DIGITAL CLASSICS ONLINE

Geo-Semantic Annotation for Ancient Textual Sources. Annotating Pliny the Elder's Description of Greece (4,1–74)

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Abstract: The paper outlines the workflow developed for the semantic annotation of named places in an ancient Latin text, Pliny the Elder's *Naturalis historia* (4,1–74). This section, dedicated to the geographical description of Greece, poses several challenges for entity disambiguation due to the presence of rare or otherwise unattested toponyms, dubious identifications, and innovations or inaccuracies introduced by the author. The paper first discusses current approaches to the geo-referencing of ancient sources, with a focus on interoperability, best practices, and data modelling. It then demonstrates how a relational data system effectively supports annotation within a pre-processed, tokenised text. The proposed pipeline leverages identifiers at both the token and annotation levels to (1) unambiguously identify the annotation within the text, (2) manage nested and non-consecutive entities, (3) represent competing interpretations in a machine-readable format, (4) integrate named entity annotation with other layers of semantic analysis, and (5) ensure interoperability across annotation projects.*

1. Introduction

Semantic annotation consists of associating a piece of text (e.g. a word) with external knowledge in order to disambiguate, explain and contextualise it.[1] Rooted in the practice of scholarly textual commentary, the semantic annotation of ancient sources has in recent years progressively transitioned to a digital environment.[2] The shift has involved not only the way texts are displayed and read through digital media, but also the practice of annotation itself, which has moved into a digital ecosystem. Sophisticated software interfaces have been developed to add annotations to texts, in which traditional editorial marks used to reference target textual passages have been replaced by HTML tags and external linking mechanisms. Crucially, the external knowledge to which annotated passages are linked is now typically part of larger digital knowledge systems (e.g. a database), designed according to pre-defined principles and interlinked with other digital resources.

Semantic annotation addresses different levels of linguistic information and textual segmentation, from single words to entire sentences. Annotation, for instance, may involve disambiguating a word's meaning in a given context. In recent years, considerable attention has been devoted to the semantic annotation of so-called Named Entities.[3] The task (known as Named Entity Recognition) consists of identifying all the entities (persons, places, collectives, etc.) that are mentioned in a text through a

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1 Unsworth (2000).

2 Barker et al. (2020).

3 Erdmann et al. (2016); Berti (2021); Ehrmann et al. (2023); Palladino / Yousef (2024); Berti (2026a); Berti (2026b).

stable designator, typically a proper name. Once the stable designator is identified (e.g. the string 'Sappho of Lesbos' for the ancient Greek poet), the named entity is assigned to a fixed type (e.g. 'person'). The next step is the disambiguation (or Named Entity Linking), which consists of associating the named entity with its corresponding entry in an external knowledge base, such as a digital encyclopaedia. Entity resolution is carried out through the use of Uniform Resource Identifiers (URIs), which provide a stable and unambiguous reference to each entry in the knowledge base (e.g. 'Sappho of Lesbos' is disambiguated through the Wikidata identifier Q17892[4]). Knowledge bases store entity metadata, such as names, chronological spans, and geographic coordinates.

The paper focuses on the semantic annotation of named places (or geo-referencing) in an ancient Latin text, Pliny the Elder's *Naturalis historia*. As discussed in the first part of the paper, recent years have witnessed the emergence of numerous projects dedicated to building extensive corpora of geo-referenced ancient texts, which has in turn prompted a broader debate on annotation harmonisation and the interoperability of annotated data. In the second part, the discussion turns to knowledge bases of ancient places (also known as gazetteers), which play a central role in the disambiguation process. By comparing the data structures of two major historical gazetteers (*Pleiades* and *Trismegistos Places*), the analysis provides additional context for current approaches to geo-semantic annotation and underscores the different strategies adopted to digitally formalise the rich semantics of ancient places. Finally, the paper outlines the workflow developed for the annotation of *Naturalis historia* 4,1–74, a section of Pliny's encyclopaedia dedicated to the geographical description of ancient Greece. In the text, Pliny alternates well-known locations with obscure or otherwise unattested toponyms. At times, his geographical information contradicts other sources; at others, he introduces innovative ways of conceptualising Greek space. From this perspective, Pliny's narrative provides a compelling case study for investigating how ancient places are not clear-cut and static entities, but rather context-dependent constructs whose meaning is continuously negotiated. The paper then demonstrates how a relational data model was adapted to manage multiple annotation layers and accommodate text-specific features. More broadly, the paper discusses to what extent semantic annotation, conceived as a critical practice, offers a productive framework for analysing place representation in ancient sources and engaging with the ambiguities and nuances that characterise it.

2. Related Works

Ancient Greek and Latin texts contain thousands of references to named places (cities, villages, rivers, mountains, etc.), which are described or simply mentioned in passing.[5] Since the early 2010s, building on the pioneering work carried out by the *HESTIA* project,[6] Digital Classics scholarship has devoted increasing effort to the construction of large-scale corpora of geo-referenced texts (Tab. 1), in a dynamic interplay between technological advances, methodological reflections and evolving research agendas. Annotated texts include both ancient Greek and Latin literary works and documentary sources, whether in the original language or modern translation. Greek texts predominate, whereas Latin sources remain comparatively under-represented.

The reconciliation of place references through consistent URIs, by interconnecting ancient texts on an unprecedented scale, has opened new ways of navigating the ancient world across a wide range of in-

4 http://www.wikidata.org/entity/Q17892 (last access date for all links 23.06.2026).

5 The *ToposText* project (https://topostext.org), devoted to the annotation of places across a substantial corpus of ancient Greek and Latin literary sources, records a total of 277,700 place attestations.

6 Barker et al. (2010).The *HESTIA* project incorporated the TEI-XML geo-referenced version of the English translation of Herodotus' *Histories* as provided by the *Perseus Digital Library*.

terlinked sources, the full potential of which is still unfolding.[7] Moreover, by establishing explicit links between textual references and real-world places, semantic annotation has also facilitated the application of various spatial technologies and visualisation methods. Geo-referenced data have been used to perform distributional analyses,[8] including hotspot analysis.[9] Some projects have applied GIS and *deep mapping* techniques,[10] while others have analysed the relations between mapped places through network analysis.[11]

Project name	Annotated Work(s)	References
ARGOmaps	Apollonius' *Argonautica*	
Beyond Translation	*Odyssey*	
Carving Connections	Inscriptions from Asia Minor attesting human mobility	
Deep Mapping Sanctuaries	Aelius Aristides' *Sacred Tales*	Katevaini / Williamson (2025)
Digital Agathemerus Project	Agathemerus' *Sketch of Geography*	Palladino (2021a)
Digital Marmor Parium	*Marmor Parium*	Berti / Stoyanova (2014)
Digital Periegesis	Pausanias' *Periegesis*	Barker et al. (2023)
Hestia	Herodotus' *Histories*	Barker et al. (2010)
Greek Spaces in Roman Times	Pliny the Elder's *Naturalis historia* (4,1–74)	Soffiantini (2024)
Linked Ancient Greek and Latin	Athenaeus' *Deipnosophists*, Valerius Harpocration's *Lexicon of the Ten Orators* and the *Suda*	Berti (2025)
MANTO	A collection of passages attesting episodes related to Greek mythology	Hawes / Smith (2025)
Mapping Ancient Sicily	A collection of passages attesting Sicilian settlements	
Mapping Cicero's Letters	A selection of Cicero's letters	Myers (2021)
Mapping Relations in Strabo's Geography	Strabo's *Geography*	Lubbers (2025)
Mapping the Catalogue of Ships	*Catalogue of Ships* (*Iliad*)	Jasnow et al. (2018)
Perseus Digital Library	A collection of ancient Greek and Latin texts	Smith / Crane (2001)

7 Isaksen et al. (2016); Barker et al. (2024).

8 Jasnow et al. (2018); Palladino (2021a); Zaccaria / Berti (2026); Hawes / Scott (2026).

9 Foka et al. (2022).

10 Carroll (2025); Esposito / Mignosa (2025); Katevaini / Williamson (2025); Palladino / Colgan (2025).

11 Barker et al. (2016).

Pliny the Elder's World	Pliny the Elder's *Naturalis historia* in English translation	
PrevNet	A collection of Ancient Greek and Latin texts attesting preverbed motion verbs	Farina / McGillivray (2025)
Proxeny Networks of the Ancient World	A collection of inscriptions attesting *proxenoi*	Mack (2022)
The Epigraphic Landscape of Athens	A collection of inscriptions from Athens	Lasagni (2020)
The Hellespont Project	Thucydides' *Peloponnesian War* (1,89–118)	Mambrini (2016)
The Networked Polis	Inscriptions related to the *Leukophryena* dossier in Magnesia on Maeander	Carroll (2024)
TM Paradoxography	Ancient paradoxographical texts	Zaccaria / Berti (2026)
ToposText	A collection of ancient Greek and Latin texts in English translation	
Tracking the Ten Thousand	Xenophon's *Anabasis*	Palladino / Colgan (2025)
Trismegistos GeoRef	A collection of literary works and historical sources (inscriptions, papyri)	Verreth (2016)
SLaVEgents	A collection of ancient sources attesting enslaved persons	Vlassopoulos / Konstantinidou (2025)

Tab. 1: List in alphabetic order of projects providing geo-spatial annotation for Ancient Greek and Latin textual sources.

