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SPY CAVE

125 years of multidisciplinary research
at the Betche aux Rotches
(Jemeppe-sur-Sambre, Province of Namur, Belgium)

Edited by Hélène ROUGIER & Patrick SEMAL

Volume 1

2013

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INTRODUCTION

Patrick SEMAL & Anne HAUZEUR
(Coordinators)

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CHAPTER II

HISTORY OF EXCAVATIONS, DISCOVERIES AND COLLECTIONS

**Patrick SEMAL, Anne HAUZEUR, Michel TOUSSAINT, Cécile JUNGELS,
Stéphane PIRSON, Laurence CAMMAERT & Philippe PIRSON**

Abstract

Spy cave, also known as the Betche aux Rotches cave, is one of the most famous Palaeolithic sites in Belgium. Excavated on numerous occasions beginning in 1879, the remains of two adult Neandertals were discovered in 1886. For the first time in the history of palaeoanthropology, human fossils were found in a stratigraphic context associated with rich archaeological material including the remains of extinct megafauna. The history of work at Spy presented here is based on a review of publications concerning the various excavations, the Lohest and Vercheval-De Puydt family archives, as well as inventories and archives possessed by the Royal Belgian Institute of Natural Sciences and the Royal Museums of Art and History. This archival review clarifies several aspects concerning the discovery of the two Neandertal specimens, particularly in light of new studies concerning the Spy material which is now dispersed amongst several public and private collections.

LOCATION

The cave of Betche aux Rotches (for a toponymic history see Pirson, this volume: chapter III), more commonly referred to simply as Spy, is located on the *commune* of Spy in the municipality of Jemeppe-sur-Sambre (prov. of Namur), 1.2 km south-east of the Onoz-Spy railway station and about 18 metres above the present level of the Orneau River, a tributary of the Sambre (De Puydt & Lohest, 1886; Figure 1). It opens to the south-west in a carboniferous limestone massif below a vast plateau (Pirson *et al.*, this volume: chapter V).

HISTORICAL CONTEXT OF THE DISCOVERY

The 1886 discovery of two Neandertal skeletons in the terrace sediments of Spy cave was a major milestone in the history of palaeoanthropology (Leguebe, 1986). In the eyes of the discoverers, followed rapidly by the majority of the international scientific community, the reliable stratigraphic context of the two individuals in a level containing Mousterian lithic material provided evidence for the existence of prehistoric fossil humans whose morphology differed from that of anatomically modern humans (De Puydt &

Lohest, 1887). During the first few decades of the 19th century, several pioneering researchers had already noted the presence of human remains contemporaneous with extinct megafauna such as mammoth or cave bear; notably Paul Tournal (1829) in Southern France or Philippe-Charles Schmerling (1833-1834) following the discovery of the famous Engis cave fossils from the middle Meuse Basin.

At a time when the very notion of human fossils was still a matter of debate, differences between anatomically modern humans and their perceived ancestors were not clear-cut given the lack of convincing evidence such as stratified bones and a sufficiently large comparative sample allowing fossil and modern humans to be clearly distinguished. A quarter of a century later in 1856, the skeleton found by quarry workers at Feldhofer cave in the eponymous Neandertal Valley near Düsseldorf (North Rhine-Westphalia, Germany; Fuhlrott, 1859), considered by some to differ from modern humans, was far from being unanimously accepted as such; notable alternative interpretations included an individual who suffered from rickets or a Cossack war victim (Mayer, 1864; Virchow, 1872). A decade later, the discovery of a mandible from the cave of La Naulette in the Lesse Valley (Hulsonniaux-Houyet, prov. of Namur; Dupont, 1866),

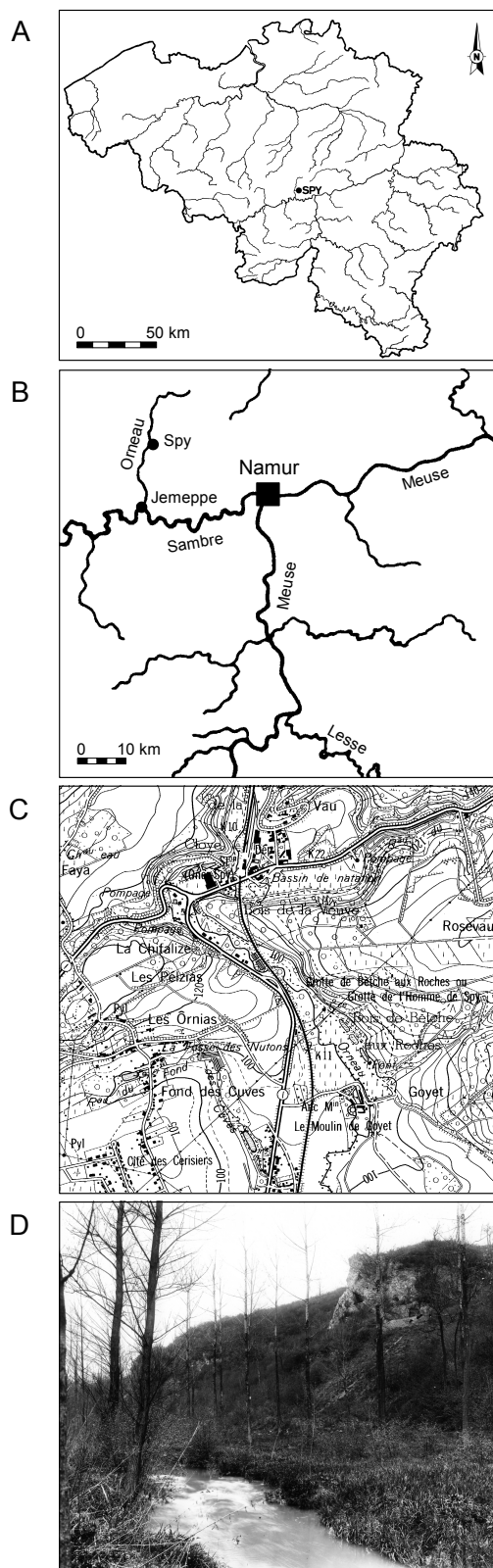


Figure 1. Location of Spy cave. A: Location on a map of Belgium; B: Detail of the map; C: Topographic map; D: S-E view from the Orneau River. Photo by Rahir (1904), IRPA no. 3353b.

only 30 km south-east of Spy, marked a significant step in the history of research into human evolution as Paul Broca, the father of modern French anthropology, considered the mandible the first serious argument supporting Darwin's theory (Broca, 1866: 595).

It was in this evolving, yet generally favourable context for the very notion of fossil humans, that the discoveries at Spy unfolded. The material recovered from the site provided the first definitive evidence for the existence of humans bearing more archaic features than anatomically modern humans. William King proposed that these remains represented a distinct species, *Homo neanderthalensis* (King, 1864), in other words, the Neandertals. The announcement of the Spy fossils at the archaeological congress in Namur on August 17, 1886, fell like a bombshell on the international press and scientific community alike (de Nadaillac, 1886). At the time, several “human races” were recognised to have peopled prehistoric Europe. Following the publication of Fraipont & Lohest's 1887 monograph presenting the Spy finds, ten further skulls described as “Neandertal” or of the “Canstadt race” were acknowledged as being genuine. However, eight were subsequently determined to be anatomically modern humans (Table 1). Finally, several isolated fossil mandibles were also recognised, including examples from the caves of La Naulette (1865), Arcy-sur-Cure (Yonne, France, 1860), and Šipka in Moravia (Štramberk, Czech Republic, 1881; Fraipont & Lohest, 1887; Fraipont, 1895a; Table 1).

ANTHROPOLOGICAL STUDIES OF THE SPY MATERIAL: A BRIEF HISTORY

Since their discovery, the Neandertal bones from Spy have been the subject of numerous anthropological studies. The first works devoted to the Spy Neandertals were those of the palaeontologist Julien Fraipont who wrote the initial publications including the 1887 monograph, which he co-authored with geologist Max Lohest (Fraipont & Lohest, 1887), a preliminary report (Fraipont & Lohest, 1886) and several articles following the publication of the original monograph (Fraipont, 1888, 1891, 1895a, 1895b, 1903).

1700	<i>Canstadt cranium</i>	Germany
1844	<i>Staengenaes skulls and skeletons</i>	Sweden
1844	<i>la Denise skull and infracranial bones</i>	France
1848	Forbes' Quarry cranium	Gibraltar
1856	Neandertal skeleton	Germany
1860	<i>Arcy-sur-Cure mandible</i>	France
1865	<i>Eguisheim cranium</i>	France
1863	<i>Olmo cranium</i>	Italy
1866	La Naulette mandible	Belgium
1868	<i>Clichy cranium</i>	France
1872	<i>Brüx cranium</i>	Czech Republic
1880	Šipka mandible	Czech Republic
1886	Spy skeletons	Belgium
1889	Malarnaud mandible	France
1892	<i>Brünn skeleton</i>	Austria
1895	Fond-de-Forêt femur	Belgium
1899	Krapina	Croatia

Table 1. Fossils related to “Neandertal race” known to J. Fraipont on the occasion of the 1886, 1895a and 1895b publications. In italics: fossils later recognised as anatomically modern; in bold: Neandertal fossils.

The Spy monograph influenced the subsequent publications of Hermann Schaaffhausen concerning the eponymous Neandertal skeleton (Schaaffhausen, 1888: 37), as well as Marcellin Boule's analysis of the La Chapelle-aux-Saints skeleton (Corrèze, France; Boule, 1911-1913). The Spy material also served as a basis for the first reconstruction of the Neandertals (Figure 2).

In 1903, Otto Walkhoff published the first radiographic study of the Spy maxillae and mandibles (Walkhoff, 1903: 391-401). Together with the study of the Krapina fossils by Dragutin Gorjanović-Kramberger (1902), this was the first time imagery techniques were used in the study of human fossils.

However, the main studies focused directly on the Spy fossils were conducted a decade later by Charles Fraipont, notably concerning the talus (Fraipont, 1912, 1913), scapula, and sacrum (Fraipont, 1927). Shortly thereafter, Aleš Hrdlička, who examined the original bones in 1912, 1923 and 1927, proposed a different arrangement

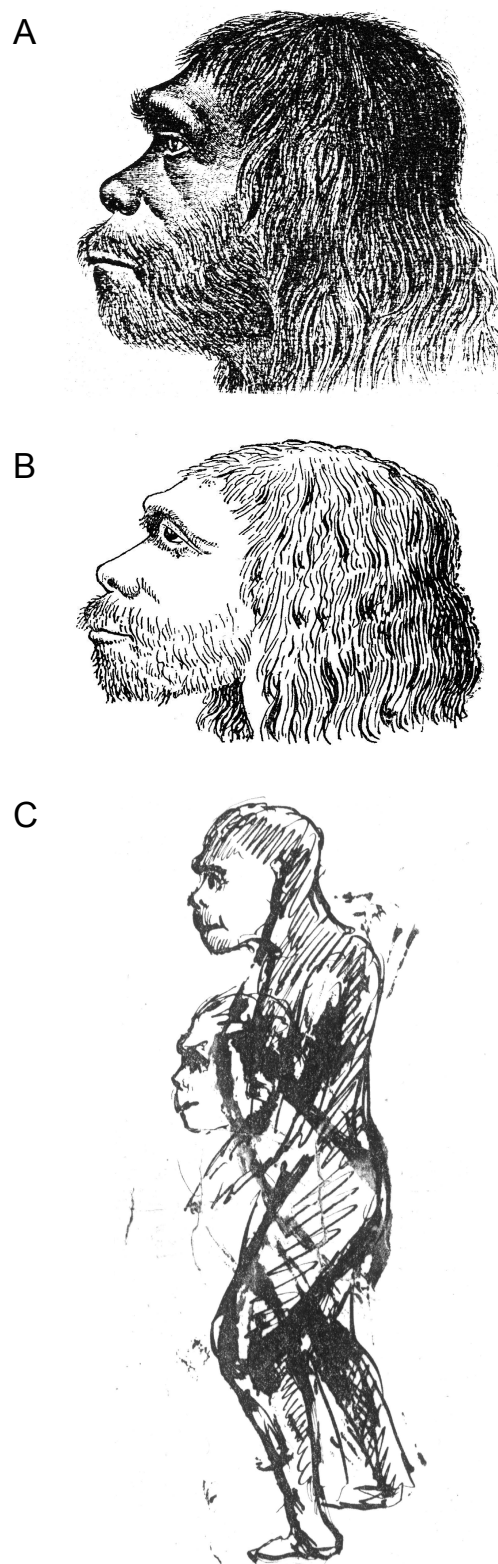


Figure 2. First Neandertal reconstructions inspired by the discoveries made at Spy. A: reconstruction by Schaaffhausen (1888); B: reconstruction by Fraipont (1895b); C: reconstruction by Lohest (undated).

of the remains comprising the two different skeletons (Hrdlička, 1930; Rougier *et al.*, volume 2: chapter XIX).

