directly on the specimen, on label(s), *etc.*), and N_{misc} the number of additional miscellaneous collection attributes affixed to the specimen (container(s), photograph(s), drawing(s), short note(s), letter(s), article(s), *etc.* – excluding collection catalogues, as explained below). The term $N_{lab} + N_{num} + N_{misc}$ represents the attributes of the collection(s) and N_{prov} the number of collection-objects. Being abstract entities, several collection-objects may be represented on a same meteorite specimen.

The aim of the proposed index is twofold: (*i*) to rapidly assess the potential socio-historical value of the specimen in disregard of its intrinsic scientific value and (*ii*) to emphasize the importance of collection attributes (the collection-object) such as labels and inventory numbers in this assessment. A *SHCI* of zero means that the specimen is of unknown origin and has no collection attribute. A high *SHCI* is synonymous of a factual chain-of-custody if $N_{prov} > 1$. The *SHCI* can be updated anytime new information comes to light. To get a reliable *SHCI* value, the number of collection catalogues in which the specimen is listed should not be counted in N_{misc} since this number would then depend on the frequency of catalogue releases, which varies significantly from institution to institution (knowing that (unfortunately) in the last decades most institutions no longer publish such catalogues). Similarly, a chain of letters discussing the specific specimen should count as (+) 0+0+0+1 (see Eq. 1) whatever the number of letters in the chain is. Photocopies of labels or other documents should be counted in the *SHCI* since they may contain valuable information otherwise lost for research. However, duplicate labels do not count if they do not provide any additional information. When a specimen is known to originate from a given institution (such as a museum) under the supervision of a given curator, it only counts as (+) 1+0+0+0. Containers should only be counted if their characteristics are unusual, i.e., if there is a chance they may be retraced to a specific source (i.e., basic cardboard boxes do not count). The *SHCI* only provides an a priori socio-historical value in the sense that different collections are treated equally although some may be historically more important than others (collection weighting is out of the scope of the present essay – Yet, the author would a priori not count in the *SHCI* the labels from private collections more recent than c. 1990, i.e. from the Internet era).

Here is an example on how the *SHCI* is calculated for the Ensisheim and Krasnojarsk meteorite specimens shown in Figures 3 and 4:

Ensisheim specimen: *SHCI* = 3 (Friedrich Wöhler, J. Lawrence Smith, and Harvard University) + 1 (label from Friedrich Wöhler) + 1 (partial number from J. Lawrence Smith) + 0 = 5.

Krasnojarsk specimen: *SHCI* = 2 (Berlin University, Babes-Bolyai University) + 2 (origin undetermined label and UBB label) + 2 (unidentified "3" number and UBB number) + 2 (sketch of the specimen on the