Although all these projects achieve place disambiguation through stable identifiers, the methodology adopted in the annotation workflow may vary significantly. Some projects rely entirely on manual curation, whereas others employ semi-automated approaches that incorporate string-matching heuristics or automated systems, typically followed by human validation. Annotation platforms such as *Recogito* (https://recogito.pelagios.org/)[12] and *INCEpTION* (https://inception-project.github.io) are frequently integrated into the annotation pipeline; more recently, alternative approaches such as the use of relational data systems like FileMaker have also been explored.[13] Finally, annotations are generally published either in tabular format or using markup languages such as XML.

In parallel with the development of digital annotation projects, digital gazetteers have been created to systematically catalogue historical places.[14] This massive endeavour is not entirely new. Early geographical dictionaries, such as the *Dictionary of Greek and Roman Geography*, provided lists of an-

12 *Recogito* was specifically designed for the geo-annotation of historical sources and provides a built-in visualisation tool (Simon et al. [2015]). See now *Recogito Studio*, described in Middle et al. (2025).

13 Berti (2021); Palladino (2021c); Barker et al. (2023); Zaccaria / Berti (2026). See also the implementations adopted in the present project below.

14 For a discussion of the development of the technologies used to support geo-spatial annotation of ancient sources, see Barker et al. (2024).

cient places with a brief commentary.[15] More recently, works like *An Inventory of Archaic and Classical Poleis* have focused on collecting specific place categories within defined chronological frameworks.[16] Around the same time, the *Barrington Atlas of the Greek and Roman World* marked a major milestone by providing the first comprehensive cartographic representation of more than 25,000 places.[17] By supplying authoritative lists of place names and coordinates, the *Barrington Atlas* also represented a turning point in the construction of digital gazetteers of the ancient world. Indeed, its digitisation led to the creation of the *Pleiades Gazetteer* (https://pleiades.stoa.org), which now contains over 42,000 records of ancient places.[18] Over time, other digital initiatives emerged, focusing on specific regions or chronological spans, like *Trismegistos Places* (https://www.trismegistos.org/geo/), which encompasses more than 64,000 records, primarily covering Ancient Egypt.[19] Notably, historical gazetteers have gradually evolved from static lists of place names and coordinates into knowledge bases of complex digital objects, in which places are modelled through their properties, functions, and relationships with other entities.[20]

While these achievements are substantial, significant limitations persist, particularly regarding the reusability and interoperability of annotated data. First, efforts to harmonise annotation practices, while increasingly sustained, are relatively recent, with projects often relying on different guidelines. For example, a core issue in geo-semantic annotation lies in the very definition of what constitutes a 'place' and, consequently, of what should or should not be included. Although the concept may appear intuitive, it is far from straightforward.[21] Another source of variation across annotation projects concerns the delineation of name boundaries, which determines where a place annotation should begin and end.[22] Finally, as noted by Beersmans et al. (2024), ethnonyms (e.g. the 'Greeks') and adjectival forms derived from place names (e.g. an 'Athenian' ship) are treated inconsistently across geo-referencing projects.[23]

Second, projects rely on different gazetteers to support entity disambiguation. Interoperability across gazetteers, and by extension across annotated data, is achieved through URI alignments between equivalent entries, an infrastructure effort primarily sustained by the *Pelagios Network*.[24] Since 2025, the *Pleiades Gazetteer* has reinforced its Linked Open Data (LOD) infrastructure with the introduction of the 'Linked Data Sidebar', a component that aggregates incoming references from other databases, providing a gold-standard validation for entity alignment.[25] Nevertheless, URI alignments remain incomplete for some entities. More importantly, gazetteers do not always exhibit a straightforward one-

15 Smith (1854). The *Dictionary of Greek and Roman Geography,* now fully digitised on *Perseus*, contains 10,292 records.

16 Hansen / Nielsen (2004). The *Inventory* contains 1,035 Greek cities. Place numbers from the *Inventory* are now integrated into *Wikidata.*

17 Talbert (2000).

18 Elliott / Gillies (2009); Elliott (2018).

19 Depauw (2018).

20 Horne (2020). See also below. Several projects are progressively adopting *Wikidata* as a standard gazetteer. See Kiesling et al. (2025); Chen et al. (2026).

21 A full examination of the notion of 'place' in antiquity exceeds the scope of this paper. For a discussion see, among many others, Janni (1984); Thalmann (2011); de Jong (2012); Jacob (2014). Within the framework of geo-semantic annotation, see the discussion in Barker et al. (2016) and Barker (2021).

22 Palladino (2026).

23 Annotation inconsistencies have long contributed to the relatively low quality of automated NER systems for ancient places (Beersmans et al. [2024]). Very recent standardisation efforts are substantially improving performance, as described in Litta Modignani Picozzi et al. (2026).

24 Vitale et al. (2021); Middle (2024).

25 https://pleiades.stoa.org/help/linked-data-sidebar.

to-one correspondence: a single entity in one gazetteer may map onto multiple entities in another. These asymmetries arise from differing place-modelling choices in the underlying knowledge bases, which in turn introduce potential limitations for data interoperability (see below).

Against this background, and before addressing the challenges encountered (and the solutions adopted) in annotating Pliny's text, the following section examines the data structures of two reference gazetteers: the *Pleiades Gazetteer* and *Trismegistos Places*. After introducing their ontological frameworks, a concrete example is discussed to compare how place-related knowledge is formalised in the two knowledge bases. More broadly, the comparison raises a fundamental question: how can places be modelled in a digital environment, and how does digital modelling relate to the ways in which places are represented in ancient texts? In line with previous observations, the analysis shows that there is no single way to digitally encode the layered semantics of places: each ontology emphasises certain aspects while downplaying others.[26] The section concludes by addressing another central issue in annotation practice, that is the data architecture connecting the annotated text to the gazetteer URIs, and discusses the linking strategies of three projects: *Trismegistos GeoRef*, the *Digital Periegesis*, and *MANTO*.

3. Modelling Knowledge about Places

In a digital context, place modelling refers to the structuring of knowledge about places through a formalised representation, typically by means of structured metadata.[27] A widely privileged aspect in place modelling is the use of spatial data, such as geographical coordinates. However, as has been extensively debated in previous scholarship, places are extremely complex concepts, and a purely numeric representation fails to capture their other properties, as well as the qualitative, cultural, and symbolic dimensions that inform them.[28] Furthermore, the applicability of GIS mapping techniques, grounded in the modern European cartographic tradition, to pre-modern and/or non-European spatial understandings has often been called into question.[29]

In response to these theoretical shifts, the *Pleiades Gazetteer* adopted a critical cartographic approach to the study of ancient geography. Within its framework, places are conceived as 'un-GIS' abstract entities with no inherent temporal or spatial properties.[30] Accordingly, *Pleiades* distinguishes the concept of 'place' from the notions of both 'location' (which connects a place to its geographical coordinates) and 'name'.[31] A place may be linked to one or multiple locations and names, but it may also lack either, as in the case of a toponym recorded in a text but never identified at a specific location on the ground, or an archaeological site whose ancient name has been lost.

Trismegistos Places adopts a slightly different framework. Here, 'place' is a broad term encompassing towns, villages, regions, rivers, sanctuaries, and other geographically or culturally significant sites connected with the ancient world.[32] Each place is associated with a name and, where available, geo-

26 Hacıgüzeller (2021); Chen et al. (2026).

27 Middle et al. (2022).

28 Bodenhamer et al. (2015); Murrieta-Flores et al. (2019). For a theoretical discussion of the cultural, symbolic, and affective aspects informing places in antiquity, see now Katevaini / Williamson (2025); Proietti / McInerney (2025) with previous bibliography.

29 Barker et al. (2016); Palladino (2021b).

30 https://pleiades.stoa.org/docs/papers-and-presentations/whats-an-un-gis.

31 Unlike 'places', which do not carry temporal attributes, both 'locations' and 'names' can be assigned the attribute 'Temporal attestations'.

32 https://www.trismegistos.org/geo/about.php.

graphical coordinates. Moreover, *Trismegistos Places* uses multiple fields to contextualise each place historically and geographically, including the temporal attributes 'ancient region', 'Roman province' and 'modern region' which indicate the broader region to which the place belonged in the third century BC and around AD 200, and to which it belongs today.