In the mid-20th century, Santiago Genovés (1954) became interested trying to determine the sex of the Spy Neandertals. From the 1970s onwards, Erik Trinkaus studied multiple aspects of the Spy bones, dedicating several articles to the material, particularly the metatarsals and phalanges (Trinkaus, 1978) as well as the biomechanics of the femur (Trinkaus & Ruff, 1989). Andor Thoma also re-examined issues surrounding the possible transitional position of the Spy fossils (Thoma, 1975a, 1975b). Finally in 1976, one of the first tomographic studies of fossil material was dedicated to the temporal bones from Spy (Hotton *et al.*, 1976).

The Spy Neandertal remains also figure in hundreds of publications relating to the main European and Near Eastern Neandertal fossils, as well in analyses and doctoral dissertations concerning particular anatomical aspects. Furthermore, the Spy fossils are systematically included in comparative analyses of Neandertal specimens. It is impossible to provide a detailed account of the numerous works concerning the Spy material in such a short historiography, such an endeavour would require a full monograph similar to the one recently published concerning the Krapina Neandertals (Frayer, 2006). However, between the appearance of Fraipont & Lohest's volume (1887) and the present monograph, no exhaustive treatment of the Spy collections exists, despite the fact that some 125 years after their discovery the Spy material still represents a major reference collection for the study of the Neandertals.

BRIEF HISTORY OF ARCHAEOLOGICAL INVESTIGATIONS

The purpose of this chapter is not to establish a complete inventory of the numerous studies and hypotheses concerning the various archaeological collections from Spy, rather it aims to expose the richness and complexity of the different industries and cultural attributions (see Pirson *et al.*, this volume: chapter VI, for a complete overview of the archaeological collections and their relation to the site's known stratigraphy).

Although the archaeological material from the 1886 excavations was published by the excavators (e.g. De Puydt & Lohest, 1886), the first three quarters of the 20th century saw very few prehistorians take an active interest in the collection. Abbé Henri Breuil (1907a, 1907b) proposed the first interpretation of the industries from the different levels of the Spy deposits: the lowest level, or "third fauna-bearing level", corresponds to the Mousterian; the intermediate, or "second fauna-bearing level", assigned to the Montaigne-type corresponding to the Middle Aurignacian and the uppermost level attributed to the Trou Magrite-type corresponding to the Late Aurignacian, also referred to as the "Upper Perigordian" (Gravettian). Shortly thereafter, A. Rutot (1911) estimated that there were in fact three Aurignacian levels at Spy (lower, middle and upper), although some researchers attributed the uppermost level to the Solutrean (Claerhout, 1911-1912). In 1912, Breuil identified four facies at Spy: Early Mousterian, Quina Mousterian, Aurignacian and Late Aurignacian (which is in fact, Gravettian). Fairly similar attributions were adopted by H. Delporte (1956), for whom level 1 represented the "Upper Perigordian" (Gravettian) with Font Robert points, level 2 assigned to the Aurignacian and levels 3 and 4 belonging to the Mousterian. Denise de Sonneville-Bordes (1961) later assigned the two Mousterian industries to the Mousterian of Acheulean Tradition and the Quina-Ferrassie type.

At roughly the same time, François Bordes (1959) attributed the Neandertal skeletons to the Quina Mousterian. However, we would have to wait for Marguerite Ulrix-Closset's doctoral thesis (Ulrix-Closset, 1975) followed by those of Marcel Otte (1979), Michel Dewez (1987) and finally Patricia McComb (1989) to have detailed analyses, often including tool counts, of the Middle and Upper Palaeolithic material from the site. These studies confirmed both Delporte's and de Sonneville-Bordes' original interpretations. Most recently, Damien Flas' (2008) doctoral thesis supplied various pieces of information concerning the Lincombian-Ranisian-Jerzmanowician transitional facies which had already been hinted at but never assigned a precise cultural attribution by Marcel Otte (1974, 1979) and John B. Campbell (1980).

HISTORY OF THE EXCAVATIONS

It is sometimes difficult to trace the history of excavations conducted at Spy and several examples have already been published, notably those by de Loë & Rahir (1911), Hrdlička (1930), Ulrix-Closset (1975), Otte (1979), Dewez (1981a), Cahen (1986), Toussaint *et al.* (2001) and Rougier *et al.* (2004). The new history presented here differs from previous examples insofar as it adds new insights from unpublished archives and information to the traditional re-reading of the publications (see also Cammaert, this volume: chapter IV). We also further develop both the description of 1885 and 1886 excavation campaigns, which led to the discovery of the two adult Neandertal skeletons, and the current location of the various collections resulting from research conducted at Spy.

The first excavations (1879-1881)

The first official excavations at the site were conducted by Alfred Rucquoy (1858-1888), a doctor in Namur, amateur archaeologist and collector. As early as August 1879, he began important research at the site (Figure 3) after having secured permission from the owner of the cave, Count Albert de Beaufort. However, in his published report, A. Rucquoy states that he had carried out some preliminary digging a few years earlier (Rucquoy, 1886-1887: 318). Rucquoy was eventually forced to stop his research in 1881 following a disagreement with Count de

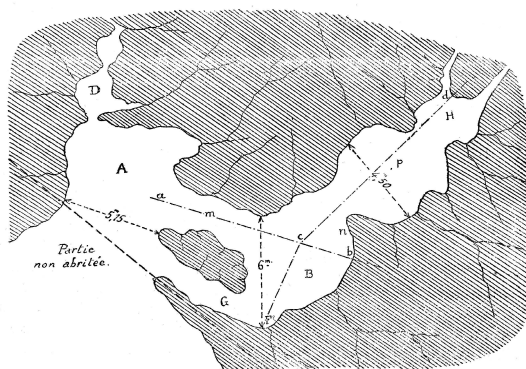


FIG. 1. — Plan de la caverne de Spy.

Figure 3. Plan of Rucquoy's (1886-1887) 1879-1881 excavations.

Beaufort. Although he drew some profiles, Rucquoy did not note the stratigraphic context, nor the position of his discoveries on a plan except for a large *phtanite* (black bedded silicite) handaxe (Royal Belgian Institute of Natural Sciences – RBINS collection: I.G. 5608; Figure 4) that was found in the cave on the surface of the lower level (Rucquoy, 1886-1887: 322). The stratigraphic data available in his publication is imprecise and several remarkable discoveries, such as seven mammoth tusks piled together in the sheltered area of the cave, were largely destroyed during their extraction (Rucquoy, 1886-1887: 324).

As far as we know, no human remains, either Neandertal or anatomically modern, were found during these investigations which exclusively concerned the cave's interior. On the other hand, the archaeological material and fauna collected at the time were of excellent quality (Rucquoy, 1886-1887) and are today part of the RBINS collections thanks to an 1889 donation by the widow of Emile Henricot, an industrial engineer at Court-Saint-Etienne and A. Rucquoy's brother-in-law.

Excavations between 1881 and 1885

It seems that after Rucquoy's excavations, numerous amateur archaeologists conducted further, more or less systematic investigations in the cave. Although nothing was ever published, this work was accurately detailed in a

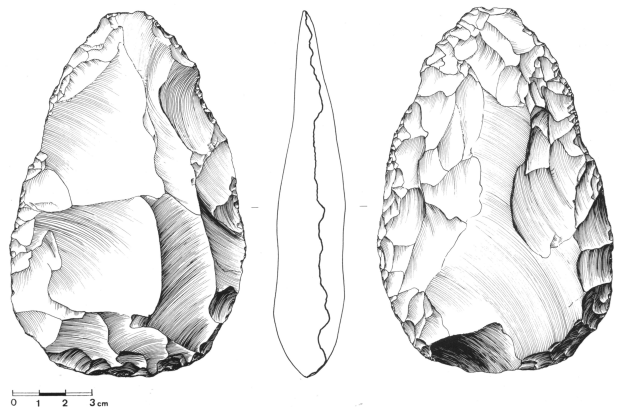


Figure 4. Black *phtanite* handaxe (I.G. 5608). Rucquoy collection, RBINS.

letter sent by Mr. J. Dauvelois to the newspaper *Le Hainaut* and published in *L'Écho de Namur* on October 15, 1886. An unabridged translation of the paragraph concerned (the original French citation is available as a footnote) reads:

“Those who went to the Bèche-aux-Roches in the wake of Rucquoy are too many to cite; let us however mention Mr. Gilson, a teacher at the *Athénée* of Namur, who explored the cave in the company of the children of Mr. Sterpin, notary at Spy; Mr. Gérard of Court-St-Etienne, an archaeologist very well-versed in prehistory; Mr. J.-B. Pérès from Dion-le-Mont; the late Mr. Van Hollebèque, archivist in Brussels. Mr. Louis Stassin of Wavre, a young and quite erudite amateur, explored the same cave from 1880 to 1884 with the help of a miner, Clarembeau-Corbu, and gathered an important collection, the smallest part of which was presented at the exhibition of retrospective arts held in your good city of Mons in 1885, as well as in the catalogue listed under no. 1792, page 120”¹.

Some of these pieces are now to be found in the De Puydt collection of the *Grand Curtius* Museum. The “official” history has forgotten the various excavators who followed A. Rucquoy's exploration of the site.

J. Dauvelois' letter also mentions that around 1872 during the construction of the railway between Gembloux and Tamines,

“[...] the soil of the cave was exploited by the railway workers who used the gravels in their work. This gravel, as well as all the carboniferous limestone walls friable enough to be converted into ballast were removed; the earth was pushed back inside the cave and

today constitutes its floor, while a heap of earthy refuse about 5 metres high was made at the entrance. All this waste contained a huge quantity of animal debris from races which are today extinct or have disappeared from our latitude; most of that debris was then taken away and used as ballast”².

Contrary to J. Dauvelois' controversial assertion, it is doubtful that the exploitation of the cave by the railway workers largely destroyed the site's original stratigraphy. In fact, in the right gallery of the cave A. Rucquoy (1886: 320) identified a superficial, 10 cm thick layer rich in microfauna. Mr. De Pauw, curator of the natural history collections at the *Université libre de Bruxelles*, interpreted this layer as resulting from the gradual accumulation of the prey of rapacious birds, comparing it to a similar level at Trou du Sureau at Montaigle (Falaën, prov. of Namur; in Rucquoy, 1886: 323).

The exploitation of the cave's interior by the railway workers, as suggested in J. Dauvelois' letter, would have *de facto* resulted in the removal of this superficial layer. We believe that J. Dauvelois confused this cave with another cavity, possibly the cave of Chifalize, located on the right bank of the Orneau River which was also quarried between 1863 and 1890. The inner part of this cave, far better preserved than the porch zone, was excavated by the RBINS in 1950 (archives of the Section of Anthropology and Prehistory, explorations 64, 68, 69, 70 and 71 in 1950) and produced numerous faunal remains attributed to the “mammoth age” as well as a “thick chert blade”.