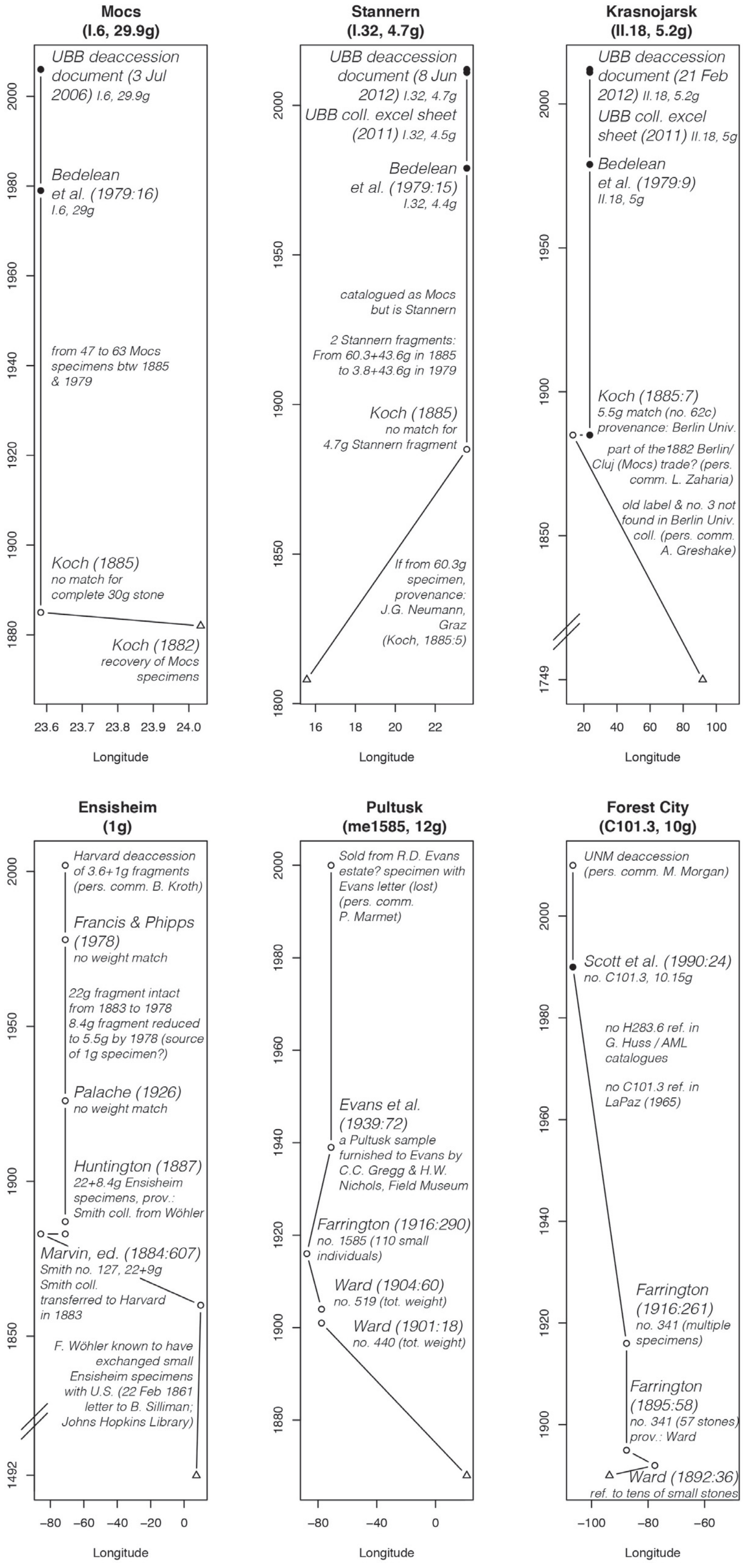

Fig. 6. Space-time diagrams describing the object biography of the six meteorite specimens shown in Figs. 3, 4, and 5. The spatial migrations are approximated by the longitude of the collection location (x-axis). Triangles represent the starting point of the biographies (i.e., for meteorites, their place and date of find/fall). Solid circles represent milestones in the biography of a specimen with robust information available on the specimen's whereabouts. Open circles represent valuable information but with no direct references to the specimen itself. Information from: Bedelean et al. (1979); Evans et al. (1939); Farrington (1895; 1916); Francis & Phipps (1978); Huntington (1887); Koch (1882; 1885); Marvin (1884); Palache (1926); Scott et al. (1990); Ward (1892; 1901; 1904).

Table 1. Late nineteenth century UBB meteorite collection catalogue (simplified and translated from Koch (1885)). Meteorite names in italics are not official (i.e., they are synonyms or contain typographical errors).