To further illustrate how the two gazetteers operate, I manually compared their data structures for the same entity. As a case study, I selected 'Macedonia', the ancient region located in northern Greece. Due to its historically stratified definition and its consistent representation in the two databases, the place appeared to be an ideal candidate for this purpose.[33] I inspected the relevant metadata for each 'Macedonia' entry in both *Pleiades* and *Trismegistos* (Fig. 1). To improve readability, the extracted metadata were transformed from RDF/GeoJSON statements into nodes (subjects and objects) and edges (predicates), and visualised as a directed graph (Fig. 2).[34] Links between entities are also represented as edges. In the network, nodes are colour-coded according to their category, while literal values without an identifier are shown in grey regardless of their type.

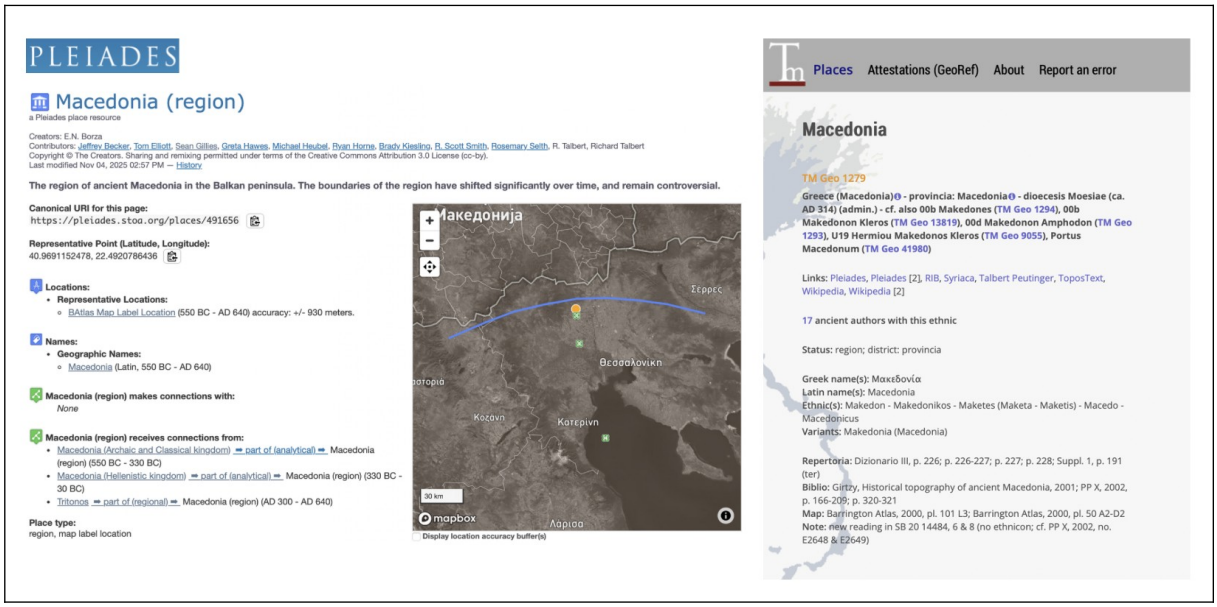

Fig. 1: Entries in *Pleiades* (on the left) and *Trismegistos* (on the right) for 'Macedonia'.

First, in both gazetteers each place receives an identifier. For instance, 'Macedonia (region)' has *Pleiades* place identifier 491656, while in *Trismegistos* 'Macedonia' has TMGeo id 1279 (Fig. 3, in yellow). Moreover, places have place names. In *Pleiades*, each place name is assigned a unique identifier (Fig. 3, in red): for instance, 'Macedonia (region)' (= Pleiades 491656) has name 'Macedonia' (= 491656/macedonia). Since in *Pleiades* name identifiers are composed of the identifier of the associated place and the transcription of the toponym, each name identifier refers to only one place. As a result, homonymous places receive different name ids and are currently not automatically interlinked, which limits large-scale analyses of place-naming patterns.[35] Name variants are also recorded. In some cases, these correspond to transcriptions in other languages (e.g. the Greek name 'Μακεδονία' and the

33 According to Hansen / Nielsen (2004), 794, "As Macedonia is simply the land of Makedones, its extent followed Makedonian expansion".

34 The HTML interactive version of the network can be downloaded from the *Zenodo* repository of the paper: https://doi.org/10.5281/zenodo.18925430. On a larger scale, the *Pelagios Graph Explorer* project developed a prototype to visualise the graph of connections between historical gazetteers. See Simon et al. (2012). At the time of writing, the site is no longer accessible.

35 For instance, the name Ἡράκλεια has id 452333/herakleia for the city of 'Herakleia' in Lucania (= Pleiades 452333) and id 599642/herakleia for the homonymous island of 'Herakleia' in the Aegean Sea (= Pleiades 599642). For best practices in the digital modelling of ancient onomastics, see Broux / Depauw (2015).

Latin ‘Macedonia’). Other cases are much more complex: multiple names may be associated with a single place and organised hierarchically (e.g. as preferred and variant forms), even when their identification remains uncertain or debated.[36] In *Pleiades*, places may also have a location, which receives an identifier and is associated with the corresponding coordinates. For instance, ‘Macedonia (region)’ (= Pleiades 491656) has location 491656/batlas-map-label-location (Fig. 3, in dark green). In *Trismegistos*, place names, name variants and adjectival derivatives (e.g. ‘Macedonicus’), including inflected forms, receive a GeoVar identifier. At present, GeoVars are incorporated into the *TMPlaces* search tool to enable broad data retrieval, but no explicit hierarchical structure exists among the GeoVar forms.

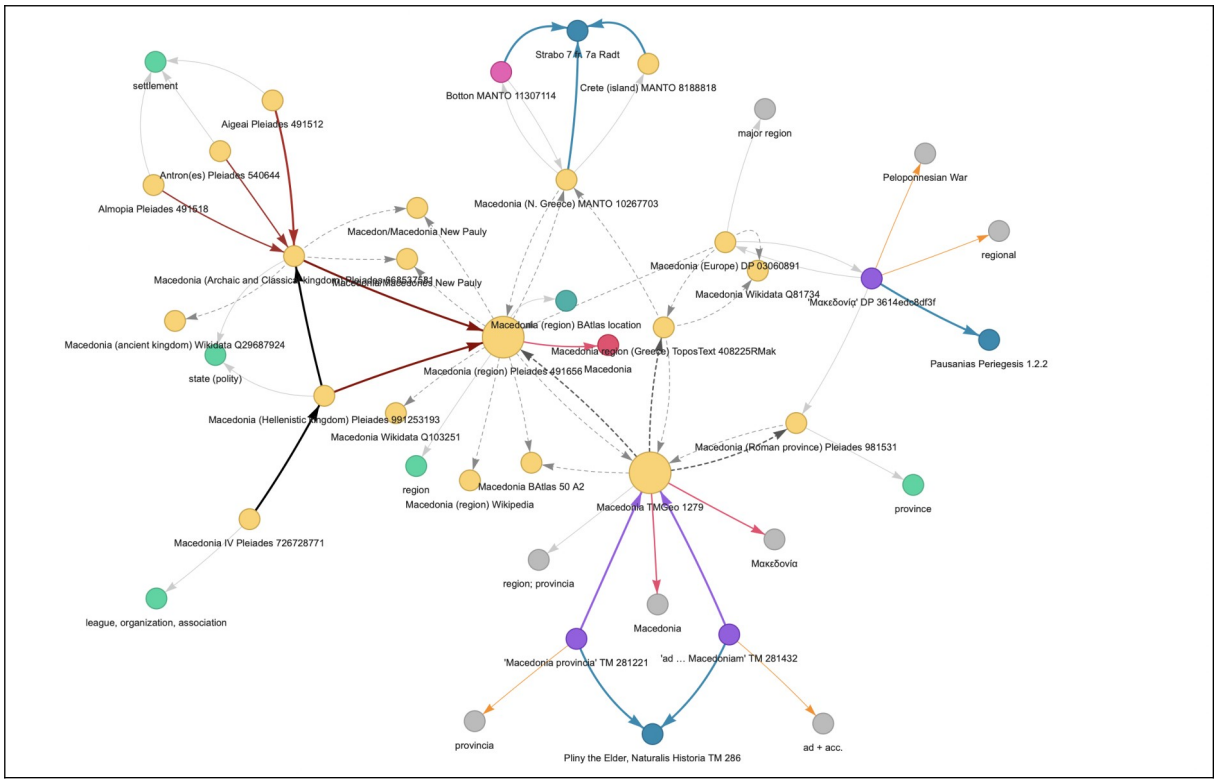

Fig. 2: Network of entities and attributes for ‘Macedonia’.