It is quite possible that some of the amateur investigations mentioned in *L'Écho de Namur* also relate to the cave of Chifalize. Nevertheless, a short newspaper article does con-

¹“Trop nombreux seraient à citer ceux qui se rendirent à la Bèche-aux-Roches à la suite de Rucquoy ; mentionnons cependant M. Gilson, professeur à l'Athénée de Namur, qui explora la grotte en compagnie des enfants de M. le notaire Sterpin de Spy ; M. Gérard, de Court-St-Etienne, archéologue très versé dans la partie préhistorique ; M. J.-B. Pérès de Dion-le-Mont ; feu M. Van Hollebèque, archiviste à Bruxelles. M. Louis Stassin, de Wavre, un jeune amateur très érudit, qui a exploré la même caverne de 1880 à 1884, aidé du mineur Clarembeau-Corbu, y a recueilli une collection nombreuse dont la plus faible partie a figuré à l'exposition des arts rétrospectifs ouverte en votre bonne ville de Mons en 1885, et au catalogue de laquelle elle a été inventoriée sous le n° 1792, page 120.”

²“[...] le sol de la grotte fut exploité par les constructeurs de la voie ferrée qui en utilisèrent les graviers pour leurs travaux. Ces graviers, ainsi que toute la partie des parois en calcaire carbonifère qui fut trouvée assez friable pour être convertie en ballast, furent emportés ; les terres furent rejetées à l'intérieur et forment aujourd'hui le sol de la grotte, tandis qu'à l'entrée de celle-ci on fit un amas de détritux terreux ayant environ cinq mètres de hauteur. Tous ces déchets contenaient une quantité considérable de débris d'animaux de races aujourd'hui éteintes, ou disparues de notre latitude ; la plupart de ces débris furent alors emportés comme ballast.”

firm that Mr. Gilson repeatedly and successfully “scoured” the so-called La Bèche aux Roches cave after having paid a visit to Mr. Rucquoy (*L'Étoile*, 4/11/1886).

The second excavation period: 1885-1886

Maximin Lohest (1857-1926) and Julien Fraipont (1857-1910) were long-standing friends dating back to the beginning of junior high school spent together at the *Collège des Jésuites*, Saint Gilles Street in Liège.

“Being exactly the same age, living close to one another and exchanging our reflections each day, we ended up adopting identical principles concerning our studies and the conduct of our lives. Only occasional travels abroad momentarily interrupted our daily meetings. We lived in neighbouring houses both in town and the country. At university, our assistant lecturer's, then lecturer's, then professor's laboratories were all adjacent. We occupied the same world, shared the same friends”³ (Lohest *et al.*, 1925: 131-132).

At the end of their final year of high school in 1874, J. Fraipont and M. Lohest became “transformists” based on their reading, conversations and discussions, having been especially influenced by lectures given by Reverend Father Van Tricht concerning Darwin's theories on the evolution of species (Lohest *et al.*, 1925: 137).

After high school, M. Lohest first obtained a Master of Philosophy from the *Université de Liège* (ULg), then registered at the *École des Mines*. J. Fraipont worked in his father's bank, however his interest in zoology eventually drove him to study for a bachelor's degree (then a Ph.D.) in natural sciences at the ULg under the supervision of Professor Edouard Van Beneden. Appointed assistant lecturer

in 1881, J. Fraipont succeeded Gustave Dewalque in teaching palaeontology as early as 1884 and then became director of the ULg in 1909 (Lohest *et al.*, 1925: 143). M. Lohest became assistant lecturer to G. Dewalque who occupied the chair of geology. In 1893, he lectured on fuel and phosphate deposits, the latter becoming a lecture on applied geology. In 1897, he succeeded his mentor G. Dewalque and finished his career as head of the Geological Institute at the ULg (Fourmarier, 1953).

In approximately 1881, both men met Marcel De Puydt (1855-1940), who shared the same desire of resolving the problem of human antiquity (Lohest *et al.*, 1925: 144). M. De Puydt was a lawyer and head of the legal department of the city of Liège. His pastime however was the study of prehistoric archaeology, which explains his contribution to the development of the *Curtius* Museum in Liège (today known as the *Grand Curtius*) and its rich archaeological collections (Lohest *et al.*, 1925: 145). In his youth, De Puydt had “looked for knapped flints in the neighbourhood of Namur and during his trips had the opportunity to visit Spy cave [...]. He was convinced that it had been inhabited by prehistoric humans”⁴ (Lohest *et al.*, 1925: 145). He had known of the existence of the cave since 1872, although he referred to it as Goyet cave given its proximity to the Goyet Mill (Figure 1), and had collected numerous bones and flint artefacts (Vercheval archives, copy of *Les Amis de l'Homme de Spy*). A few pieces from the De Puydt collection in the *Grand Curtius* Museum are labelled *Grotte de Goyet, CC Spy*. M. De Puydt himself recounts the circumstances of his first contact with the site (De Puydt, 1939: 7):

“In Namur, my excellent schoolmate at the *Athénée Royal*, Ernest Lemaire from Moustier-sur-Sambre, had let me collect fossil teeth and knapped flints from the terrace of the cave”⁵.

³“Exactement du même âge, vivant l'un près de l'autre, nous communiquant chaque jour nos réflexions, nous avons fini par épouser les mêmes principes dans la direction de nos études et dans la conduite de la vie. Seuls des voyages à l'étranger vinrent momentanément interrompre nos relations quotidiennes. A la ville comme à la campagne, nous habitons des maisons voisines. A l'Université, nos laboratoires d'assistant, de chargé de cours, de professeur, étaient contigus. Nous fréquentions le même monde, nous avions les mêmes amis.”

⁴“recherché des silex taillés aux environs de Namur et, dans ses courses, avait eu l'occasion de visiter la grotte de Spy [...]. Il avait la conviction qu'elle avait été habitée par les hommes préhistoriques.”

⁵“A Namur, mon excellent condisciple à l'Athénée Royal, Ernest Lemaire, originaire de Moustier-sur-Sambre, m'avait fait recueillir sur la terrasse de la grotte, dents fossiles et silex taillés.”

Further details of his activities are to be found in a letter by De Puydt published by J. Servais (1940: 9-10).

M. De Puydt had seen the archaeological material recently discovered by A. Rucquoy and informed M. Lohest of the richness of the deposits, assuring him that the terrace was still unexplored. In the spring of 1885, Lohest decided to start excavations at Spy (Lohest *et al.*, 1925: 145; Vercheval archives, Report by M. De Puydt to J. Hamal-Nandrin on 15/02/1929). Count A. de Beaufort granted his authorisation by letter on July 24, 1885, following M. De Puydt's visit to his chateau at Mielmont (in Onoz, a village next to Spy) (De Puydt, 1939: 3). They recruited Armand Orban, who had been a miner at the Moha lime kilns (Lohest *et al.*, 1925: 145), in order to carry out research which was entirely financed by M. De Puydt and M. Lohest. Professor G. Dewalque, "according to whom the Quaternary was [...] the refuge of failed geologists"⁶, did not support the research which he esteemed to be of little interest (Lohest *et al.*, 1925: 149).

Information dealing with the conditions of the excavations is scarce and sometimes contradictory. The field documents concerning the 1885 and 1886 excavations, as well as notes and sketches by M. De Puydt were accidentally destroyed in 1886 (Vercheval archives, Report by M. De Puydt to J. Hamal-Nandrin on February 15, 1929: 4; De Puydt, 1939). Consequently, we have to trust the information published in articles related to the discovery, later publications by M. Lohest (Lohest *et al.*, 1925), J. Fraipont (1895a, 1895b) and M. De Puydt (1939), published reports of later excavations (de Loë & Rahir, 1911), various archives from the Lohest and De Puydt-Vercheval families and the inventory of the archaeological material undertaken in 1920 by Jean Servais following the donation of the De Puydt collection to the *Grand Curtius* Museum.

The 1885 campaign

In August 1885, A. Orban was commissioned to explore the rockfall on the cave's ter-

race (Lohest *et al.*, 1925: 145). Among the finds was a cranial fragment representing the first anthropological piece officially discovered at Spy (De Puydt & Lohest, 1886: 35), but which today has gone missing. It seems that a portion of the blocks on the terrace were removed using gunpowder (Fraipont & Lohest, 1887: 666). They noted:

"The opening of the cave, covered by an enormous terrace towards the inside portion, seems to be the only part never to have been explored; thus it is towards the inside portion of this terrace that we had a trench dug, about 3 metres long, 2 metres wide and 1.80 metres deep"⁷.

M. De Puydt and M. Lohest (1886: 35) recognised a "brown clay mixed with limestone blocks" ("*une argile brune entremêlée de blocs calcaires*") in the lower part in which they found a "30 to 40 cm thick fauna-bearing level" ("*un niveau ossifère, épais de trente à quarante centimètres*"). Below this fauna-bearing level they found "either bedrock or a light coloured, unstratified and relatively loose sandy clay" ("*soit le roc, soit une argile sableuse claire non stratifiée et très peu compacte*"). The authors added that their publication presents only the excavations carried out near the entrance, which by itself also indicates the position of the trench (De Puydt & Lohest, 1886: 35). The traces indicated by A. de Loë & E. Rahir (1911) and E. Rahir (1928) are perhaps those of this first trench in front of the cave.

The authors also provided details of their "excavation method":

"We followed the osseous level across our excavation; but the thickness of the rockfall under the terrace sometimes forced us to work using wooden galleries"⁸ (De Puydt & Lohest, 1886: 35).

⁷ "L'orifice de la grotte, recouvert par une énorme terrasse vers la portion intérieure, paraît seul n'avoir jamais été exploré ; c'est vers la portion intérieure de cette terrasse que nous avons fait pratiquer une tranchée d'environ trois mètres de longueur sur deux de large et d'une profondeur moyenne d'un mètre quatre-vingt centimètres."

⁸ "Nous avons suivi le niveau ossifère tout autour de notre excavation ; mais sous la terrasse, l'épaisseur des éboulis nous a parfois obligés de conduire notre travail par galeries boisées."

⁶ "pour qui le quaternaire était [...] le refuge des géologues manqués."

Traces of a gallery towards the right corridor of the cave are visible in the plan of the cave published by Rahir (1928; Figure 5). Such a practice was quite usual at the end of the 19th century and was also used during excavations at La Naulette (Hulsonniaux-Houyet, prov. of Namur), Trou Al'Wesse (Petit-Modave, prov. of Liège) and at various prehistoric sites in South-west France (Toussaint & Pirson, 2006).

The difficult excavation conditions are attested to by a letter from De Puydt to Lohest which, although undated, is known to date to 1885⁹. A. Orban was paid weekly, De Puydt and Lohest shared the costs and took turns going to the site, while Fraipont received and identified the discoveries but did not participate in the excavation costs. Orban dug galleries by candle-light, measured them and sketched them on paper. De Puydt added,

“Orban's manner of working frightens me and the galleries give me a fever I certainly do not need”¹⁰ (undated letter from M. De Puydt to M. Lohest).

In fact, A. Orban conducted a large part of the excavation alone. Although Lohest and De Puydt came to oversee how work was progressing, they were not present all the time. The interval between two visits was sometimes so long that Orban updated De Puydt about the progress of the work by post.

The results of these initial excavations highlight the significance of the deposits (De Puydt & Lohest, 1886: 35; Lohest *et al.*, 1925: 146). Several heaps of burnt earth and charcoal surrounding flat, Late Carboniferous sandstone, some still showing traces of fire, were unearthed and interpreted by the discoverers as hearths. The occasional fragmentary faunal remain was recovered together with various types of worked objects (awls, pendants, beads,...) made from osseous materials (bone, tooth, antler and ivory). The lithic industry, mainly flint artefacts,

numbered several thousand. Finally, there were also indications of the presence of hematite and lignite.

The 1886 campaign

During the second campaign of 1886, investigations continued in the trench opened in 1885 as well as in the galleries propped up with freshly cut wood. It seems that the galleries dug by A. Orban in 1886 are those that originated from the first trench at the junction of the cave and the terrace. However, given the absence of field documents related to the excavation, this cannot be known for sure. The plan of the cave published by E. Rahir in 1928 (Figure 5) does not indicate any galleries on the terrace, however de Loë and Rahir did not work in the zone explored by M. De Puydt and M. Lohest (Figure 6), having only excavated the limits of the terrace to the left and right of the zone which had been deliberately left untouched by M. De Puydt and M. Lohest (“purposely and as a control”, “à dessein et pour contrôle”; de Loë & Rahir, 1911: 43). At least part of the excavated earth was scattered down the steep slope between the terrace and the Orneau River (Rutot, 1888: 200). Several refits of the human fossils discovered by De Puydt and Lohest with those discovered in the 20th century from the slope deposits confirm this observation.