Koch's no.	Meteorite (Country ISO code)	Provenance	
		Hungarian	English translation
(a) Stony			
1	Ensisheim (FR)	British museum és Berlini egyetem	British museum & Berlin university
2	Sienna (IT)	Bolognai egyetem	Bologna university
3	Wold Cottage (GB)	British museum	British museum
4a	L'Aigle (FR)	Bécsi udv. ásványtár	Vienna Court mineral collection
4b		Berlini egyetem	Berlin university
5	Alais (FR)	Bolognai egyetem	Bologna university
6	Timochin (RU)	Bécsi udv. ásványtár	Vienna Court mineral collection
7	Weston (US)	Göttingeni egyetem	Göttingen university
8	*Cusignano* (IT)	Bolognai egyetem	Bologna university
9a	Stannern (CZ)	J.G. Neumann, Graz	J.G. Neumann, Graz
9b	Stannern (CZ)	Berlini egyetem	Berlin university
10	Lissa (CZ)	Bécsi udv. ásványtár	Vienna Court mineral collection
11	Charsonville (FR)	Bécsi udv. ásványtár	Vienna Court mineral collection
12	Toulouse (FR)	J. Siemaschko	J. Siemaschko
13a	Erxleben (DE)	Göttingai egyetem	Göttingen university
13b	Erxleben (DE)	Berlini egyetem	Berlin university
14	Chantonnay (FR)	Bécsi udv. ásványtár és párisi musée d'hist natur.	Vienna Court mineral collection & Paris nat. hist. museum
15	Juvinas (FR)	Bécsi udv. ásványtár és berlini egyetem	Vienna Court mineral collection & Berlin university
16*	Futtehpur (IN)	British museum	British museum
17	Honolulu (US)	British museum	British museum
18	*Pawlograd* (UA)	Bécsi udv. ásványtár	Vienna Court mineral collection
19	Richmond (US)	Bécsi udv. ásványtár	Vienna Court mineral collection
20	*Cold Bokkeweldt* (ZA)	Göttingai egyetem	Göttingen university
21	Chateau Renard (FR)	Bécsi udv. ásványtár	Vienna Court mineral collection
22	*Miljana* (HR)	Zágrábi egyetem	Zagreb university
23	Bishopville (US)	Berlini egyetem	Berlin university
24	*Blaauw-Capel* (NL)	Utrechti egyetem	Utrecht university
25*	*Cabarras County* (US)	J. Siemaschko	J. Siemaschko
26	Shalka (IN)	Bécsi udv. ásványtár	Vienna Court mineral collection
27†	*Mezömadaras* (RO)	Br. Kemény Ignácz ajándéka	Br. Kemény Ignácz gift
28	Bremervörde DE)	Göttingai egyetem	Göttingen university
29	Trenzano (IT)	Bolognai egyetem	Bologna university
30	Parnallee (IN)	British museum	British museum
31*	Kaba (HU)	Debreczeni collegium	Debrecen College
32	Ohaba (RO)	Bécsi udv. ásványtár	Vienna Court mineral collection
33*	Quenggouk (MM)	J. Siemaschko	J. Siemaschko
34	*Clarac* (FR)	British museum	British museum
35	*Montréjeau* (FR)	Párisi Mus. d'hist. natur.	Paris nat. hist. museum
36	New Concord (US)	Bolognai egyetem	Bologna university
37	Dhurmsala (IN)	Bécsi udv. ásványtár	Vienna Court mineral collection
38	Butsura (IN)	British museum	British museum
39	Orgeuil (FR)	Párisi Mus. d'hist. natur.	Paris nat. hist. museum
40†ab	Knyahinya (UA)	Már 1872-ben megvolt (Vásároltatott)	There was already in 1872 (bought derivative)
41a	Pultusk (PL)	Bécsi udv. ásványtár	Vienna Court mineral collection
41bc		Bécsi egyet. petrog. int.	Petrographic Institute, Vienna university
42	Daniels Kuil (ZA)	British museum	British museum
43	Hessle (SE)	Stockholmi Riksmus.	Stockholm national museum
44	Tjabé (ID)	Haarlemi egyetem	Haarlem university
45	*Ibbenbürren* (DE)	Berlini egyetem	Berlin university