Furthermore, in *Pleiades* places receive a place type according to their categorisation in the *Barrington Atlas*. For instance, ‘Macedonia (region)’ has place type ‘region’ (Fig. 3, in green). Most *Pleiades* place types have an id and are defined according to the *Getty Vocabularies* (http://vocab.getty.edu/). However, some definitions are absent or incomplete, while others (e.g. ‘settlement’) remain conceptually broad, thereby constraining more granular differentiation.[37] In *Trismegistos*, each place can be associated with multiple place types recorded as a string type. General categories are described in English (e.g. ‘region’), while ancient terms in transliteration are also present, derived from the place-type annotation in *Trismegistos GeoRef* (see below).[38]

36 The management of place name variants is complicated by the heterogeneous ways in which they are treated in the sources. In some instances, alternative toponyms are used interchangeably. In other cases, however, ancient sources disagree as to whether two or more names refer to the same place or to distinct locations. In Pleiades, ‘certainty’ attributes qualify the relation between a name and a place. MANTO, by contrast, distinguishes between ‘alternative name of’ and ‘identified with’ relations.

37 Barker et al. (2010); Middle (2024).

38 *Trismegistos* provides a list of the terms used to qualify place types in ancient sources, with their modern equivalent semantically categorised: https://www.trismegistos.org/geo/about_status.php.

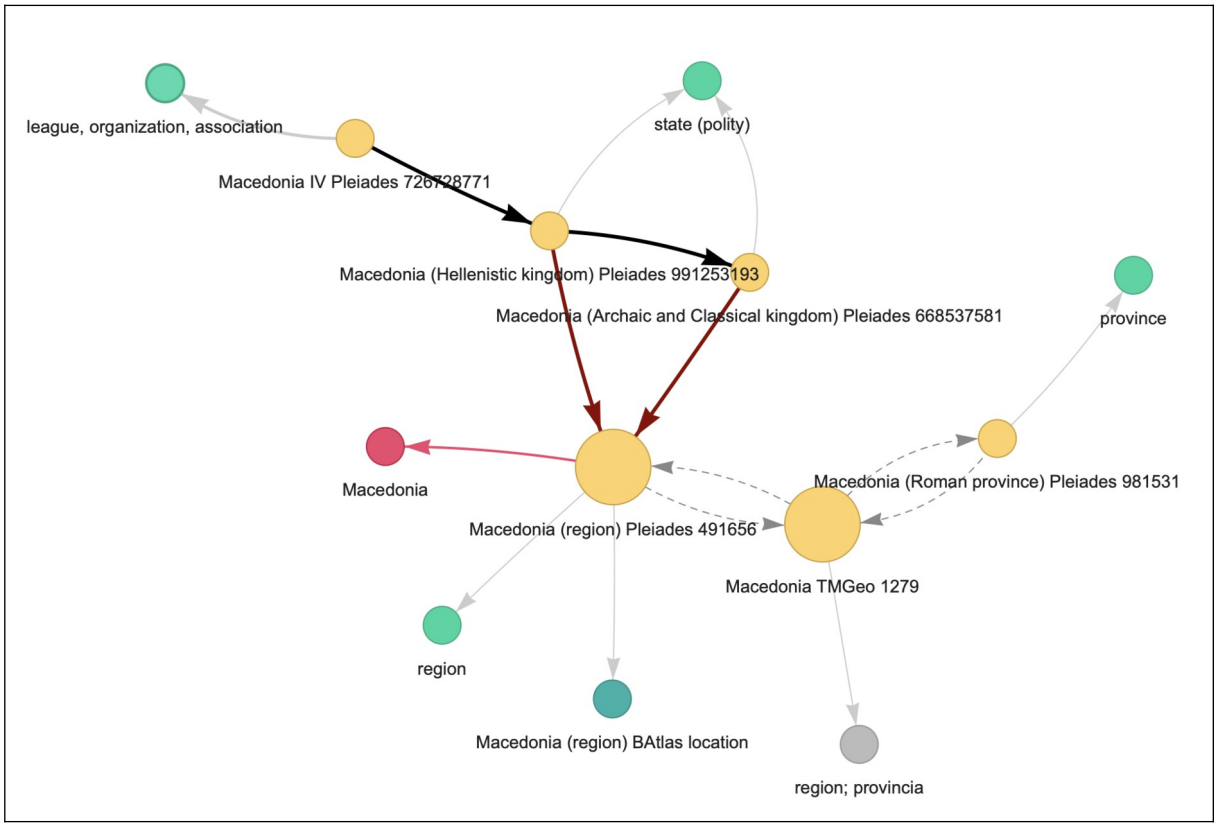

Fig. 3: Close-up of the place 'Macedonia' in *Pleiades* and *Trismegistos Places*, highlighting the attributes name, location, and place type.

Finally, places are not fixed entities, but exhibit evolving boundaries and shifting mental representations. At present, gazetteers lack a unified approach to managing entity granularity. In general, *Pleiades* adopts a more fine-grained approach. For example, *Pleiades* contains five distinct 'Macedonia' entities (Fig. 3): 'Macedonia (region)' (= Pleiades 491656), which captures the geo-physical aspect of the place, and four other entries which correspond to distinct administrative and political phases of Macedonia in different historical periods, such as 'Macedonia (Archaic and Classical kingdom)' (= Pleiades 668537581), 'Macedonia (Hellenistic kingdom)' (= Pleiades 991253193), 'Macedonia IV' (= Pleiades 726728771), and 'Macedonia (Roman province)' (= Pleiades 981531). Some of these are connected to each other through pre-defined relationships: for instance, 'Macedonia (Hellenistic kingdom)' (= Pleiades 991253193) is associated with 'Macedonia (Archaic and Classical kingdom)' (= Pleiades 668537581) through the relation 'succeeds', which indicates temporal succession.[39] By contrast, *Trismegistos* generally provides a single entry per place. In this example, *Trismegistos* provides one entity for Macedonia (= TMGeo 1279). It is labelled 'region; provincia' and corresponds to ancient Macedonia in a broader sense, emphasising its conceptual continuity over fragmentation. As a result, in terms of gazetteer alignment, 'Macedonia' (= TMGeo 1279) is mapped to two distinct *Pleiades* entities: 'Macedonia (region)' (= Pleiades 491656) and 'Macedonia (Roman province)' (= Pleiades 981531) (Fig. 3). To codify the partial conceptual overlap, *Trismegistos* uses the 'closeMatch' link following the best practices outlined by Simon et al. (2016) and Grossner / Mostern (2021). Still, in cases of partial alignment like this one, entities are not fully interchangeable (e.g. TMGeo 1279 and Pleiades 981531), and additional filtering, such as the application of temporal constraints, is required to prevent inconsistencies. Regarding semantic annotation, no established criteria exist for deciding

39 *Pleiades* represents place relations using pre-defined links to other places, following a controlled vocabulary (https://pleiades.stoa.org/vocabularies/relationship-types).

whether to use a single place identifier or multiple fine-grained identifiers and, importantly, the implications of this methodological choice remain largely unexplored.[40]

Another crucial aspect concerns the data architecture connecting the gazetteer with the annotated text. In particular, the granularity with which annotations are anchored within the text – depending on the annotation tool, the input data format, and the expected output – determines whether the annotated word(s) can be unambiguously identified. To illustrate how different projects handle annotation anchoring, I compare three annotations of 'Macedonia' extracted from *Trismegistos GeoRef*, the *Digital Periegesis*, and *MANTO*, created using FileMaker, Recogito and NodeGoat respectively (Fig. 4). In *Trismegistos GeoRef* and the *Digital Periegesis*, annotations receive an identifier (Fig. 4, in purple). For instance, 'TMGeoRef 281432' identifies the annotated piece of text 'ad … Macedoniam'. The annotation is associated with the relevant place ('Macedonia' = TMGeo 1279) and the work in which it occurs (in this case, Pliny's *Naturalis historia* = TMAuthorwork 286; Fig. 4, in blue). A string value specifies the textual passage where the annotation occurs, usually at the paragraph level. In the example, '4, 01, 03' indicates that the annotation occurs in book 4, paragraph 1,3. While common, this type of reference is relatively coarse-grained and can introduce ambiguity: if the same place name appears multiple times within a paragraph, indices are required to distinguish each occurrence. In the *Digital Periegesis*, annotations receive a 'Recogito Link UUID', which identifies the annotated string through the range of character indices it occupies within the text (Fig. 4, 'Μακεδονία' = 'DigitalPeriegesis 3614edc8df3f'). The character indices are automatically assigned by the annotation platform (here, Recogito) based on the selected textual span.[41] Other projects, such as *MANTO*, do not provide annotation identifiers. Instead, place identifiers (e.g. 'Macedonia' = MANTO 10267703) are connected directly to the textual passage in which they are attested (in the example, 'Strabo 7 fr. 7a Radt').

