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### Article

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## RESOURCES

# MEMOR: A database of archeological human remains collections from Flanders, Belgium

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## Abstract

The aim of this article is to describe a newly created open access database of archeological human remains collections from Flanders, Belgium. The MEMOR database ([www.memor.be](http://www.memor.be)) was created to provide an overview of the current practices of loans, reburial, and the research potential of human skeletons from archeological sites currently stored in Flanders. In addition, the project aimed to provide a legal and ethical framework for the handling of human remains and was created around stakeholder involvement from anthropologists, geneticists, contract archeologists, the local, regional and national government agencies, local and national government, universities, and representatives of the major religions. The project has resulted in the creation of a rich database with many collections available for study. The database was created using the open-source Arches data management platform that is freely available for organizations worldwide to configure in accordance with their individual needs and without restrictions on its use. Each collection is linked to information about the excavation and the site the remains originate from, its size and time period. In addition, a research potential tab reveals whether any analyses were performed, and whether excavation notes are available with the assemblage. The database currently contains 742 collections, ranging in size from 1 to over 1000 individuals. New collections will continue to be added when new assemblages are excavated and studied. The database can also be expanded to include human remains collections from other regions and other material categories, such as archaeozoological collections.

## KEYWORDS

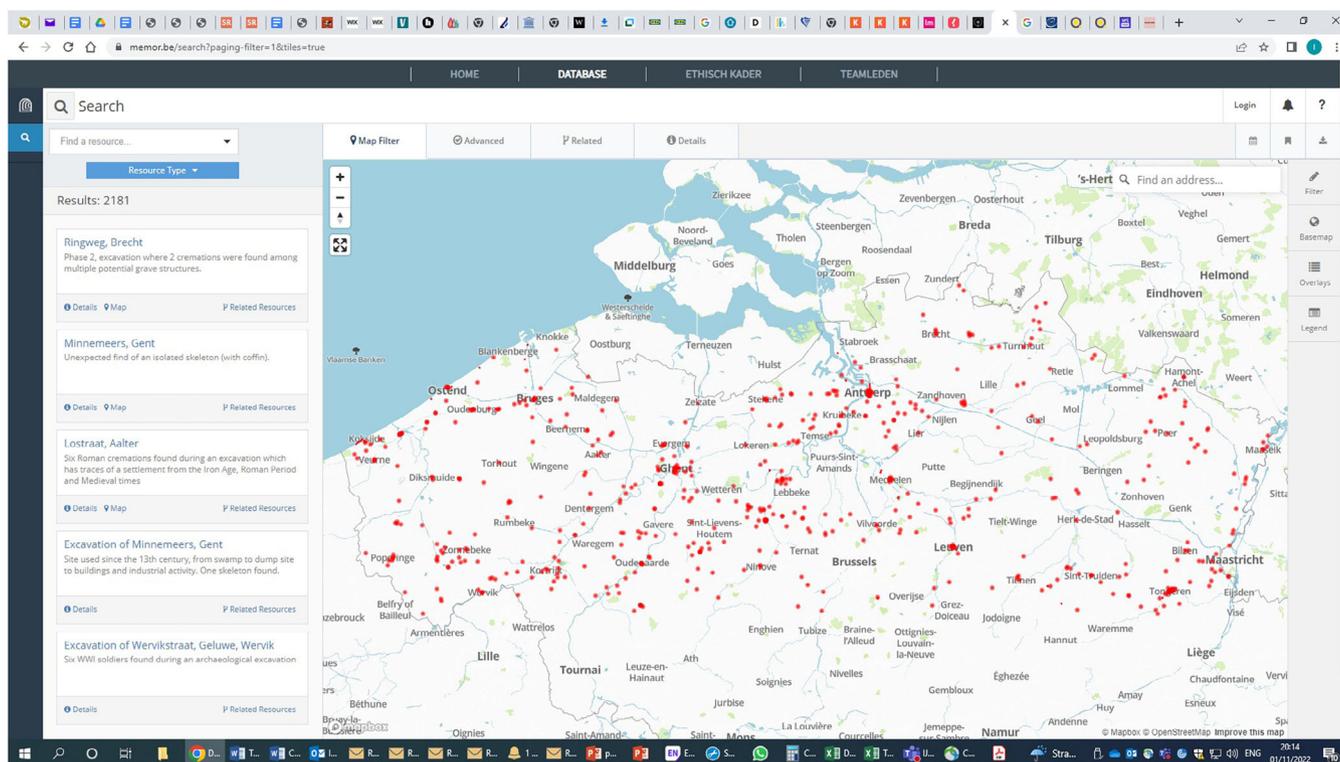
curation, Europe, Flanders, multiperiod, skeletal collections