It is difficult to determine the proportion of work carried out in the gallery and trench dur-

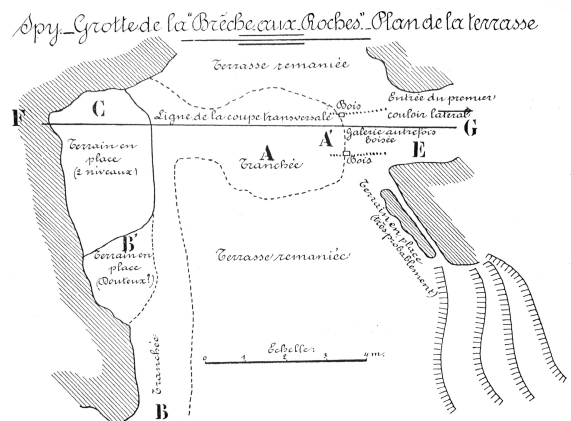


Figure 5. Plan of the cave and excavations at Spy after Rahir (1928). Note the wooden gallery indicated in the right gallery.

⁹ A carved bone piece mentioned in the letter by De Puydt is illustrated in the publication concerning the 1885 excavations (De Puydt & Lohest, 1886: 37). This artefact can be found today in the RBINS collections.

¹⁰ “J'ai peur de la manière dont Orban travaille, les galeries me donnent la fièvre et je n'en ai, certes, pas besoin.”

ing 1886. A photo (Figure 6) of the section taken of the terrace by Camille Collard in 1909 shows the heterogeneity and complexity of the sedimentary fill along the zone excavated by De Puydt and Lohest in 1886; however, the excavation method(s) employed and their relative importance is impossible to deduce. In 1925, Lohest described difficult and mostly underground excavation conditions, justifying his choice for financial reasons. He wrote:

“Removing these fallen rocks, practically devoid of artefacts, would have been a huge and expensive work. Orban, recalling his job as a miner, suggested an underground method to investigate the fauna-bearing levels that consisted in digging galleries and carefully shoring them up with wood in order to avoid accidents. It was an econom-

ical, yet dangerous solution due to the weak consistency of the ground”¹¹.

He also provides a more detailed description of the miner's method:

“From the end of the gallery, Orban brought us a basket of earth extracted, as far as possible, at a well-defined level which we examined in the open. If Orban signalled that he had come across an interesting object, we would enter the gallery by candle-

¹¹ “C'eût été un travail coûteux et considérable que d'enlever et de transporter ces éboulis, presque stériles en documents. Orban se rappelant son métier de mineur, proposa d'exploiter souterrainement les couches ossifères. Il s'agissait donc de creuser des galeries et de les boiser soigneusement pour éviter tout accident. C'était une solution économique, mais dangereuse par suite du peu de consistance du terrain.”

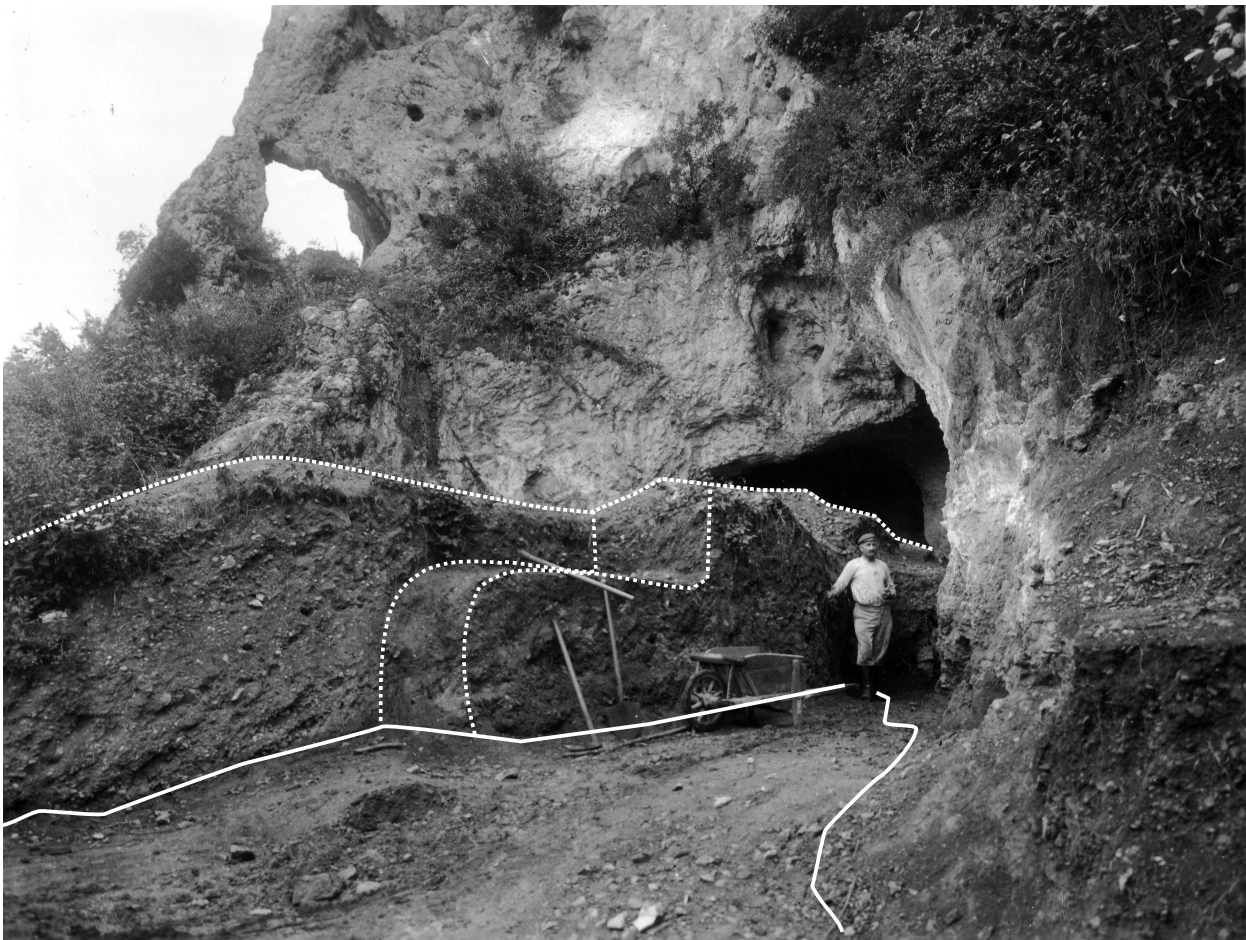


Figure 6. Photo by E. Rahir (1909) showing the terrace and zone excavated by Camille Collard. Continuous line: projected limits of the area excavated in 1909; dotted line: extent of the terrace sediments and sections. Photo by E. Rahir, IRPA no. 410b.

light and remove the sample, noting its precise location”¹².

The geologist adds:

“But, as this kind of work required artificial lighting, we ran the risk of overlooking or destroying some interesting pieces. If we could have foreseen then the exceptional interest that our excavations were soon to present, we would have proceeded differently. As we were not rich and were carrying out this work entirely at our own expense, acting with thrift was important”¹³.

Although this “harsh” and remorseful description was made nearly forty years after the event, it nevertheless seems credible as it was later confirmed by De Puydt (1939: 149). Other documents also suggest the use of a trench in the 1886 excavations. The minutes describe a section 8 metres to the south of the cave’s entrance (Lohest & De Puydt, 1887: 229), probably indicating the existence of an approximately 11 m long trench in the outer part of the terrace.

Certain authors have suggested that Orban may have changed his excavation method after the discovery of the first skeleton, resuming work from the top of the terrace (Dewez, 1980: 38). However, no direct information attests to this change of strategy, nor is it mentioned in any publication. Both the underground galleries and the surface trenches seem to have been used during the two campaigns of 1885 and 1886 and it is probable that the excavators alternated between the two techniques depending on the nature of the ground.

The discovery of the two Neandertal skeletons

It is equally difficult to precisely recon-

struct the chronology and conditions in which the two Neandertal skeletons were discovered. In addition to the first 1885 discovery, human bones were found in and after June 1886 (Fraipont & Lohest, 1886: 744, 1887: 598). However, M. Lohest (Lohest *et al.*, 1925: 146) specifies:

“During excavations in July 1886, we had collected a few fragments of human bone including the anterior section of a calotte that very much resembled that of the Neandertal cranium, which we knew from drawings and casts”¹⁴.

Both Neandertals were found during a short period between June (Spy no. 2, Fraipont & Lohest, 1887; Spy I, this study) and the first days of July (Spy no. 1, Fraipont & Lohest, 1887; Spy II, this study).

M. De Puydt and M. Lohest (1887) describe the finds as follows:

“A first, unfortunately rather incomplete, skeleton was found 6 metres south of the cave entrance; another one, also quite incomplete, 8 metres south and slightly west of the first one. The position of the first skeleton, which we shall call ‘Spy no. 2’, was difficult to specify. The bones lay out of their natural connections and the cranium was fractured into about 40 pieces”¹⁵.

A letter from A. Orban to M. De Puydt confirms the scattering of the bones:

“Nothing particularly rare in this level, I found more dry human bones. What I do have in this level and which I believe to be good, is half a human jaw as well as fragments from the primitive pot, the human limbs are scattered across the entire terrace and we may suppose that the skull is amongst them, [...] [...] I have moved earth

¹² “Du fond de la galerie, Orban nous apportait une petite manne de terre recueillie autant que possible à un niveau bien déterminé. Nous examinions le tout au grand jour. Si Orban nous signalait la rencontre d'un objet intéressant, nous pénétrions dans les travaux, éclairés par des bougies, et nous allions dégager l'échantillon et noter sa situation précise.”

¹³ “Comme ce genre de travail nécessitait l'éclairage artificiel, on courait, d'autre part, le risque de laisser échapper ou détruire quelque pièce intéressante. Si nous avions pu prévoir alors l'intérêt exceptionnel qu'allaient bientôt présenter nos fouilles, nous aurions procédé différemment. Mais comme nous n'étions pas riches, et comme nous exécutions ces travaux entièrement à nos frais, il importait d'agir avec économie.”

¹⁴ “En juillet 1886, nous avons recueilli, dans nos fouilles, quelques débris d'ossements humains, entre autres la partie antérieure d'une calotte crânienne ressemblant beaucoup à celle du crâne de Néanderthal, que nous connaissions par des dessins et des moulages.”

¹⁵ “Un premier squelette, assez incomplet malheureusement, a été trouvé à six mètres au sud de l'entrée de la grotte ; un autre également fort incomplet, à huit mètres au sud du même point et un peu à l'ouest du premier. La position du premier squelette que nous désignerons sous le nom de ‘Spy n° 2’, était difficile à préciser. Les os se trouvaient déplacés de leurs connexions naturelles et le crâne était fracturé en une quarantaine de morceaux.”