40 For a recent discussion, see also Kiesling et al. (2025), 26.

41 While, in principle, span-based annotation schemes can support both non-consecutive (e.g. 'mare … Aegaeum') and nested ('e.g. aedes Iovis Optimi Maximi Capitolina') entities, *Recogito* does not natively provide this functionality, which can be achieved only by creating a relational link between the separate spans.

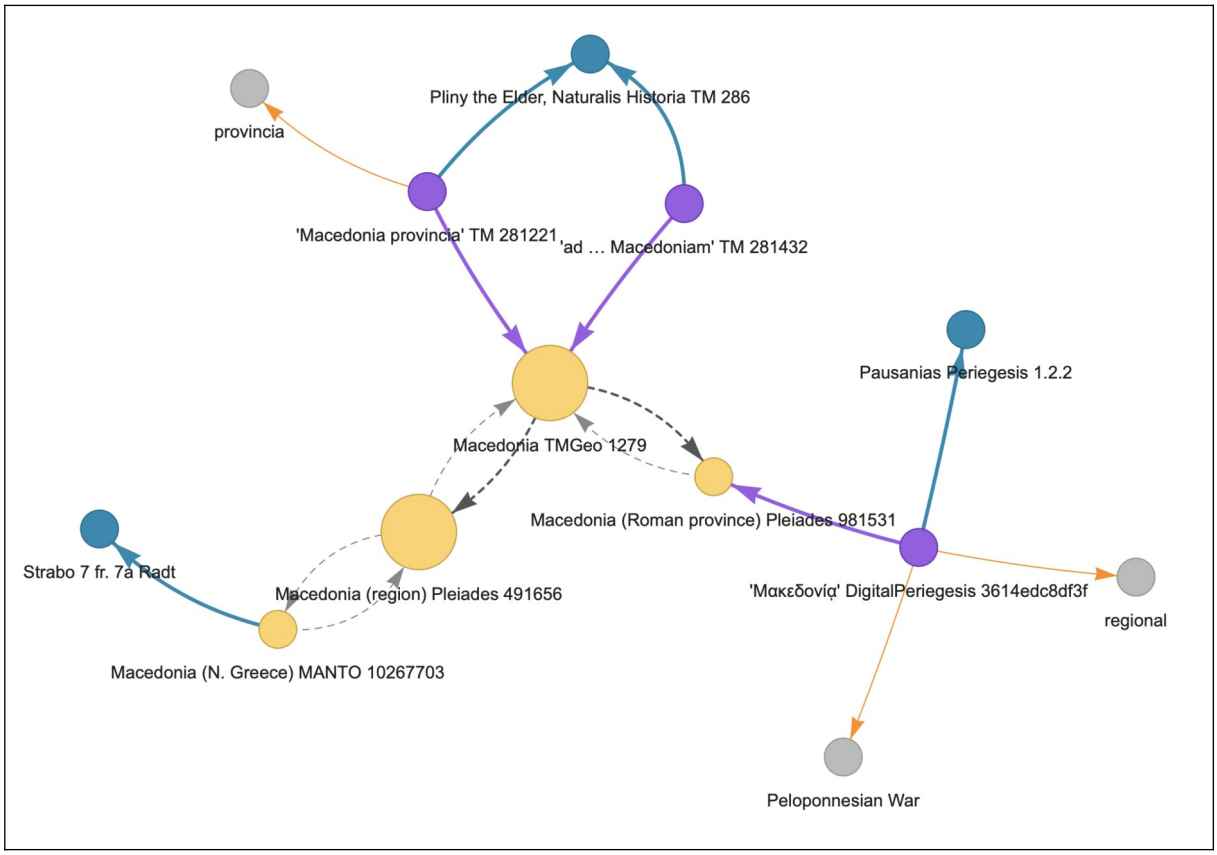

Fig. 4: Network visualisation of the linking systems between individual gazetteers, *Trismegistos GeoRef*, *MANTO* and the *Digital Periegesis*.

Finally, annotations can receive additional tags. These typically capture contextual information that is not recorded in the gazetteer entry, or qualify the alignment between attestation and place. *Trismegistos GeoRef*, for instance, annotates the geographic term qualifying a place, when explicitly mentioned in the text source. In the example, the attestation 'Macedonia provincia' (= TMGeoRef 281221) in the *Naturalis historia* receives the geographic label 'provincia' (Fig. 4). In the *Digital Periegesis*, annotations receive a place-type tag and a temporal tag, both assigned on the basis of contextual information.[42] In the example, 'Μακεδονία' is associated with the tags 'regional' and 't-Peloponnesian war', since the annotated passage refers to an episode related to Classical Macedonia.[43] The aligned place, however, is 'Macedonia (Roman province)', a choice possibly intended to signal the tension between the Macedonia evoked by the passage and the one a Pausanias reader would have had in mind.

To sum up, the inspection has shown that modelling ancient places in a digital environment requires negotiating a wide range of conceptual and technical dimensions. While several aspects call for further formalisation (e.g. annotation guidelines, name variants management, place-type terminology), some shared tendencies emerge. Most notably, the use of consistent identifiers and of a defined terminology has become a backbone for data interoperability, with projects progressively adopting a relational data model for semantic annotation.[44] The example of 'Macedonia', furthermore, demonstrates that the linked data model operating both within individual gazetteers and annotation projects functions as a network that structures the complex and stratified semantics of places. Considered as an integrated system, the graph-based structure organises knowledge about places and enables multiple, and at times competing, conceptualisations (e.g. historical stratifications) to coexist. Importantly, this network configuration should not be understood merely as a technical solution. Rather, the adopted data model re-

42 Barker et al. (2023). In the *Digital Periegesis* project, tags are limited to book 1.

43 The passage under inspection is Paus. 1,2,2: τέθαπται δὲ Εὐριπίδης ἐν Μακεδονίᾳ παρὰ τὸν βασιλέα ἐλθὼν Ἀρχέλαον.

44 Broux (2024); Depauw (2024).

flects a structural feature of spatial representation in ancient sources, where places are primarily defined through their relations to other places, entities, and concepts.[45] The graph, therefore, while supporting interoperability, provides a formal framework to visualise and also to analyse the relational features that underpin ancient conceptualisations of place.

In the final part of the paper, I describe the annotation conducted on Pliny the Elder's description of Greece (4,1–74), focusing on the technical solutions implemented to accommodate the text's specificities and account for interpretative decisions. I present the prototype of the platform developed to annotate a pre-tokenised version of the text, with particular attention to the data model adopted. The use of a pre-tokenised version serves to integrate named entity annotation with other layers of semantic analysis (tokenisation, lemmatisation), with the ultimate goal of creating a smart, multi-layered digital version of Pliny's description of Greece.[46] Overall, through the close analysis of selected examples, the discussion aims to demonstrate how semantic annotation, rather than 'resolving' ambiguities, offers a methodological framework to reflect critically on textual interpretation and on Pliny's conceptualisation of Greek places.

4. Pliny the Elder's Greece: the Annotation Workflow

The workflow presented here was developed within the framework of the project *Greek Spaces in Roman Times* which aims to investigate the representation of Greece in book 4 (1–74) of the *Naturalis historia* (1st cent. AD). In Pliny's encyclopedic text, Greece is described, starting at the Acroceraunian mountains in ancient Epirus (modern Albania) and ending at the Hellespont across Greek historical regions and islands.[47] When my project began, two semantic annotations of Pliny's geographical books were already available, both carried out on the English translation. The first one, curated in the context of the *TopostText* project, was integrated into an English-to-Latin annotation projection experiment, as described in Soffiantini (2024). The second one, conducted within *Pliny the Elder's World* project (Tab. 1) based on Turner / Talbert (2022), consisted of the extraction of all place names contained in Pliny's geographical books 3–6. In a .csv file ('pliny_database_ver_2.csv'), each place was associated with a unique identifier, its name in Latin and English translation, the book-chapter reference(s) to the passage(s) in which it occurs, and the corresponding *Pleiades* URI (see also below).[48] More recently, in 2023 *Trismegistos GeoRef* provided an annotation of Pliny's entire work, and in 2025 the *MANTO* project released the annotation limited to entities related to Greek mythology.

Since prior annotations were limited to the English translation, a new manual annotation was undertaken on the Latin text. For this purpose, I used the digital text of the *Naturalis historia* in *Teubner*'s edition available through the *Perseus Digital Library* in the lemmatised, Part-of-Speech tagged, and tokenised version provided by the *Corpus Latin Antiquité et Antiquité Tardive lemmatisé.*[49] The TEI-encoded .xml file was converted into .csv format. Tokens were automatically assigned a unique identifier and associated with the corresponding Canonical Text Services Universal Resource Names (CTS URNs) provided by *Perseus*. The annotation followed the NER guidelines established by Palladino et

45 Barker / Palladino / Gordin (2024); Hawes / Smith (2026).

46 See, as an example, Crane et al. (2026).

47 Vial-Logeay (2024).

48 The database is available at: https://isaw.nyu.edu/research/pliny-the-elder. The geo-referenced data were visualised in a map hosted by the *Ancient World Mapping Center* available at the following link: https://experience.arcgis.com/experience/34c49dbd58984226aa213243f3787ff9/page/Page.