<table>
<tr><th rowspan="2">Koch’s no.</th><th rowspan="2">Meteorite
(Country ISO code)</th><th colspan="2">Provenance</th></tr>
<tr><th>Hungarian</th><th>English translation</th></tr>
<tr><td>46</td><td>Orvinio (IT)</td><td>Bolognai egyetem</td><td>Bologna university</td></tr>
<tr><td>47</td><td>Khairpur (PK)</td><td>British museum</td><td>British museum</td></tr>
<tr><td>48</td><td>Homestead (US)</td><td>Bécsi udv. ásványtár</td><td>Vienna Court mineral collection</td></tr>
<tr><td>49</td><td>Ställdalen (SE)</td><td>Stockholmi Riksmus.</td><td>Stockholm national museum</td></tr>
<tr><td>50a</td><td rowspan="2">Soko Banja (RS)</td><td>Budapesti egyetem</td><td>Budapest university</td></tr>
<tr><td>50b</td><td>Dr. Mártonti Lajos</td><td>Dr. Louis Mártonti</td></tr>
<tr><td>51</td><td>Nogaya (AR)</td><td>Berlini egyetem</td><td>Berlin university</td></tr>
<tr><td>52a</td><td rowspan="3">Mocs, Kolozsm Erdély (RO)</td><td>Csobánczy Pál gyüjt.</td><td>Paul Csobánczy coll.</td></tr>
<tr><td>52b</td><td>Dr. Mártonti Lajos aj.</td><td>Dr. Louis Mártonti gift</td></tr>
<tr><td>52c</td><td>Dr. Herbich Fer. gyüj</td><td>Dr. F. Herbich coll.</td></tr>
<tr><td>53</td><td>Mocs, Palatka (RO)</td><td>Dr. Primies Gy. gyüj</td><td>Dr. G. Primies coll.</td></tr>
<tr><td>54*a</td><td rowspan="2">Mocs, Keszü (RO)</td><td>Mike Lajostól véve.</td><td>Mike Lajostól account</td></tr>
<tr><td>54b</td><td>Csobánczy Páltól véve.</td><td>Paul Csobánczy account</td></tr>
<tr><td>55ab</td><td>Mocs, Vajda-Kamarás (RO)</td><td>Gr. Bethlen Dániel aj</td><td>Daniel G. Bethlen gift</td></tr>
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<tr><td>56c</td><td>Dr. Koch Antal gyüj</td><td>Dr. Antal Koch coll.</td></tr>
<tr><td>56d</td><td>Csobánczy P.-tól véve.</td><td>Paul Csobánczy account</td></tr>
<tr><td>56f</td><td>Dr. Primies. Gy. gyüj</td><td>Dr. G. Primies coll.</td></tr>
<tr><td>57</td><td>Mocs, Marokháza (RO)</td><td>Csobánczy P.-tól véve.</td><td>Paul Csobánczy account</td></tr>
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<tr><td>58b,su</td><td>Naláczy Farkas gyüjt.</td><td>Farkas Naláczy coll.</td></tr>
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<tr><td>58g,i,km,o,qr</td><td>Dr. Koch Antal gyüjt.</td><td>Dr. Antal Koch coll.</td></tr>
<tr><td>58h,p</td><td>Dr. Herbich Fer. gyüjt.</td><td>Dr. F. Herbich coll.</td></tr>
<tr><td>59ad,h</td><td rowspan="2">Mocs, Visa (RO)</td><td>Dr. Koch Antal gyüjt.</td><td>Dr. Antal Koch coll.</td></tr>
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<tr><td>60*</td><td>Pawlowska (RU)</td><td>J. Siemaschko</td><td>J. Siemaschko</td></tr>
<tr><td>61*</td><td>Alfianello (IT)</td><td>L. Bombicci tanár</td><td>Prof. L. Bombicci</td></tr>
<tr><td colspan="4">(b) Stony-iron</td></tr>
<tr><td>62a</td><td rowspan="3">Krasnojarsk (RU)</td><td>British museum</td><td>British museum</td></tr>
<tr><td>62b</td><td>Dr. A. Krantz</td><td>Dr. A. Krantz</td></tr>
<tr><td>62c</td><td>Berlini egyetem</td><td>Berlin university</td></tr>
<tr><td>63</td><td>Imalac (CL)</td><td>Berlini egyetem</td><td>Berlin university</td></tr>
<tr><td>64a</td><td rowspan="2">Hainholz (DE)</td><td>Berlini egyetem</td><td>Berlin university</td></tr>
<tr><td>64b</td><td>Bécsi udv. ásványtár</td><td>Vienna Court mineral collection</td></tr>
<tr><td>65</td><td>Atacama (BO)</td><td>Bécsi egyet. petrog. int.</td><td>Petrographic Institute, Vienna university</td></tr>
<tr><td>66</td><td>Breitenbach (?)</td><td>British museum</td><td>British museum</td></tr>
<tr><td>67</td><td>Estherville (US)</td><td>Bécsi udv. ásványtár</td><td>Vienna Court mineral collection</td></tr>
<tr><td colspan="4">(c) Iron</td></tr>
<tr><td>68a</td><td rowspan="2">Toluca (MX)</td><td>Bécsi udv. ásványtár</td><td>Vienna Court mineral collection</td></tr>
<tr><td>68b</td><td>Budapesti egyetem.</td><td>Budapest university</td></tr>
<tr><td>69</td><td>Xiquipilco (MX)</td><td>Bonni egyetem.</td><td>Bonn university</td></tr>
<tr><td>70</td><td>Zacatecas (MX)</td><td>Bonni egyetem.</td><td>Bonn university</td></tr>
<tr><td>71</td><td>Jóreménység foka “Cape of Good Hope “ (ZA)</td><td>Haarlemi egyetem.</td><td>Haarlem university</td></tr>
<tr><td>72</td><td>Jóreménység foka (ZA)</td><td>Berlini egyetem.</td><td>Berlin university</td></tr>
<tr><td>73</td><td>Red river (US)</td><td>Bonni egyetem.</td><td>Bonn university</td></tr>
<tr><td>74a</td><td rowspan="2">Lénártó (SK)</td><td>Nemz. muzeum Bpest.</td><td>Hungarian national museum, Budapest</td></tr>
<tr><td>74b</td><td>British museum</td><td>British museum</td></tr>
<tr><td>75</td><td>Bolson de Mapimi (MX)</td><td>Dr. A. Krantz</td><td>Dr. A. Krantz</td></tr>
<tr><td>76</td><td>Tarapaca (CL)</td><td>Bécsi udv. ásványtár</td><td>Vienna Court mineral collection</td></tr>
<tr><td>77</td><td>Cosby Crack? “Cosby’s Creek” (US)</td><td>Berlini egyetem.</td><td>Berlin university</td></tr>
<tr><td>78a</td><td rowspan="2">Szlanicza (SK)</td><td>Bécsi udv. ásványtár</td><td>Vienna Court mineral collection</td></tr>
<tr><td>78b</td><td>Berlini egyetem.</td><td>Berlin university</td></tr>
</table>