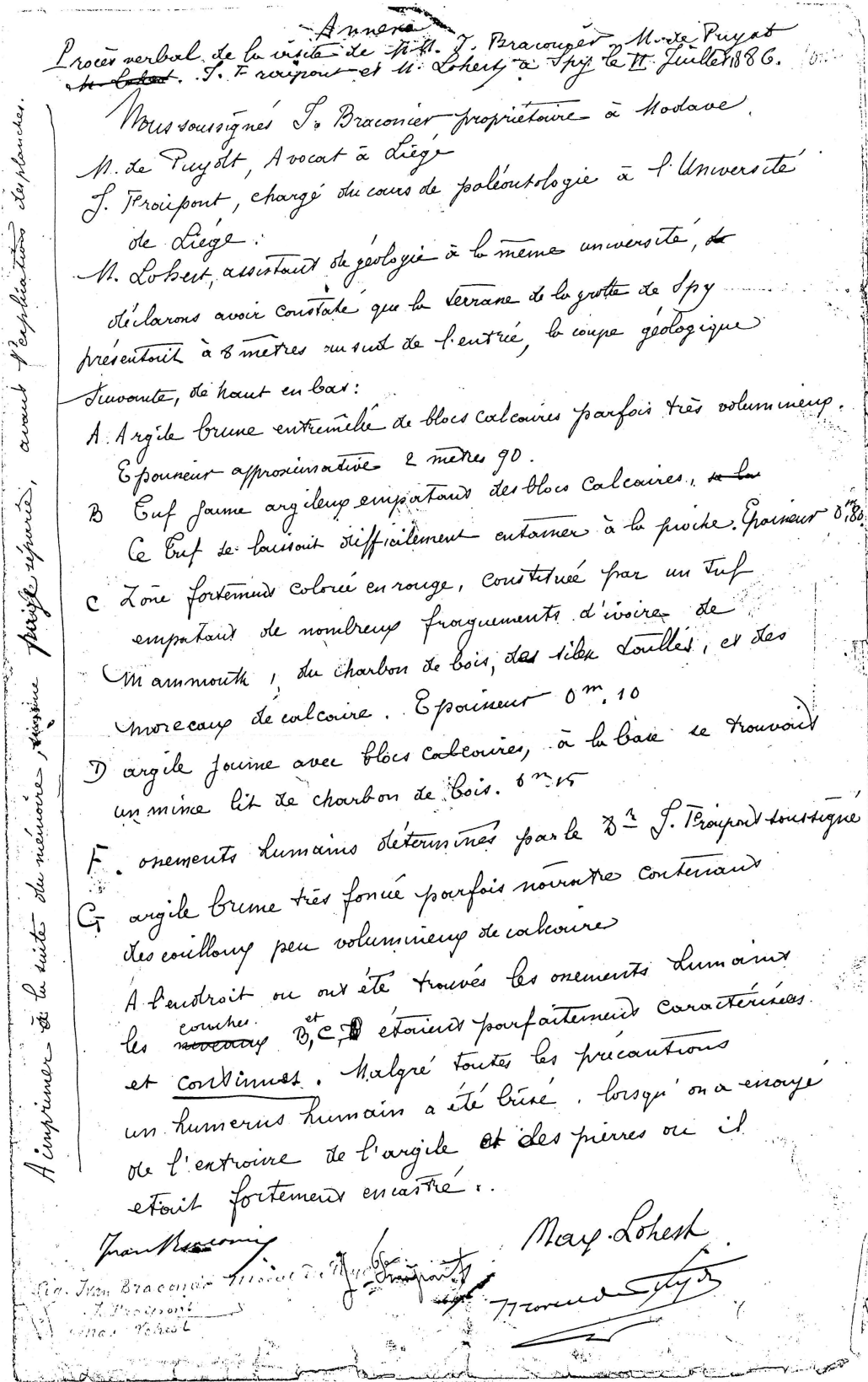


Figure 7. Minutes of July II, 1886, attesting to the discovery of human remains in stratigraphic position (copy from the Dallemagne archives). See SF1 in Cammaert (this volume: chapter IV) for the transcribed version.

like a slave, the area for the section is ready, [...]”¹⁶ (Letter from Orban to De Puydt, Wednesday evening, undated, Dallemagne archives).

This letter however was written before the discovery of the skull, the first fragments of which were excavated in early July, 1886 (Lohest *et al.*, 1925: 147). The bones mentioned therein are probably those of Spy no. 2, which were the first to be discovered and presented no intact anatomical connections. It is uncertain if this individual was found in a gallery or a trench; however, Orban also indicates in his letter that he is preparing an area in order to excavate a profile, although he does not specify where.

The second skeleton (Spy no. 1) was found in early July and more precise information is available concerning its discovery:

“The second skeleton, which we shall call ‘Spy no. 1’, seemed to be resting on its right side with the hand leaning against its lower jaw. It was lying slightly across the axis of the cave with its head towards the east and feet towards the west. In spite of a careful search, many bones were not found. The skull was fractured. Several fractures were very old as some fragments were no longer in anatomical connection and cemented together by calcareous incrustations”¹⁷ (De Puydt & Lohest, 1887: 229).

The minutes

The minutes (Figure 7) were written on July 11, 1886 (or on July 2, see Cammaert, this volume: chapter IV) in the presence of M. Lohest, M. De Puydt, J. Fraipont and I. Bra-

conier, a Modave landlord with whom De Puydt and Lohest had explored other caves (Lohest *et al.*, 1925: 147). This event is essential:

“Considering the importance of this discovery, we have taken extra special care to have the authenticity of the deposit of human bones certified by competent persons. The learned geology professor at the University of Liège, Mr. G. Dewalque, being unwell, we went to Spy accompanied by Mr. J. Fraipont and Mr. Ivan Braconier and, in front of their very eyes, excavated some still *in situ* human bones from under a red coloured breccia that was mainly composed of ivory fragments, flints, etc..., that is to say below our second fauna-bearing level”¹⁸ (De Puydt & Lohest, 1887: 229-230).

The geological section was plotted at the spot where the cranium of Spy no. 1 was found (Fraipont & Lohest, 1886: 766), indicating the probable existence of a trench at the same area of the terrace. Fraipont, who cites “Max Lohest’s unforgettable minutes” (“*le mémorable procès-verbal de Max Lohest*”), confirms that human bones were excavated “[...] at the moment when I was removing the last bones with my own hands” (“[...] *au moment ou je retirais de mes propres mains les derniers ossements*”; Fraipont, 1895a: 37). They then celebrated the event:

“With the minutes signed, we went for lunch in an inn in Moustiers [sic], which was then famous for its excellent cuisine. De Puydt was radiant. Although a member of numerous temperance societies, on that day he left his convictions aside”¹⁹ (Lohest *et al.*, 1925: 148).

¹⁶ “Dans le niveau rien de rare, j’ai encore trouvé des os humains, non gras. Dans le niveau, ce que j’ai de bon selon moi c’est une demi machoire humaine, ainsi que des fragments du pot primitif, les membres humains sont ainsi décimés, parmi toute la terrasse, il est à supposer que le crâne s’y trouve aussi, [...] [...] j’ai remuer de la terre comme un forcat la place pour prendre la coupe est déjà prêt, [...]”

¹⁷ “Le second squelette que nous appellerons ‘Spy n° 1’ paraissait couché sur le côté droit, la main appuyée contre la mâchoire inférieure. Il était placé à peu près en travers de l’axe de la grotte, la tête vers l’est, les pieds à l’ouest. Beaucoup d’os n’ont pas été retrouvés malgré des recherches minutieuses. Le crâne était fracturé. Plusieurs fractures étaient fort anciennes, des morceaux déplacés de leurs connexions anatomiques étant ressoudés par des incrustations calcaires.”

¹⁸ “Vu l’importance de cette découverte, nous avons mis un soin tout spécial à faire immédiatement constater l’authenticité du gisement des ossements humains, par des personnes compétentes. Le savant professeur de géologie de l’Université de Liège, M. G. Dewalque étant indisposé, nous nous sommes rendus à Spy, accompagnés de M. M. J. Fraipont et Ivan Braconier et devant eux extraits des ossements humains en place, sous une brèche principalement formée de fragments d’ivoire, de silex, etc., et teintée en rouge, c’est à dire sous notre second niveau ossifère.”

¹⁹ “Ce procès verbal signé, nous allâmes déjeuner dans une auberge de Moustiers [sic], célèbre alors pour son excellente cuisine. De Puydt était radieux. Membre de nombreuses sociétés de tempérance, il sut en cette journée mémorable déroger à ses convictions.”

However, Lohest specifies that the drawing up of the minutes took place with the utmost urgency:

“Things were urgent at Spy. On any given day, the trench in the cave where a few bones belonging to a second skeleton could still be distinguished threatened imminent collapse. It became a matter of certifying that the bones were indeed *in situ* and overlain by a layer containing mammoth and rhinoceros, as well as excluding possible subsequent reworking of the sediments”²⁰ (Lohest *et al.*, 1925: 147).

Unfortunately, it is impossible to be certain if the “second” skeleton Lohest makes reference to is indeed Spy no. 1, the second to be found at the place where the minutes were drawn up, or if he is referring to Spy no. 2 which had previously been found about 6 m away from the cave entrance. The same question can be posed regarding the “trench in the cave”: does it refer to the 1885 trench, dug at the cave entrance and widened during later excavations, or simply to a trench on the site?

From a stratigraphic point of view, the Neandertal bones “were lying at a depth of 3.85 m beneath three layers of undisturbed deposits” (“*se trouvaient à 3^m,85 de profondeur sous trois couches de dépôt non remaniés*”; Fraipont, 1891: 322). The description contained in the minutes places the bones in the “third fauna-bearing level” underlying a layer of cemented sediments belonging to layer C. J. Fraipont and M. Lohest (1886: 692) state:

“The skull of Spy no. 1 was almost immediately covered by cooking waste from the second fauna-bearing level”²¹.

The archaeological context of the skeletons is described as follows:

“Apart from a heavily worn bone splinter,

²⁰ “*A Spy les choses pressaient. D’un jour à l’autre la tranchée de la grotte, où l’on distinguait encore quelques ossements appartenant à un second squelette, pouvait s’écrouler. Il s’agissait de constater que les ossements humains étaient bien en place, surmontés par une couche où l’on rencontrait du mammoth et du rhinocéros et qu’aucune hypothèse de remaniement n’était admissible.*”

²¹ “*le crâne de Spy n° 1 était presque immédiatement recouvert par les déchets de cuisine de l’homme du second niveau.*”

the flints are the only remains of the industry collected from this third fauna-bearing level. They were generally crudely made. We found two Moustiers [sic] type points at the level of and next to the human bones. Similar points were found in layer G”²² (Fraipont & Lohest, 1886: 769).

M. De Puydt and M. Lohest (1887: 233-234) add:

“a coarse flint probably derived from the gravels was particularly abundant in the level of the skeletons. This however was only knapping waste given that from beside Spy no. 1, M. Fraipont extracted a perfectly typical, black *phtanite* Mousterian type point measuring 65 mm. This piece, figure 9, as beautiful as most of the points from the second fauna-bearing level, is reproduced in pl. V together with four flint specimens found close to the skeletons”²³.

In reality, except for this *phtanite* point that is very similar to those from the “second fauna-bearing level”, the rare archaeological pieces “associated” with the Neandertal skeletons are flint or lustred sandstone flakes together with flint pseudo-Levallois points (see Jungels *et al.*, this volume: chapter X).

J. Fraipont was entrusted with the study of the human and animal fossils (Fraipont & Lohest, 1886: 741). The official announcement of the discovery was made during the congress at Namur on August 17, 1886 (De Puydt & Lohest, 1887). The collections were shared between M. Lohest and M. De Puydt; M. De Puydt took the stone artefacts while M. Lohest kept the human bones and bone artefacts. The faunal

²² “*À part une esquille d’os grossièrement usée, les silex sont les seuls restes d’industrie recueillie à ce troisième niveau ossifère. Ils sont généralement d’un travail assez grossier. Deux pointes du type de Moustiers [sic] ont été trouvées par nous au niveau et à côté des ossements humains. D’autres pointes analogues ont été trouvées dans la couche G.*”

²³ “*un silex grossier provenant probablement du gravier était particulièrement abondant au niveau des squelettes. Ce n’était cependant là que des déchets et rebuts de la taille, attendu qu’à côté du Spy n° 1, M. Fraipont a extrait une pointe en phtanite noir, mesurant 65 mill., du type moustérien le plus pur. Cette pièce, fig. 9, aussi belle que la plupart des pointes du deuxième niveau est reproduite pl. V. avec quatre spécimens des silex recueillis dans le voisinage immédiat des squelettes.*”

remains were then entrusted to the palaeontology collections of the ULg. On June 4, 1920, in front of witnesses, M. Lohest amongst them, M. De Puydt bequeathed all his prehistoric collections, including the Spy lithic material to the Prehistory Section of the *Musée Archéologique Liégeois* or *Musée Curtius* (Notarial deed of June 4, 1920; Vercheval archives). A controversy surrounding the ownership of the human bones arose several years later (see Cammaert, this volume: chapter IV). Apart from two scapula fragments and a first sacral vertebra, all the human bones and bone artefacts from Maximin Lohest's collection were ultimately donated to the Belgian State on October 19, 1994 (RBINS, I.G. 28169). C. Fraipont listed these three bones in the register of the ULg in 1929 during the court case opposing the Belgian State against the Lohest family (1929-1934; see Cammaert, this volume: chapter IV).