49 Clérice (2021). Although Mayhoff's edition (1906) remains the standard reference text for the *Naturalis historia*, recent scholarship has significantly clarified its complex textual tradition (Reeve [2021]) resulting in new critical editions of book 4 (Zehnacker / Silberman [2017]; Ilyushechkina et al. [2023]), which have been systematically consulted.

al. (2024), to which I refer for further details. As a knowledge base, I opted to re-use the place identifiers assigned within *Pliny the Elder's World* project. Their annotation proved to be highly fine-grained, in line with the purpose of the present study, while remaining interoperable with external resources. The internal identifiers are intended to identify a place as it appears in Pliny's text: for instance, 'Macedonia' (= Pliny the Elder's World 3614) refers to 'Macedonia' as represented in the *Naturalis historia* (see below).

Text table

Token ID	Token
1800300	a
1800301	Megarico
1800302	incipiens
1800303	sinu

Annotation table

Annotation ID	Token ID(s)	Place ID
189	1800301, 1800303	3833
...	...	...
...	...	...

Place table

Place ID	Place name	Pleiades ID
3833	Megaricus Sinus	570469
...	...	...
...	...	...
...	...	...

Fig. 5: Extract of the three resulting tables connected through identifiers. The example refers to the non-consecutive entity Megarico … sinu 'Megaric Bay' at Plin nat. 4,19.

The annotation was conducted in a relational data system for managing tabular data. The overall task consisted of linking the relevant token(s) in the text file ('Text table' in Fig. 5) with the corresponding place identifier in the *Pliny the Elder's World* data sheet ('Place table'), generating a new entry with assigned annotation identifiers ('Annotation table'). In this way, annotated tokens are unambiguously identified within the text. Sentence numbers were automatically assigned based on punctuation marks and manually verified for the section under consideration. The interface was created using the *Streamlit Python* library and leverages the highly structured format of the input file. The text can be visualised at different levels of granularity (sentence/chapter level). The number of the section to annotate (e.g. sentence number) is selected through a pop-up menu (Fig. 6) and, based on the selected text granularity, tokens are automatically displayed as a continuous text.

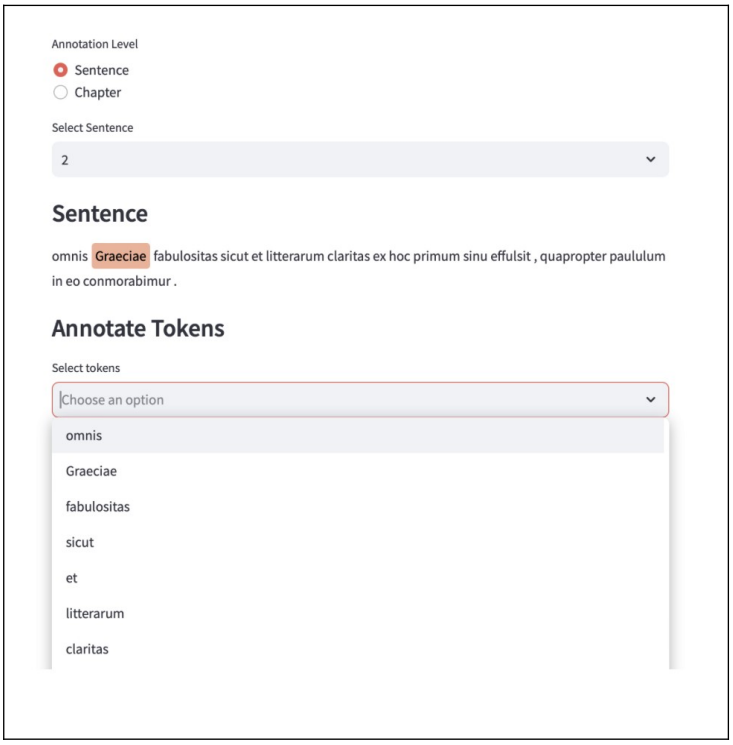

Fig. 6: Interface for selecting the token(s) to annotate.

To annotate an entity, the corresponding token(s) are selected in a pop-up window ('Select tokens' in Fig. 6). The order in which tokens are selected determines the order in which the token identifiers are associated with the annotation identifier. The system thus allows the selection of non-consecutive tokens to annotate discontinuous and nested entities (Fig. 5). This feature proved particularly relevant, since Latin is a language with free word order where tokens corresponding to a single entity may not appear consecutively. Place identifiers are navigated through a separate pop-up interface (Fig. 7). The system also permits the addition of new entries to the 'Place table', which is useful for addressing gazetteer incompleteness or experimenting with granularity levels. Furthermore, comments and tags can be attached directly to the place identifier via the dedicated field. While most annotation platforms restrict tags to the annotation identifier, requiring subsequent entity-level reconciliation, the system provides a complementary tool for managing place-level notes throughout the annotation process.

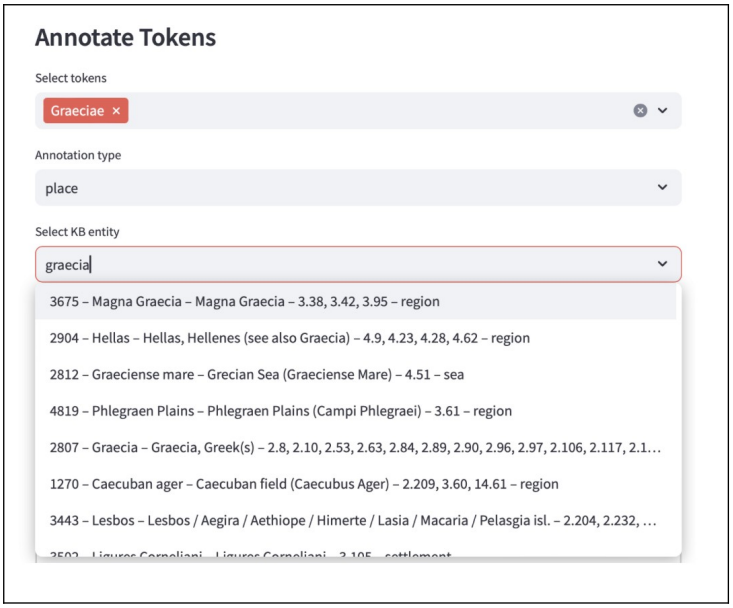

Fig. 7: Interface for the annotation to select the relevant place entry.

In general, the annotated data was the output of an interpretative process which required constant verification throughout the annotation. Choices related to disambiguation, especially in terms of entity granularity, proved to be decisive in the following analytical steps. Moreover, although the *Pliny the Elder's World* project offered a fine-grained annotation as a starting point, in some cases my annotation diverged from its results. To provide additional context, in the rest of the section I examine selected passages from Pliny's description of Greece that are representative of the text's peculiarities encountered during the annotation and summarised in Tab. 2. I provide a detailed commentary on these case studies, discuss how they were previously annotated, and describe how their annotation was handled within the relational data model.

Class	Example(s)	Annotation
Innovative place conceptualisation	*Graeciense mare*	Distinct internal id
Reading variants for place name	*Ten<ed>um, An<tan>drum*	Managed through the relational system aligning variant reading through identifiers (recommended)
Shifting referents of the same place name	*Achaia, Graecia*	Distinct internal id (where more fine-grained distinctions are necessary, distinct identifiers should be arranged within a hierarchical framework anchored to a primary place id)
Name variant	*Emathia* for *Macedonia*	Distinct place id
Distinct places (erroneously) merged	*Same*	Single place id associated with multiple external ids

Tab. 2: Classification of annotation cases in Pliny's description of Greece.