Koch's no.	Meteorite (Country ISO code)	Provenance	
		Hungarian	English translation
79a	Seeläsgen (PL)	Dr. A. Krantz	Dr. A. Krantz
79b		Bonni egyetem.	Bonn university
79c		Berlini egyetem.	Berlin university
80	Chesterville (US)	Berlini egyetem.	Berlin university
81	Schwetz (PL)	Berlini egyetem.	Berlin university
82*	Ruff's Mountain (US)	Bécsi udv. ásványtár	Vienna Court mineral collection
83	*Tazelwell* (US)	British museum	British museum
84	Sarepta (RU)	Berlini egyetem.	Berlin university
85	Denton County (US)	British museum	British museum
86	Obernkirchen (DE)	British museum	British museum
87*	*Cohahuila* (MX)	Bécsi udv. ásványtár	Vienna Court mineral collection
88ac	Ovifak (GL)	Koppenhágai egyetem	Copenhagen university
88d		Stockholmi Reichsmu.	Stockholm national museum
89*	*Bates Co.* (US)	Bécsi udv. ásványtár	Vienna Court mineral collection
90	S-ta Catharina (BR)	Párisi Mus. d'hist. nat.	Paris nat. hist. museum

reverse of the origin undetermined label and original UBB trade document) = 8.