Early 20th century excavations

Given the importance of the discoveries made at the Betche aux Rotches in 1885 and 1886, excavations continued uninterrupted until the early 1980s in the cave, on the terrace, as well as on the slope deposits and the alluvial plain below. In 1902, Baron Alfred de Loë and Edmond Rahir from the Royal Museums of Art and History (RMAH), at that time known as the Royal Museums of Industrial and Decorative Arts, visited the site and E. Rahir took the first known photo of the site (IRPA no. 5041b, Rahir 1902; Figure 8). They then decided to continue excavating, “fearing, not without good reason, the depredations of over-zealous collectors” (“*redoutant non sans raisons, les dépradations des collectionneurs trop zélés*”). After obtaining Count de Beaufort's authorisation, Baron de Loë asked the Minister of Agriculture for a



Figure 8. Photo showing the condition of the cave's entrance in 1902. Photo by E. Rahir, IRPA no. 5041b.

grant. On June 30, 1903, he secured a 600 francs grant to start new excavations at Spy (mail 30947 of 30/06/1903, Ministry of Agriculture, Department of Fine Arts) and immediately set to work. On July 12, 1903, the Royal Museums' curator delegate wrote to the Minister and informed him of the discovery of "several thousand knapped flints, elements of finery made of bone and animal tooth, meal remnants, etc..." (*"plusieurs milliers de silex taillés, des éléments de parures en os et en dents d'animaux, des débris de repas, etc..."*); Letter sent by the curator delegate to the Minister of Agriculture on July 13, RMAH archives). By the end of November, an excavation report was submitted and a new grant to continue excavations was requested. Furthermore, in his letter of November 5, 1903, addressed to the Minister, the chief curator suggested the permanent recruitment of Camille Collard who had already carried out the initial work. He described him as follows:

"The person in question is intelligent, observant, very orderly and methodical when carrying out the tasks assigned to him. He is a very industrious individual and thanks to his physical strength, does not hesitate to tackle a task before which many others would recoil"²⁴ (Letter sent by the chief curator to the Minister of Agriculture on November 5, 1903, RMAH archives).

A new allowance was granted on November 30, 1903. In its wake, a ministry dispatch authorised the creation of a State Excavations Office on December 24, 1903 (de Loë, 1910), and Camille Collard was appointed clerk of the excavations. Taking photos before and during excavations was then listed as standard procedure (de Loë, 1910). This was subsequently applied to new excavations at Spy, thus providing the first photos of the excavations, the glass plates of which are now kept at the Royal Institute for Cultural Heritage (IRPA/KIK).

From 1903 to 1905, C. Collard worked inside the cave, digging into the backdirt of the previous excavations, investigating some still unexplored zones and eventually working on the terrace (Ulrix-Closset, 1975: 55). In 1905, he excavated at the limits of the 1886 excavations, immediately at the cave's entrance (de Loë, 1905). The following year, he investigated the area to the west of the 1885-1886 excavations and in 1909 he dug in the eastern part of the terrace and a gallery opening just inside the cave (Figure 9). The two archaeologists published the results of their 1906 and 1909 work in the *Bulletin de la Société d'Anthropologie de Bruxelles* (de Loë & Rahir, 1911), which included an invaluable plan of the cave indicating the areas explored by A. Rucquoy, M. De Puydt, M. Lohest and M. Fraipont, as well as their own investigations (Figure 9).

While this article described their excavations, it did not mention any discovery of human bones. However, an inspection of the RMAH inventories and collections underlines the fact that in reality the two archaeologists' investigations were richer and more complex than suggested by their 1911 publication. The first collections from Spy were officially listed in the RMAH collections on October 24, 1903, consisting of over 6,000 pieces, including several dozen human bones. The lists contain no other relevant stratigraphic information other than the following sentence:

"All these various objects and debris, numbering six to seven thousand, come from new excavations conducted in the Brèche-aux-Roches cave at Spy (province of Namur). They were collected at two different levels and are good examples of the so-called Eburnean and Tarandian industries"²⁵.

These collections could correspond to the 1903 excavations that, according to A. Rutot's remarks (Rutot, 1904a: 11), may have been partly conducted in the backdirt of the previous excavations.

²⁴ "L'intéressé est intelligent, observateur et montre beaucoup d'ordre et de méthode dans l'exécution des tâches qui lui sont confiées. Il déploie une grande activité et grâce à sa force musculaire, il n'hésite pas à assumer tel labeur qui ferait reculer beaucoup d'autres."

²⁵ The terms "Eburnean" and "Tarandian" were coined by Edouard Piette in 1894 (Piette, 1894). The Eburnean chronologically succeeds the Mousterian and could correspond to an early Upper Palaeolithic with Mousterian points, while the Tarandian comes just after and could correspond to the Solutrean-Magdalenian.

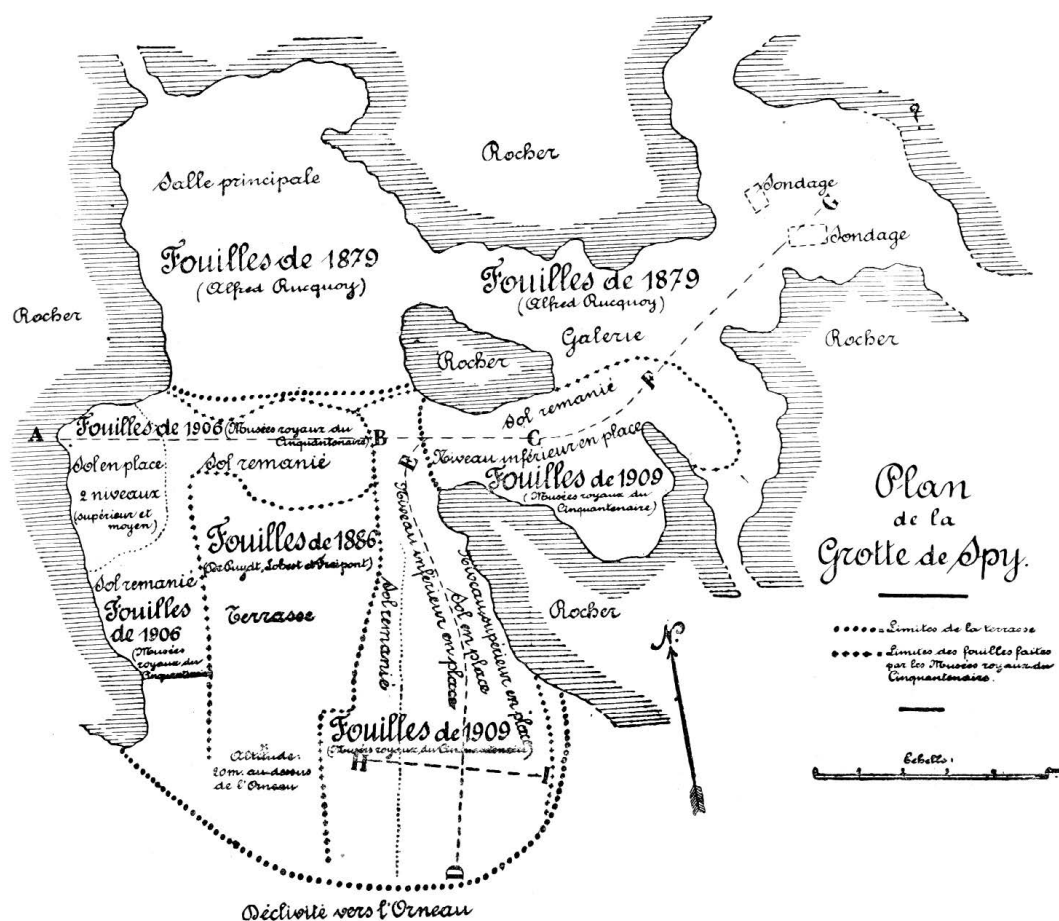


Figure 9. Map of the successive excavations at Spy, after de Loë & Rahir (1911).

Other RMAH inventory numbers relating to Spy and including human bones bear reference to the months of June, 1905, and February, 1906. These collections total approximately fifty human bones, part of which has been re-attributed to the Neolithic, and could correspond to A. de Loë's 1905 excavations. The material from the 1906 and 1909 excavations was listed, respectively, in 1907 and 1910, without any mention of human bones (de Loë & Rahir, 1911).

We also have information relating to other early 20th century excavations that were far less substantial than those of the RMAH. In 1909, Baron Ivan de Radzistky d'Ostrowick (1892-1975), a member of the *Chercheurs de la Wallonie*, excavated sediments at the back of the cave and on the terrace (de Radzistky d'Ostrowick, 1909). His published plan shows that the sediments removed during previous excavations appear on the front of the terrace, towards the

right (Figure 10). Joseph Hamal-Nandrin carried out some personal research, the results of which are now kept at the RMAH, although the artefacts are generally found mixed with the de Loë collection (1908-1909; see handwritten notes in the Inventory list no. 1 kept at the RMAH in Brussels; Ulrix-Closset, 1975: 55, note no. 12).

The 1927-1948 period

The next "official" excavations were initiated by the ULg between 1927 and 1933 under the direction of Joseph Hamal-Nandrin (1869-1958), a disciple of M. De Puydt and first Professor of prehistory at the ULg, Charles Fraipont (1883-1946), Julien Fraipont's son and Professor of palaeontology at the same university, and palaeobotanist Suzanne Leclercq (1901-1994) (Hamal-Nandrin *et al.*, 1932, 1939). These new investigations concerned the cave's interior (Figure 11) where an *in situ* layer

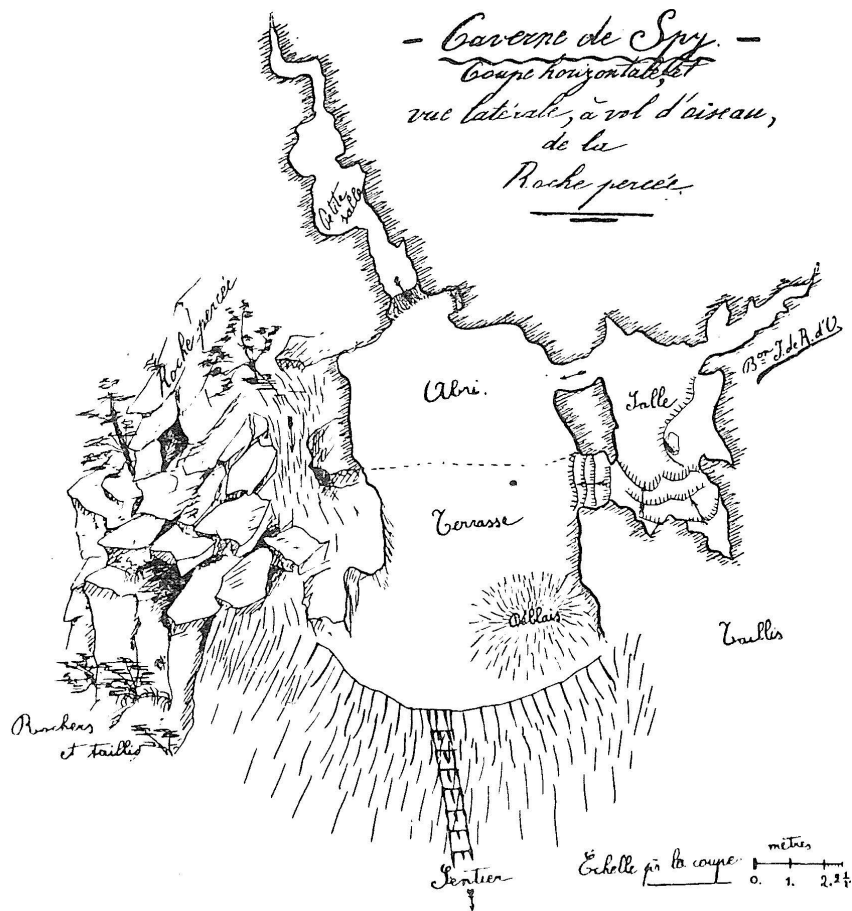


Figure 10. Plan of the site and location of the moved earth, after I. de Radzistky d'Ostrowick (1909).

of variable extent and thickness was discovered under approximately 2 metres of backfill from previous excavations (Hamal-Nandrin *et al.*, 1939: 144). This cultural layer was interpreted as representing the “Early Mousterian” and was considered to be older than the “third fauna-bearing level” of the terrace (Hamal-Nandrin *et al.*, 1939: 146).