The first example occurs at 4,51, in a passage describing the water masses along the coasts of Greece.[50] According to Pliny, the name of the Aegean Sea derives from a rock, Aex, located between the islands of Tenedus and Chius (both close to Asia Minor), which rises abruptly from the middle of the sea and is visible on the right to those sailing from Achaia (here, the Peloponnese) towards Antandrus (in the Troad; see below).[51] A part of the Aegean Sea is called the Myrtoan, after a small island close to Carystus in Euboea. The Romans, for their part, apply two names to all these waters: the Macedonian Sea where the water washes Macedonia and Thrace, and the Graeciensian Sea where it

50 Plin nat. 4,51 (I reproduce Mayhoff [1906]'s text, followed by Ilyushechkina et al. [2023]): *Aegaeo mari nomen dedit scopulus inter Tenedum et Chium uerius quam insula, Aex nomine a specie caprae, quae ita Graecis appellatur, repente e medio mari exiliens. Cernunt eum ab dextera parte Antandrum nauigantes ab Achaia, dirum ac pestiferum. Aegaei pars Myrtoo datur. Appellatur ab insula parua, quae cernitur Macedoniam a Geraesto petentibus haut procul Euboeae Carysto. Romani omnia haec maria duobus nominibus appellant, Macedonicum quacumque Macedoniam aut Thraciam attingit, Graeciense qua Graeciam adluit. Nam Graeci et Ionium diuidunt in Siculum ac Creticum ab insulis, item Icarium, quod est inter Samum et Myconum. Cetera nomina sinus dedere quod diximus.*

51 On the origin of the name of the Aegean Sea see also Ceccarelli (2012) and Kołoczek (2020).

borders Greece. The Greeks, moreover, divide the Ionian Sea into the Siculan and the Cretan, which are named after the islands, and likewise the Icarian (named after the island of Icaria), located between the islands of Samus and Myconus.[52]

In terms of place conceptualisation, the passage is particularly relevant. In Pliny's account, the open sea appears as a blank space.[53] The Greeks conceptualise the water mass as an overarching sea (the Aegean), defined through reference points on the opposing sides of Greece (Achaia) and Asia Minor (by the locations of Chius, Tenedus, and Antandrus). Both the Aegean and the Myrtoan, moreover, take their name from islands, as do the Siculan, Cretan, and Icarian Seas.[54] The Romans, by contrast, relate the same water masses to two mainland regions: on the one hand Macedonia and Thrace, on the other Greece. While the *Macedonicum mare* is otherwise attested,[55] the toponym *Graeciense mare* has no parallels. As Sallmann (1971) observed, building on Detlefsen and Burr, this innovation can be compared with other sea names attested in the *Naturalis historia* such as the *Aegyptium*[56], the *Asiaticum*[57], and the *Macedonicum*, which derive from adjacent regions.[58] Crucially, the Graeciensian Sea is clearly distinguished from the Aegean, as emphasised by the distinct names, by the explicit contrast between the Greeks and the Romans (*Graecis … Romani … Graeci*), and by the reference points in relation to which the two places are defined. In order to capture this distinction present in the text, in my annotation I assigned two separate identifiers to the 'Aegeum mare' (= Pliny the Elder's World 143) and the 'Graeciense mare' (= Pliny the Elder's World 2812). At present, the entity 'Graeciense mare' is not recorded in either *Pleiades* or *Trismegistos*, but it is present in the *Realencyclopädie* and in the related *Wikidata* entry (= Q119078902). In *Trismegistos*, the corresponding annotation 'Graeciense' (= TMGeoRef 282440) is linked to 'Aegean Sea' (= TMGeo 33222), with 'Graeciense' listed merely among the name variants, which does not correspond to Pliny's text.

The same passage contains another problematic annotation. In Mayhoff's edition, the islands of Tenedus and Antandrus are reference points for the (vaguely) located Aex rock.[59] Tenedus (= Pliny the Elder's World 5927; = Pleiades 550912) is an island located in the northeastern Aegean, north of Mytilene, while Antandrus (= Pliny the Elder's World 444; = Pleiades 550433) is a city on the coast of the Troad. However, the readings *Ten<ed>um* and *An<tan>drum* are philologically restored on the basis of a parallel passage in the geographical work by Solinus (approx. 3rd cent. AD), which rephrases Pliny's text.[60] Pliny's manuscript tradition, by contrast, records the readings *Tenum* and *Andrum,* two islands of the Cyclades located in the middle of the Aegean Sea. Accordingly, Zehnacker / Silberman (2017) and Roller (2022) retain Tenus (= Pliny the Elder's World 5931; = Pleiades 590074) together with Antandrus (possibly because the route between Achaia/Peloponnese and Andrus would stop be-

52 Plin. nat. 4,58. See Zehnacker / Silberman (2017), 227–229; Roller (2022), 214–215.

53 On the conceptualisation of the Aegean Sea in antiquity see also Ceccarelli (2015).

54 The Icarian Sea is also spatially located by reference to two other islands.

55 Liv. 44,11. See also Schmidts / Triantafillidis (2022), 1ff.

56 Plin. nat. 5,54.

57 Plin. nat. 5,102. See Descat (1998).

58 Detlefsen (1886), 256; Burr (1932), 122. Sallmann (1971), 103 and 232.

59 The same etymology appears in Varro (*De ling. lat*. 7,22), who, according to Roller (2022), 215, is Pliny's source. Varro states that goat-shaped rocks/islands called *Aeges* lie in the open sea (*in pelago*), without further geographical specifications. The explanation for the origin of the name of the Aegean from the 'goat island' also appears in a scholium to book 1 of Apollonius Rhodius' *Argonautica* (1,831), on which see Ceccarelli (2012), 33.

60 Sol. 11,1: *Inter Tenedum et Chium, qua Aegaeus sinus panditur, ab dextera Antandrum navigantibus saxum est – hoc enim verius quam insula meruit cognominari; id quoniam visentibus procul caprae simile creditur, quam Graeci aega nuncupant, Aegaeus sinus dictus*. On Solinus' re-use of Pliny see Brodersen (2014b); Brodersen (2015). The information is also reported in Mart. Cap. 6,658, although the transmitted text is corrupt and various emendations have been proposed.

fore crossing the maritime area between Tenus and Chios). Turner and Talbert (2022) adopt the same solution. However, in their digital annotation Antandrus is linked not to the city in the Troad, but to the island of Ceos (= Pliny the Elder's World 1618; = Pleiades 570348), for which Antandrus is recorded as a variant name (= Pliny the Elder's World 445) on the basis of a passage at 4.65. Nonetheless, a closer inspection of the passage reveals that the variant name is attributed to the island of Andrus, not to Ceos.[61] Finally, in *Trismegistos* the annotation 'Antandrum' (= TMGeoRef 282427) is associated with the city in the Troad, while 'inter Tenum … (var. lect.: Tenedum)' (= TMGeoRef 282423) is associated with 'Tenos' (= TMGeo 3639), with the conflicting philological reconstruction noted within the annotation text.

In my annotation, I opted to follow Mayhoff's text, annotating the readings *Tenedum* and *Antandrum*, even if the interpretation of the passage remains debated.[62] Currently, *Trismegistos GeoRef* stands out as the only resource that explicitly addresses the philological problem in this passage, though it merges the two variant readings into a single string. From this point of view, the example points to a rather crucial problem in current annotation practice, namely the lack of a system for representing textual variants in a machine-actionable format. Although ontologies for digital philology engage with the representation of textual variants, this aspect is still seldom implemented in actual annotation practices and deserves further attention.[63] In the present case, for instance, by leveraging the relational structure of the data model, the alternative reading *Tenum* could be assigned its own token identifier, aligned with the entry for *Tenedum* and linked via an annotation identifier to the corresponding place entity (= Pliny the Elder's World 5931; = Pleiades 590074). Finally, the example highlights that annotation identifiers are crucial for interoperability: at present, the annotations in *Pliny the Elder's World* (e.g. the annotation of *Tenus* at 4,51) cannot be aligned with their *Trismegistos* counterparts (e.g. TMGeoRef 282423), since the former lack a distinct identifier.

Another crucial issue concerned the disambiguation of regions which, as seen in the case of *Macedonia* discussed above, cover a wide range of overlapping concepts. In Pliny's description of Greece too, certain places denote notions that are not clearly bounded but rather reflect slightly different conceptualisations. A clear example is provided by terms such as *Achaia*, which are used in a non-fixed way.[64] *Achaia* indicates the historical region in the northern Peloponnese,[65] the Roman province of Achaia,[66]

61 Plin nat. 4,65: *Prima earum Andrus cum oppido abest a Geraesto X, a Ceo XXXVIII. Ipsam Myrsilus Cauron, deinde Antandron cognominatam tradit, Callimachus Lasiam, alii Nonagriam, Hydrusam, Epagrim; patet circuitu LXXXXIII. Ab eadem Andro passus mille et a Delo XV Tenos cum oppido.* According to the commentators on *FGrHist*/*BNJ* 477 F 12 (Myrsilos of Methymna), and on Call. F 580 Pfeiffer, Zehnacker / Silberman (2017), 254 and Ilyushechkina et al. (2023), 279 the pronoun *ipsam* refers to Andrus and not to Ceos, as argued by Turner and Talbert and in the Loeb's translation by Rackham. Winkler / König (2002), 399, Zehnacker / Silberman (2017), 254 and Ilyushechkina et al. (2023), 279 agree on associating the name *Cauros* with the location of Γαύρειον (Xen. Hell. 1,4,22) / Γαύριον (Diod. 13,69) attested on Andros. The perimeter provided is also compatible with that of the island (Zehnacker / Silberman [2017], 255). More generally, Pliny's description in this section of the book follows a consistent structure: introduction of the island, reference points, alternative names, and island dimensions. Ceos, for instance, is introduced at 4.62 with its dimensions, relative position, and alternative names (Cea, Hydrusa). It would be unusual for Pliny to introduce a digression on Ceos at 4,65, with the result of leaving Andros without any alternative names, while Ceos ending up with two separate lists of name variants. On Myrsilos (3rd cent. BCE) see also Jackson (1995). On Callimachus, author of a lost Κτίσεις νήσων καὶ πόλεων καὶ μετονομασίαι and a source for Pliny's account, see now Schorn (2024), 371 with previous bibliography.