Importantly, it is a meteorite collector and dealer who has confirmed that the Ensisheim specimen had been deaccessioned from the Harvard University (pers. comm., B. Kroth, 2013). There is however no documentation (label, number, trade document, etc.) confirming the Harvard provenance. The information provided by the dealer is valuable and validated by other sources (e.g., Huntington, 1887), contributing to (+)1+0+0+0 in the *SHCI*, but is less valuable than if it was properly documented (case (+)1+ ≥0 + ≥0 + ≥0). The Berlin University provenance of the Krasnojarsk specimen is given in the UBB catalogue from 1885 (Koch, 1885). The old label, number, and sketch (Fig. 3) increase the *SHCI* but so far could not be confirmed to originate from the Berlin collection (pers. comm., A. Greshake, 2015). The numbers, labels, and other documents associated with a collection specimen provide a unique way to "describe its biography". The higher the *SHCI* is, the larger the chance is to properly describe its journey from its landing and finding on Earth to its current collection location.

Specimens with $N_{prov} > 1$ and with a relatively high *SHCI* are representative of multiple collection-objects and, as such, can be used as inputs in prosopographical networks. The meteorite specimens from Figures 3 and 4 are now considered in more details together with two other specimens shown in Figure 5 (Pultusk and Forest City meteorite specimens with *SHCI* of 6 and 8, respectively). The biographies of these six specimens are described in Figure 6 using space-time diagrams. Each biography is represented by one path. A high *SHCI* a priori indicates a well-described biography, which can be further investigated by retrieving additional information from collection catalogues and other resources but also from specimen mass to be tracked in the catalogues (see comments in Figure 6). Specimen mass is particularly important here and can also be used to confirm that the specimen is correctly associated to its label. As a side note, if the mass does not match or is not given on the label, the label may be incorrectly associated to that specimen. Therefore, labels should always be considered with extreme care (other specimen characteristics such as the shape are also useful for specimen tracking and contradictory information checking). The space-time diagrams produced here should be considered as working documents which can be updated as new information becomes available. All paths could then be combined into prosopographical networks in a standardized way.

CONCLUSIONS

The importance of collection specimens in socio-historical research has already been well addressed. However, since collection specimens are at the triple junction between science, curation, and history, investigating the socio-historical aspects of these curated scientific specimens remains a challenge (e.g., Wyse Jackson, 1999; Alberti, 2005; Bennett, 2005). Indeed, the fundamental focus of natural history museums remains on science and education (Danks, 1991) and until recently, inventories, catalogues, and specimens themselves had attracted little interest beyond antiquarians (Spary, 2008).

The goal of the present study was to formalize the socio-historical study of collection specimens by the term “metacollecting”. Definition of the “collection-object” emphasizes the importance of collection specimens, not for their intrinsic scientific value, but for their characteristics of being part of a given collection. With the collection-object explicitly defined, one can better describe its characteristics. The various examples shown above prove that these characteristics (inventory numbers, labels, etc.; Figs. 3-5) require the use of forensic analysis methods, not to discover the culprit of a crime but the assembler and history of a collection. A database of collection attributes would represent the next step toward the generalisation of metacollecting. By simply testing the newly proposed socio-historical collection index (*SHCI*) to rapidly evaluate the a priori socio-historical value of their specimens, curators and private collectors alike would be more inclined to preserve collection attributes. Such increased awareness would in turn facilitate metacollecting and associated activities such as prosopography (using for instance correspondence networks and other space-time diagrams; Figs. 1, 2, and 6).

The concept of collection-object was illustrated in the case of meteorite collecting. Meteorites have in this context the advantage of being rare relative to most other collectibles and are therefore often listed individually in catalogues. This is rarely the case for terrestrial rock specimens for instance, making such exercise of tracking specimen history more difficult in this case (meteorites only represent a small fraction of all specimens held in natural history museums; Petersen et al., 1994). A lack of provenance details will always hamper in-depth analyses but considering metacollecting as a worthwhile activity on its own would likely improve future curating efforts into tracking whichever specimen history remains. It does not only apply to natural history collections but to any type of collection since the concept of collection-object makes any specimen, natural or artificial, part of material culture.

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