The material from these excavations is housed at the ULg and mixed with other collections, notably the De Puydt collection. A few Neandertal bones were listed by C. Fraipont in 1927: 4 metatarsals from a *Homo neanderthalensis* (ULg 14418 to 14421), 1 fragment of a human jaw (ULg 14422), 2 scaphoids (ULg 14423 and 14424), 1 femur head (ULg 14425) and a second right metacarpal from *Homo neanderthalensis* (ULg 14426). These bones probably come from the backfill of previous excavations (Cahen, 1986: 33). The location of these bones is still unknown

and they remain essentially unpublished except for a brief mention in 1939 (Hamal-Nandrin *et al.*, 1939: 147). These bones may have been lost at the end of WWII following Charles Fraipont's conviction for collaboration with the enemy and the dismantling of his laboratory. Furthermore, a wide range of human bones from Spy is now to be found in the ULg palaeontological collections and it remains impossible to determine whether the Neolithic bones come from M. De Puydt and M. Lohest's excavations or from those of J. Hamal-Nandrin and his colleagues. The last witness sections bordering the terrace were destroyed by unknown collectors between 1933 and 1948 (Dewez, 1980).

RBINS excavations between 1948 and 1954

Following a preliminary visit in 1948, the RBINS conducted excavations between April 13, 1950 (RBINS: archives of the Section of Anthro-

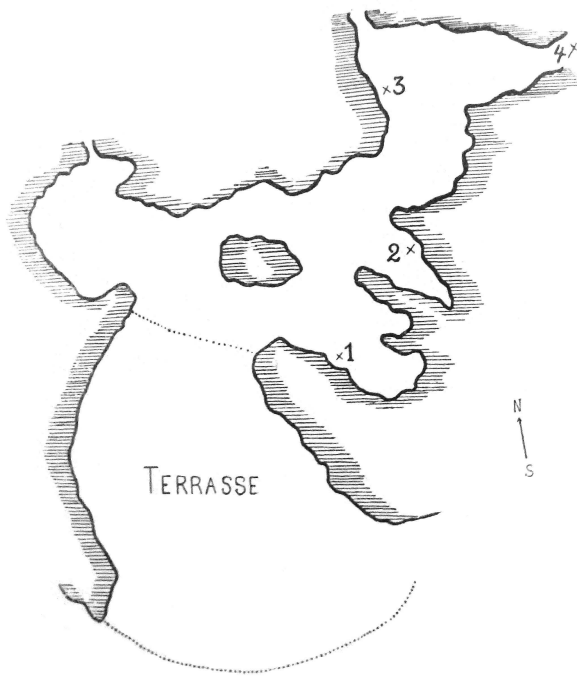


Figure 11. Plan of the site and location of the excavations conducted under the direction of Hamal-Nandrin (Hamal-Nandrin *et al.*, 1939).

pology and Prehistory, field-study trip no. 58, 1950), and September 3, 1954 (RBINS: archives of the Section of Anthropology and Prehistory, field-trip no. 59, 1954), directed by F. Twiesselmann, head of the Section. After excavating several test pits in the cave in 1950 (Figure 12), between 1952 and 1954 he began investigating the terrace slope deposits which descended by steps to the Orneau River (Figure 13). All of the



Figure 12. RBINS' excavations: test pit carried out in the cave, 1950. RBINS picture no. F017711.

sediment was investigated by square metre and then brought to the riverbank where it was sieved (Figure 14). F. Twiesselmann and his team of excavators collected thousands of archaeological, anthropological and palaeontological remains.

We have no excavation notes or systematic drawings, the only information recorded during the excavation (square, layer, depth) is safeguarded on the labels which accompany the remains. However, F. Twiesselmann did make sketches of several profiles in the cave, on the terrace and in the slope deposits in order to understand the original stratigraphy of the site. Unfortunately, it was not possible to interpret

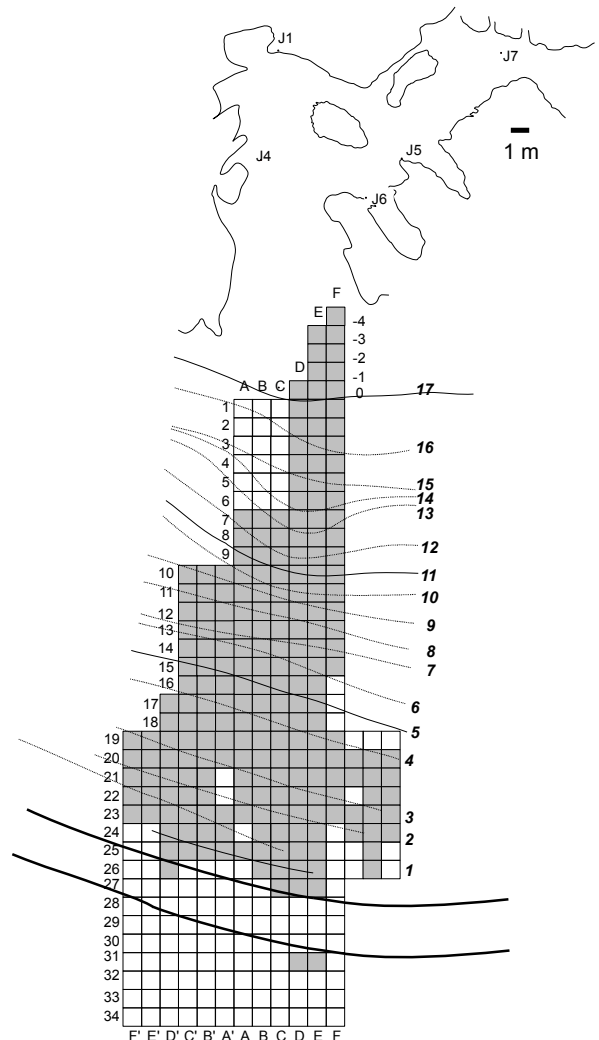


Figure 13. Plan of the excavations carried out by F. Twiesselmann between 1950 and 1954 positioned in relation to the cave. In grey: the squares for which collection items are listed.



Figure 14. RBINS' excavations of the slope deposits. RBINS picture no. F020804.

them clearly given the numerous reworked “layers” resulting from previous excavations and the complexity of the sediments themselves.

In 1955, F. Twiesselmann returned to the site to verify its condition (May 25). He observed that “the slope section remains well-preserved, however it has been compromised by amateur diggers who actively erode the section” (“*la coupe de la pente subsiste en bon état mais qu'elle est minée par les fouilleurs amateurs qui surcreusent la coupe d'une façon active*” (RBINS: archives of the Section of Anthropology and Prehistory, field-study trip no. 31, 1955).

The material from F. Twiesselmann's excavations is kept at the RBINS (I.G. 17393 and I.G. 18921) and constitutes the largest collection from Spy due to the exhaustive nature of the excavations and the extent of the explored area. Nevertheless, a large portion of it remained unpublished for many years (Dewez *et al.*, 1986) until the present study carried out in the framework of an RBINS Action 1 research project and the European TNT project. Among the anthropological pieces, only one anatomically modern facial skeleton (Spy IV) discovered in 1952 in the presumed Gravettian layer of the slope deposits has so far been published (Semal *et al.*, 1996).

1955-1985: Large amateur collections (Beaufays, Éloy and Carpentier)

Between 1955 and approximately 1985, François Beaufays (1919-2005), a resident of Jemeppe-sur-Sambre and watchmaker by profes-

sion, but who had an immense passion for Spy, made numerous “collections” from the site. He would often explore alone, accompanied by his niece and goddaughter Monique Beaufays or with his friends Michel Carpentier and Louis Éloy (M. Beaufays, pers. comm.; M. Dewez, pers. comm.). Together they form the three largest private collections from Spy known to date.

These three large, previously private collections now form part of the public collections:

- François Beaufays donated 8 anthropological remains to the RBINS (I.G. 28243) in the 1970s, but retained the majority of his collection. When her uncle died, Monique Beaufays inherited the collection and in 2007 the RBINS was authorised to make an inventory and carry out a new study of the material. Isabelle Crevecoeur and Hélène Rougier identified several Neandertal teeth and bones which can be linked, directly or indirectly, to the individuals discovered by M. Lohest and M. De Puydt in 1886. After M. Beaufays' sudden death, the RBINS purchased the pieces of the collection related to Spy in order to ensure long-term access to this collection (RBINS I.G. 31472; Semal *et al.*, 2009).
- Michel Carpentier donated his collection to the RBINS (I.G. 31471) within the framework of a multidisciplinary research project (RBINS Action 1 MO/36/012) in 2008.
- Louis Éloy's collection was bought by the *Communauté française de Belgique* in 2003 and is now kept at the *Musée de la Préhistoire en Wallonie (Préhistosite de Ramioul)* (Di Modica & Jungels, 2009).

The most recent official excavations

Michel Dewez conducted some personal investigations and published the description of objects found in the backdirt excavated outside the cave (Dewez, 1960). After a long study of some of the objects collected by F. Twiesselmann, he began official excavations from 1979 onwards within the framework of the *SOS Fouilles* (Dewez, 1980, 1981a) and later the *Société Wallonne de Paléthnologie* (Dewez *et al.*, 1986; Thiry, 1986).

Several test pits dug during the three-month long 1979 excavations essentially focused on the slope and the lower terrace (Dewez, 1980). Following attempts at pumping away the water, earth was used to build a protection dam along the Orneau River. A 200 m² area was subsequently fenced off and covered, with work continuing in 1980 within the 130 m² cleared area (Dewez, 1981b). They also investigated the cave in order to try to locate any remaining *in situ* deposits (Dewez, 1981b). Material from these excavations is housed at the *Université catholique de Louvain*. A mandible of a modern human child was described by Andor Thoma (1986), but has so far not been located. However, the RBINS is in possession of photos and a plaster cast of the piece in question (see Rougier *et al.*, volume 2: chapter XIX).

THE PRESENT STATE AND WHEREABOUTS OF THE COLLECTIONS

All the artefacts, including animal and human remains, found at Spy are currently scattered amongst several Belgian institutions and numerous private collections. Table 2 lists the known collections as well as the institution where they are housed or their private owner as of December, 2009.

As early as the beginning of the 20th century, Aimé Rutot typified a situation that hasn't really evolved over time and with which all those who have attempted to carry out an exhaustive inventory of the Spy collections have been confronted:

“[...] unfortunately this important site was repeatedly excavated by different people with the materials scattered amongst various collections. The cave itself was excavated by A. Rucquoy who made no distinction between levels. Messrs De Puydt and Lohest excavated the terrace in front of the entrance. Recently, the Museum of Decorative Arts, under supervision of our colleague Baron A. de Loë, sieved the backdirt from the two excavations with the number of valuable objects already collected in one third of the backdirt nearly equalling that of the objects recovered from the excavations. Notable amongst them are elements of a

third human skeleton. Without invalidating the conclusions drawn from the study of the known materials, we must admit that the exploration of Spy cave regrettably lacked unity [...]”²⁶ (Rutot, 1904b: 11, note at bottom of page).