62 Winkler / König (2002), 388; Zehnacker / Silberman (2017), 227; Roller (2022), 215.

63 Boschetti / Zemanek (2007).

64 See Zehnacker / Silberman (2017), xi, 96, 124 (*Achaia*), 178 (*Macedonia*).

65 See Plin. nat. 4,1, where Achaia is mentioned alongside Messenia, Laconica, and Argolis.

66 Plin. nat. 4,12.

or more generally the Peloponnese as a whole.[67] Similarly, the term *Graecia* is used in a broader sense[68] and also to indicate mainland Greece as opposed to the Peloponnese.[69] Since it is sometimes difficult to determine precisely what the author is referring to, in these cases I ultimately chose to adopt a single identifier, without distinguishing, for example, between the historical region of Achaia and the Roman province. The approach does not exclude the introduction of more fine-grained annotation, but rather recommends structuring it within a hierarchical model, in which a primary identifier functions as the top-level entity anchoring more specific sub-entities.

Pliny, furthermore, transmits name variants throughout his description, indicating how a place is named now and how it was named in the past. In other cases, he attributes name variants to different sources. As noted above, there is no single best practice for annotating place name variants. In the *Pliny the Elder's World* project, each place is assigned an identifier, even when it appears only as a variant. For instance, Pliny states that Macedonia was formerly named Emathia[70] (despite other sources attested that historical Emathia was a region of Macedonia).[71] In the database, Emathia is assigned its own identifier (= Pliny the Elder's World 2424) and external id (= Pleiades 491553). In the column 'directory_entry_as appears', the notation 'Emathia = Macedonia' indicates that Emathia is used as a name variant for Macedonia in the text. For the purposes of my research project, I adopted the data model used in *Pliny the Elder's World* project in order to keep variants distinct. However, since the textual notation used in the 'directory_entry_as appears' column may produce inconsistencies, I replaced the name-based equation (e.g. 'Emathia = Macedonia') with the identifiers: in a dedicated column, I recorded the identifier of the place to which the variant refers (here, the id of Macedonia).

The last example I discuss here refers to a place description that appears to have led Pliny (or his source) into some confusion. In 4,54, Pliny describes the islands off Aetolia. In the open sea lie Cephallania, Zacynthus, Ithaca, Dulichium, Same and Crocyle.[72] Cephallania, of free status, is said to lie 10 miles away from Paxos. Same, though destroyed by the Romans, still has three towns. Moreover, between Same and Achaia is Zacynthus, located 25 miles from the southern part of Cephallania. Although the description appears clear, the passage is considered to contain two errors. First, Zehnacker / Silberman (2017) argued that the distinction between Cephallania and the island of Same is incorrect, as Same is the Homeric name of Cephallania. Second, Pliny confuses the island of Same with the city of Same on the island of Cephallania, which was besieged and sacked by M. Fulvius Nobilior in 189 BC. The episode belongs to the context of the Roman expedition guided by the consul Fulvius Nobilior against the Aetolians,[73] when Nobilior was also charged with conquering Cephallania.[74] The Aetolian city of Ambracia was brutally sacked, as Pliny also recounts in another passage of the work explicitly mentioning Nobilior.[75] The consul then moved against Cephallania where, as Livy states,

67 Zehnacker / Silberman (2017), xi and 124. The use is attested, for instance, in the index of Plin. nat. book 4 (1,35) and at 4,32.

68 Plin. nat. 4,1.

69 Plin. nat. 4,23. See Zehnacker / Silberman (2017), 96.

70 Plin. nat. 4,33: *Macedonia postea CL populorum, duobus incluta regibus quondamque terrarum imperio, Emathia antea dicta.* See also Strab. 7,11.

71 Zehnacker / Silberman (2017), 180. See also Hansen / Nielsen (2004), 798.

72 Plin. nat. 4,54: *Ante eas in alto Cephallania, Zacynthus, utraque libera, Ithaca, Dulichium, Same, Crocyle. A Paxo Cephallania, quondam Melaena dicta, X p. abest, circuitu patet XCIII. Same diruta a Romanis adhuc tamen oppida tria habet. Inter hanc et Achaiam cum oppido magnifica et fertilitate praecipua Zacynthus, aliquando appellata Hyrie, a Cephallaniae meridiana parte XXV abest.*

73 Warrior (1988). See also Cavallero (2019) with previous bibliography.

74 Liv. 37,50.

75 Plin. nat. 35,66. See Lo Monaco (2019) with previous bibliography.

while the other cities surrendered out of fear, the city of Same revolted and was besieged for four months.[76]

According to Roller (2022), in Pliny's passage it is uncertain whether the toponym Same consistently designates the island or the town. If the latter, Pliny's assertion that Same still has three towns (*adhuc tamen oppida tria habet*) might rather refer to the city's surviving neighbourhoods. According to Zehnacker / Silberman (2017), instead, Pliny is indicating the other cities of Cephallania which, according to Livy, surrendered to Nobilior without resistance and, according to Strabo, were still in existence, unlike the city of Same.[77]

It seems that in both occurrences Pliny had an island in mind: he places Same within a list of islands lying in the open sea alongside Zacynthus and Ithaca, attributes three towns to it, and uses it together with Achaia as a reference point for locating Zacynthus. In this sense, he appears to have erroneously transferred to the island the destruction suffered by the city on Cephallania. However, the conclusion of Zehnacker / Silberman (2017), according to which Pliny was wrong to distinguish Cephallania from the island of Same, should be reconsidered. Same island is widely attested independently, since its appearance in the *Odyssey* alongside Doulichion, Zakynthos, and Ithaca.[78] Moreover, the group of islands composed by Zakynthos, Doulichium, and Same, the same appearing in Pliny's passage, occurs also elsewhere, testifying to a literary tradition.[79] By contrast, the identification of Homeric Same with Cephalonia reflects a later interpretation, as reported by Strabo, who also notes that Cephallania, never explicitly mentioned by Homer, was identified by some with Doulichion.[80] As a result of this complex picture, modern annotations vary depending on the aspect prioritised: in *Pleiades* both occurrences are linked to the city of Same on Cephallania (= Pleiades 531093), whereas in *Trismegistos* and *MANTO* they are associated with the Homeric island ('Same [island]' = TMGeo 64289; 'Same (island)' = MANTO 9364183). In my annotation, I also opted to link both occurrences to a single entity (= Pliny the Elder's World 5278), and yet to associate it with the identifiers of both the city and the island, in order to flag the overlap of the two in Pliny's text and its debated interpretation.

76 Liv. 38,28–29.

77 Strab. 10,2,13.

78 Hom. Od. 1,246: Δουλιχίῳ τε Σάμῃ τε καὶ ὑλήεντι Ζακύνθῳ; 16,123.

79 Verg. Aen. 3,270–271: *iam medio apparet fluctu nemorosa Zacynthos, Dulichiumque Sameque et Neritos ardua saxis.*

80 Strab. 10,2,14.

5. Conclusions

This paper has offered an overview of current practices in the geo-semantic annotation of ancient sources, tracing the main lines of development of the field since its pioneering phase and highlighting a number of issues that remain open. After surveying the growing landscape of geo-referencing projects for ancient Greek and Latin texts, the discussion turned to the digital modelling of place knowledge, comparing the ontological frameworks of two major gazetteers, *Pleiades* and *Trismegistos* Places. The analysis showed that, while significant variation persists in how places are modelled with direct consequences for annotation practice, the use of consistent identifiers and linked data infrastructure is increasingly establishing itself as a shared backbone for interoperability. The paper then described the annotation workflow developed for Pliny the Elder's description of Greece in book 4, demonstrating how a relational data model was adopted as the underlying data structure for the textual annotation and offers technical solutions to digitally manage the specific challenges posed by the text. Through the close analysis of selected case studies, the discussion has illustrated concrete instances of the complexity raised by the annotation of places in ancient texts, ultimately arguing that geo-semantic annotation is an interpretative practice deeply embedded in historical and philological analysis.

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