Since the Valetta Convention (1992) (Europe, 1992), guidance on the excavation of human remains has been standardized across Europe (Council of Europe Treaty Series no. 143) (Europe, 1992). The

convention also states that when human remains need to be excavated they must be cared for, made accessible for scientists, and be the subject of a basic descriptive analysis prior to either storage or

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**FIGURE 1** The MEMOR database showing the sites with human remains collections from Flanders using the Arches platform.

reburial. Since the implementation of legislation in Flanders (Belgium) following the Valetta Convention, a large number of excavations have been carried out, often due to town planning applications for the redevelopment of city and town squares, the construction of underground parking (e.g., Van de Vijver et al., 2018), or more recently the separation of the sewage system (e.g., Schryvers et al., 2023). This has resulted in frequent excavations of squares and streets surrounding churches, many of which hold pre-1800 AD Christian cemeteries. Although very few guidelines around the excavation, storage, display and disposal exist (Ervynck, 2018; Quintelier et al., 2011), the Flemish Heritage Agency (<https://www.onroerendergoed.be/>) has provided guidelines of good practice for the excavation and study of human remains (Ervynck, 2018), but until now there was no overview of existing human remains collections, their research potential, nor their current storage conditions.

The MEMOR project set out to create a database of archeological human remains collections and to set up an ethical and legal framework for the handling of human remains after their excavation in Flanders, Belgium. Here, we focus on the database which will be a useful resource for those studying human remains. The database was created using Arches (Myers et al., 2016), an open source data management platform that was developed for the cultural heritage sector by the Getty Conservation Institute and World Monuments Fund ([archesproject.org](http://archesproject.org)) (Myers et al., 2016). It allows organizations to install, configure, and extend the platform in accordance with their individual needs but also promotes interoperability and sustainable data practices. It uses a CIDOC Conceptual Reference Model

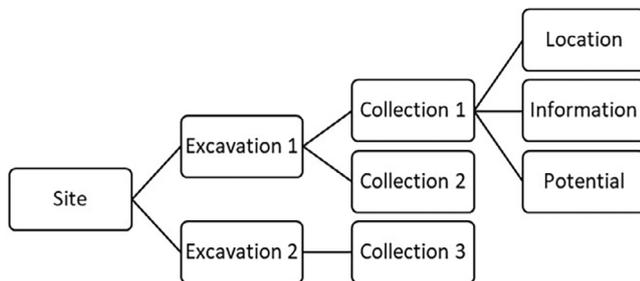
(CIDOC-CRM) model and definitions list (CIDOC n.d.). The CRM is an ontology for cultural heritage developed since 1996 by the CRM Special Interest Group of the International Committee for Documentation (CIDOC) of the International Council of Museums (ICOM).

The CIDOC Conceptual Reference Model (CRM) is a theoretical and practical tool that allows for the integration of information in the field of cultural heritage. Because cultural heritage is so diverse and researchers, administrators and the public often ask complex and diverse questions, it facilitates a shared ontology across diverse datasets. This is achieved by providing definitions and a structure for describing relationships between cultural heritage datasets. These are then known as form ontologies and allow the integration of data from multiple sources into different software packages. By using the CIDOC CRM we promote a shared understanding of cultural heritage information by using a common language. The CIDOC CRM has been developed for over 20 years and is recognized as an official ISO standard. The MEMOR project uses the CIDOC-CRM model and definitions list and uses it to define the relationship between sites, excavations, and collection.

The aim of this project was not to provide individual data for each skeleton or even detailed collections information, but instead provide information on the site, storage conditions, and research potential of the collections. In addition, the objective was to create the database in such a way that it can be expanded to include other heritage categories such as pottery or animal remains. The database starts from the main unit “the site” which is mapped in the database using Cartesian coordinates (Figure 1). Information on collections was gathered through a survey sent to curators of depositories and archeological commercial units

**TABLE 1** Definitions of time periods used in the MEMOR database.

Broad period	Detailed period	Dates
Prehistory	Paleolithic	1,3 Mya–ca. 12,000 BC
	Mesolithic	Ca. 9500 BC–ca. 4000 C
	Neolithic	Ca. 5250 BC–ca. 2000 BC
Metal Ages	Bronze Age	Ca. 2000 BC–ca. 800 BC
	Iron Age	Ca. 750 BC–ca. 57 BC
Roman Age	Roman Age	Ca. 57 BC–406 AD
Middle Ages (5th–15thC)	Early Middle Ages	Ca. 5th–9th C (Carolingian and Merovingian)
	High Middle Ages	10th–12th C
	Late Middle Ages	13th–15th C
Modern times (Nieuwe en Nieuwste tijd)	Modern times	16th–19th C
	WO	World Wars I and II
	20th Century	20th C
Unknown		

**FIGURE 2** The MEMOR database structure. The main unit is the site represented on the map by coordinates. Each excavation is linked to one or more collections. For each collection data is entered on the current storage location, information about storage, period, and number of individuals; as well as research potential which summarizes the availability of associated information.

and data in published reports and articles. The site is briefly described. For each site, there are one or more excavation campaigns resulting in the creation of one or more human remains collections. The dates of the excavation, who conducted the excavation and general information on what was excavated are recorded here, such as type of site and time period (Table 1). Multiple collections can result from a single excavation, for example, when remains from different time periods are stored in different repositories (Figure 2). For each human remains collection, the current location, information about storage, and the number of individuals are entered in the database, if known. Furthermore, the research potential, summarizing the availability of the associated information such as excavation notes and recording sheets, is indicated. For each resource (site, excavation, and collection) the database collects resource-specific

information. The information is searchable in the Arches database on the project website ([www.memor.be](http://www.memor.be)) using keywords or an advanced search option that lets a user select more specific data, such as collection size.

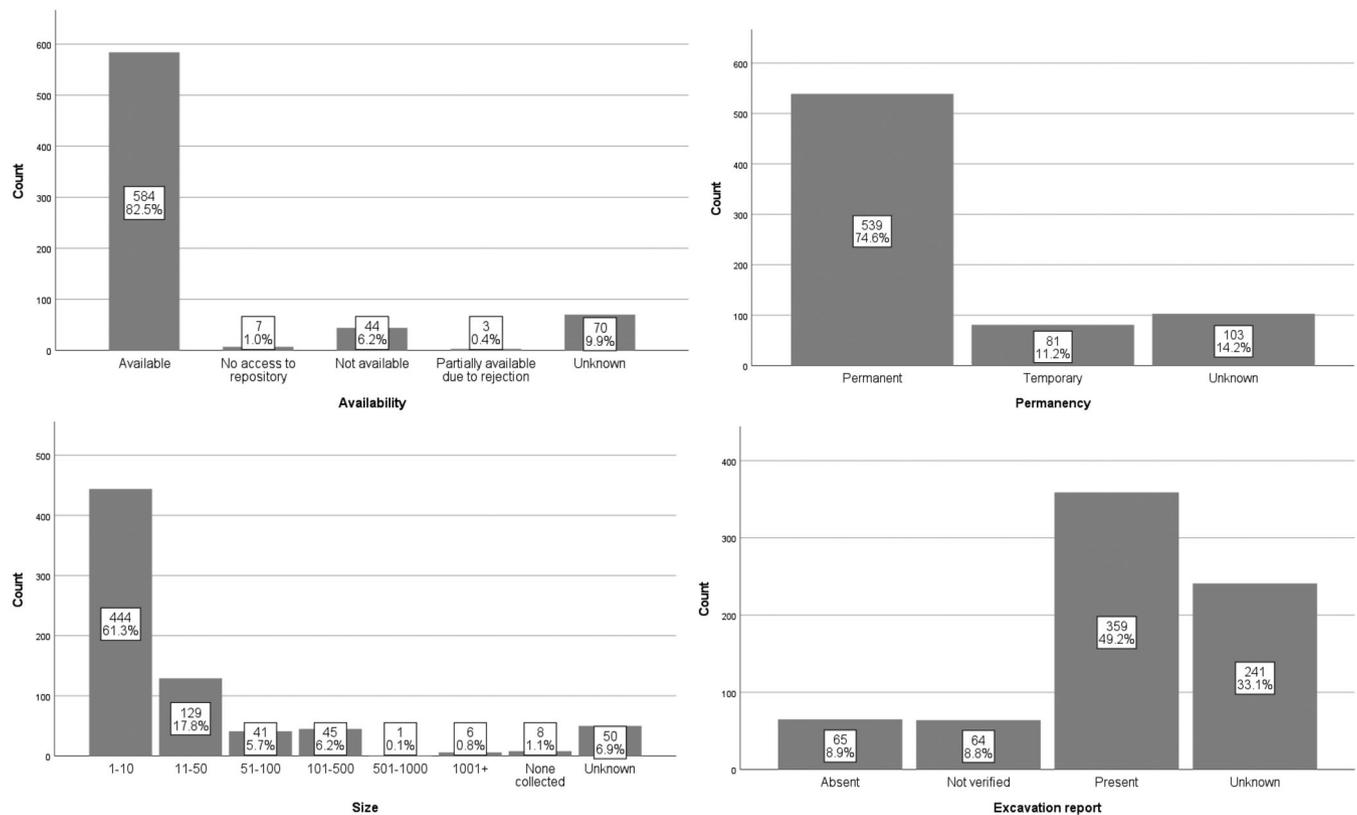
From April 2021 until June 2022, information for 742 human remains collections were already entered into the database. These collections were created from the late 19th century until now and are stored in various national or regional public institutions as well as private repositories and universities. Of the 742 collections, 584 are currently available for research. Unfortunately, the availability of 70 collections (~10%) is unknown and 3 (collections were deaccessioned—it is unknown whether they were already reburied or were not collected during the excavation) (Figure 3a). Some collections are not yet available because they are still stored in the temporary storage facilities of the archeological companies that excavated them or with researchers and await permanent deposit in a regional repository ( $n = 81$ , 11%). Despite the fact that access is mandatory for recently excavated collections, some collections may be stored with private persons, in which case it is difficult to assess whether these will become accessible at some point, so their permanency is also unknown (Figure 3b).

The collections originate from different time periods and these are based on the calendar dates used in Belgian history (Table 2). Currently the best-represented period in the database is the Roman Period ( $n = 245$ , 33%) due to the many single cremation deposits. There are 242 medieval collections (33%), of which the majority are late Medieval. Only four Neolithic collections were entered and these are all cremation burials. Another 62 cremation collections date to the Iron Ages (8%). Due to the acidity of the Flemish soil, prehistoric skeletal material is rarely preserved (De Reu, 2012), unless the remains are cremated. About 20 collections date to the World Wars (3%).

The size of the collections varies greatly (Figure 3c). The majority is small and have between 1 and 10 individuals ( $n = 444$ , 61%). A total of 129 collections consist of 10–15 individuals (18%). Most larger collections (>100 individuals) date to the late and post-Medieval period (post 16th Century). There are some very large collections (Table 2) with over 1000 individuals that are available for research. The largest so far is the collection from Sint-Rombout's churchyard in Mechelen with 4158 individuals (Van de Vijver et al., 2018). A few older collections are still stored by skeletal element, although recently collected material is primarily preserved by individual or archeological context. The storage type (where known) is recorded in the database so researchers can make informed decisions by whether they can include collections stored by skeletal element considering the individuals are not necessarily identifiable.

Aside from the characteristics of the collections, the presence of documentation regarding each assemblage was recorded (Figure 3d). Records are of crucial importance when skeletal remains are stored. Therefore, for each collection the availability of an excavation report, skeleton recording sheets, basic assessment, and follow-up research was recorded. Where the information was available it was also noted if abdominal soil samples or samples for biochemical analyses were collected.

The MEMOR database is a unique resource that will continue to grow, input of information on collections from both recent and older collections is ongoing. Currently, the database is being expanded to



**FIGURE 3** Summary statistics of the database: top left. Availability for research; top right. Permanency of the current repository; bottom left. Size of the collections; bottom right. Availability of the excavation report.

**TABLE 2** The largest collections in the database with their current location.

Collection	(Estimated) number of individuals	Current location
Abdij Ten Duinen, Koksijde (1949–1987)	1300–1400 inhumations	Royal Belgian Institute of Natural Sciences (and a small sample in the Museum Ten Duinen, Koksijde)
De Meersen, Sint-Niklaaskerk, Sint-Jansstraat, Ieper (Ypres)	1075 inhumations	Cultural Heritage Depot of the Flemish Heritage Agency (in the future the Cultural Heritage Depot of Depotyze, Ieper (Ypres)).
Grijpenveld, Tienen	1000+ cremations	City depot Tienen (IOED Portiva)
Groenmarkt, Sint-Truiden	3077 inhumations	Cultural Heritage Depot GAZO, Sint-Truiden
Onze-Lieve-Vrouwekathedraal, Antwerpen (1987–1989)	1076 individuals	Cultural Heritage Depot, City of Antwerp
Sint-Baafskathedraal, Sint-Baafsplein, Gent	1019+ individuals	Cultural Heritage Depot De Zwarte Doos, City of Gent
Sint-Romboutskerkhof, Mechelen (2009–2011)	4158 individuals	Cultural Heritage Depot Rato, City of Mechelen

Note: Some of these collections are represented by multiple excavations in the database as they were formed from multiple excavations.

include zooarchaeological collections from Flanders. The project has increased awareness with the curators and archeological commercial units to digitize and make available the documentation vital for the study of these collections. Curators of human remains collections are encouraged to enter new and existing collections into the database. Curators can request a username and password via the website. The website is also where we have made the database definitions,

instructions and an instruction video available (<https://www.memor.be/data-invoeren>). All new entries will be immediately visible but marked as “provisional” until they are periodically checked and approved by one of the MEMOR team (cf. the authors). We rely on the curators of collection to enter the data of the collections they are responsible for and have the authority to share the existence of. Therefore, new users will be vetted for authenticity required to

declare that they have the consent of the owners of the collections to enter data as sharing information in an open access database without consent could have serious ethical ramifications. Here, we think specifically of war victims or very recently deceased.

If collections are improperly stored, excavation archives are not curated, or collections are not studied because their existence is unknown, then these human remains should perhaps not be collected or stored at all. The MEMOR database has identified and recorded an extremely rich resource for anthropologists and scientists of other disciplines to carry out their research and to increase our understanding of the past.

#### AUTHOR CONTRIBUTIONS

**Isabelle De Groote:** Conceptualization (equal); formal analysis (equal); funding acquisition (equal); investigation (equal); methodology (equal); project administration (equal); resources (equal); validation (equal); visualization (equal); writing – original draft (equal). **Katrien Van De Vijver:** Conceptualization (equal); data curation (equal); funding acquisition (equal); investigation (equal); methodology (equal); resources (equal); writing – review and editing (equal). **Barbara Veselka:** Conceptualization (equal); data curation (equal); funding acquisition (equal); methodology (equal); resources (equal); writing – review and editing (equal). **Pieterjan De Potter:** Conceptualization (equal); data curation (equal); funding acquisition (equal); software (lead). **Liesbeth Massagé:** Conceptualization (equal); data curation (equal); funding acquisition (equal); methodology (equal); writing – review and editing (equal). **Lien Van der Dooren:** Data curation (equal); investigation (equal); writing – review and editing (equal). **Jeroen Vandendorre:** Conceptualization (equal); funding acquisition (equal); investigation (equal); project administration (equal); writing – review and editing (equal). **Maarten Larmuseau:** Conceptualization (equal); formal analysis (equal); funding acquisition (equal); writing – review and editing (equal). **Jonas Danckers:** Conceptualization (equal); data curation (equal); formal analysis (equal); funding acquisition (equal); resources (equal); writing – review and editing (equal). **Bart Robberechts:** Conceptualization (equal); data curation (equal); funding acquisition (equal); resources (equal); writing – review and editing (equal).

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#### CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

#### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in the MEMOR database at [www.memor.be](http://www.memor.be).

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