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We wish to express our thanks to E. Poty and M. Otte of the ULg for granting us access to the University collections. We are also grateful to Dr. Ph. Masy for a copy of the ULg register. We also wish to thank A. Cahen-Delhayé, N. Cauwe, Cl. Massart and L. Paquay for granting us access to the collections and archives of the Royal Museums of Art and History and M. Dewez and N. Cauwe of the *Université catholique de Louvain* for information and making the original documents and archives available to us.

We are grateful to the various museums who also gave us access to their collections and archives: J.-L. Antoine of the *Musée archéologique de Namur*, J.-L. Schütz of the *Grand Curtius* Museum, B. Clarys of the *Cercle d'Histoire et d'Archéologie du Pays de Genappe* and M. Dewez of the *Musée du pays d'Ourthe-Amblève*.

We wish to express our thanks to Mrs. D. Henrotay, J. M. Brams and M. Beaufays, who gave us the opportunity to visit and study their collections. We are grateful to M. Carpentier who donated his collection to the RBINS. Thanks to A. Waroquier and to *Les Amis de l'Homme de Spy* for providing archival documents and original data. We thank Mrs Dallemagne, M. Lohest's granddaughter, and the

²⁶ “[...] malheureusement ce gisement si important a été fouillé à diverses reprises par des personnes différentes et les matériaux en sont disséminés dans diverses collections. La caverne proprement dite a été fouillée par A. Rucquoy sans distinction des niveaux. MM. de Puydt et Lohest ont fouillé la terrasse qui s’étendait devant l’entrée. Récemment, le Musée des arts décoratifs a fait procéder, sous la direction de notre confrère M. le baron A. de Loë, au tamisage des déblais des deux fouilles et le nombre des objets de valeur ainsi recueillis jusqu’ici dans le tiers des déblais, atteint déjà presque celui des objets retirés des fouilles. Il s’y trouve notamment les éléments d’un troisième squelette humain. Sans infirmer en rien les conclusions tirées de l’étude des matériaux connus, nous devons reconnaître que l’unité a fait malheureusement défaut dans l’exploration de la caverne de Spy [...]”

A. INSTITUTIONS / MUSEUMS

Royal Belgian Institute of Natural Sciences, Brussels	Musée de la Préhistoire en Wallonie, Ramioul
Beaufays (“The watchmaker”) collection	Éloy collection
Carpentier collection	Lonneux collection
Castin collection	Collection of unknown origin (Docquiez?)
Colette collection	
Delvaux collection	Musée archéologique, Namur
Fraipont collection	Angelroth collection
Lohest collection	De Puydt collection
Mailleux collection (origin uncertain)	Le Grand-Metz collection
Malaise collection	
Rucquoy collection (Dr Henricot donation)	Université catholique de Louvain, Louvain-la-Neuve
Rutot collection	Dewez collection (1979-1980 excavations)
Stainier collection	Gilbert-Louis collection
Twisselmann collection (RBINS excavations)	
Royal Museums of Art and History, Brussels	Musée du pays d'Ourthe-Ambève, Comblain-au-Pont
de Loë collection	Loneux collection
Dupreel collection	
Hamal-Nandrin collection (personal research)	Temploux Museum
Verheyleweghen collection	Gillon collection (origin uncertain)
Grand Curtius Museum, Liège	Jemeppe-sur-Sambre Museum
De Puydt collection	Binon collection
Médart collection	Carpentier collection (some artefacts)
Tomballe collection	
Université de Liège, Prehistory Museum	Floreffe cave
Dewez collection	Renier collection
Fraipont collection	
Hamal-Nandrin collection (excavations subsidised by the University patrimony)	Cercle d'Histoire et d'Archéologie du Pays de Genappe, Maison de l'Histoire et du Patrimoine, Glabais
Servais collection	Abbé Coche collection
Various donations incl. De Puydt and Beaufays (“The watchmaker”)	

B. PRIVATE COLLECTIONS

Known and located collections	Unknown and unlocated collections cited in the literature
Brams collection (part of the old Renier collection)	Biral collection
Henrotay collection	Denis collection
Pirson collection	Dierick collection
Warquier collection	Stassin (1880-1884) collection
	Woot de Trixhe (Couthuin) collection

Table 2. Collections from Spy.

Lohest and De Puydt-Vercheval families for giving us access to their family archives.

Finally, we thank H. Rougier for her excellent editorial work. This research has been conducted in the context of the “Action 1” project of the RBINS, funded by the Belgian federal scientific policy: “Multidisciplinary study of the Spy cave collections: new technical and scientific approaches” (MO/36/012).

BIBLIOGRAPHY

- BORDES F., 1959. Le contexte archéologique des Hommes du Moustier et de Spy. *L'Anthropologie*, **63**: 154-157.
- BOULE M., 1911. L'homme fossile de La Chapelle-aux-Saints. *Annales de Paléontologie*, **6**: 111-172.
- BOULE M., 1912. L'homme fossile de La Chapelle-aux-Saints. *Annales de Paléontologie*, **7**: 85-192.
- BOULE M., 1913. L'homme fossile de La Chapelle-aux-Saints. *Annales de Paléontologie*, **8**: 1-70.
- BREUIL H., 1907a. La question aurignacienne. Étude critique de stratigraphie comparée. *Revue préhistorique*, **2**: 173-219.
- BREUIL H., 1907b. Les gisements présolutréens du type d'Aurignac. Coup d'œil sur le plus ancien âge du Renne. In: *Congrès International d'Anthropologie et d'Archéologie préhistoriques. Compte rendu de la 13^{ème} session, Monaco, 1906*. Monaco, Imprimerie de Monaco, **1**: 323-350, figs 101-110.
- BREUIL H., 1912. Remarques sur les divers niveaux archéologiques du gisement de Spy (Belgique). *Revue Anthropologique*, **22** (2): 126-129.
- BROCA P., 1866. Discussion sur la mâchoire humaine de La Naulette (Belgique). *Bulletins de la Société d'Anthropologie de Paris*, 2^{ème} série, **1**: 584-603.
- CAHEN D., 1986. La grotte de Spy et son importance pour la préhistoire de Belgique. In: A. LEGUEBE & D. CAHEN (ed.), *Au temps des Hommes de Spy. Nos ancêtres, les néandertaliens*. Bruxelles, Éditions du Crédit Communal: 31-47.
- CAMPBELL J. B., 1980. Le problème des subdivisions du Paléolithique supérieur britannique dans son cadre européen. *Bulletin de la Société royale belge d'Anthropologie et de Préhistoire*, **91**: 39-77.
- CLAERHOUT J., 1911-1912. L'Aurignacien en Belgique. *Annales de la Société Scientifique de Bruxelles*, **36**: 264-280.
- DE LOË A., 1905. Continuation des fouilles dans la grotte de Spy. *Bulletins des Musées royaux des Arts Décoratifs et Industriels*, **5** (1): 22-23.
- DE LOË A., 1910. Le service des fouilles de l'État. Sa mission et son fonctionnement. In: *Exposition Universelle et Internationale de Bruxelles. Section belge*. Bruxelles, Dreesen & De Smet: 41 p.

- DE LOË A. & RAHIR E., 1911. Nouvelles fouilles à Spy, grotte de la Bêche-aux-Rotches. *Bulletin de la Société d'Anthropologie de Bruxelles*, **30**: 40-58.
- DELPORTE H., 1956. Note sur le Périgordien belge. *Bulletin de la Société préhistorique française*, **53**: 11-15.
- DE NADAILLAC M., 1886. Sur la découverte faite, en Belgique, d'une sépulture de l'âge du Mammouth et du Rhinocéros. Note de M. de Nadaillac, présentée par M. de Quatrefages. *Comptes-rendus de l'Académie des Sciences de Paris*, **103**: 490-492.
- DE PUYDT M., 1939. Grotte de Spy. Souvenirs du premier Congrès de Namur. Le marquis Albert de Beaufort et les fouilles de 1885 à 1886. In: *Congrès de Namur, 1938*. Annales de la Fédération archéologique et historique de Belgique, **35**: 147-152.
- DE PUYDT M. & LOHEST M., 1886. Exploration de la grotte de Spy. *Annales de la Société géologique de Belgique*, **13**: 34-39.
- DE PUYDT M. & LOHEST M., 1887. L'homme contemporain du Mammouth à Spy (Namur). *Annales de la Fédération archéologique et historique de Belgique, Compte rendu des travaux du Congrès tenu à Namur les 17-19 août 1886*, **2**: 207-240, 10 pl. h.t.
- DE RADZITZKY D'OSTROWICK I., 1909. Grotte de Brèche aux Roches (Spy). *Bulletin de la Société Scientifique et Littéraire "Les Chercheurs de la Wallonie"*, **3**: 125-127.
- DE SONNEVILLE-BORDES D., 1961. Le Paléolithique supérieur en Belgique. *L'Anthropologie*, **65** (5-6): 421-443.
- DEWEZ M., 1960. Découvertes récentes d'objets du Paléolithique supérieur dans les déblais de la caverne de Spy. *Bulletin de la Société royale belge d'Anthropologie et de Préhistoire*, **71**: 21-24.
- DEWEZ M., 1980. Recherches au gisement de Spy. *Activités 79 du SOS fouilles*, **1**: 34-47.
- DEWEZ M., 1981a. Spy. Cent ans de fouilles et de découvertes. *Parcs nationaux (Ardenne et Gaume)*, Monographie n° 13, **36** (1): 25-42.
- DEWEZ M., 1981b. Achèvement des fouilles sur la terrasse inférieure à Spy. *Activités 80 du SOS fouilles*, **2**: 59-72.
- DEWEZ M., 1987. *Le Paléolithique supérieur récent dans les grottes de Belgique*. Louvain-la-Neuve, Institut supérieur d'Archéologie et d'Histoire de l'Art, Université catholique de Louvain: 466 p.
- DEWEZ M., KOZŁOWSKI S. K. & SACHSE-KOZŁOWSKA E., 1986. Spy. Les fouilles de F. Twiesselmann sur la Basse Terrasse. Paléolithique supérieur. *Bulletin de la Société royale belge d'Anthropologie et de Préhistoire*, **97**: 153-178.
- DI MODICA K. & JUNGELS C. (dir.), 2009. *Paléolithique moyen en Wallonie. La collection Louis Éloy*. Collections du Patrimoine culturel de la Communauté française, **2**. Bruxelles, Service du Patrimoine culturel de la Communauté française de Belgique: 219 p.
- DUPONT É., 1866. Étude sur les fouilles scientifiques exécutées pendant l'hiver de 1865-1866 dans les cavernes des bords de la Lesse. *Bulletins de l'Académie royale des Sciences, des Lettres et des Beaux-Arts de Belgique* (2^{ème} série), **XXII**: 44-54.
- FLAS D., 2008. La transition du Paléolithique moyen au supérieur dans la plaine septentrionale de l'Europe. *Anthropologica et Præhistorica*, **119**: 254 p.
- FOURMARIER P., 1953. *Notice sur Max Lohest*. Annuaire de l'Académie royale de Belgique: 109 p.
- FRAIPONT C., 1912. L'astragale chez l'Homme moustérien de Spy. Ses affinités. *Bulletin de la Société d'Anthropologie de Bruxelles*, **31**: CXCVC-CCXXVIII.
- FRAIPONT C., 1913. *Sur l'importance des caractères de l'astragale chez l'homme fossile*. Liège, Université de Liège, Faculté des sciences: 66 p.
- FRAIPONT C., 1927. Sur l'omoplate et le sacrum de l'homme de Spy. *Revue anthropologique*, **37**: 189-195.
- FRAIPONT J., 1888. Étude comparative du tibia dans ses rapports avec la station verticale chez l'homme et les anthropoïdes. *Revue d'Anthropologie*, 3^{ème} série, **3**: 145-158.
- FRAIPONT J., 1891. Les Hommes de Spy (la race de Canstadt ou de Néanderthal en Belgique). In: *Congrès international d'Anthropologie et d'Archéologie préhistoriques. Compte-rendu de la dixième session à Paris, 1889*. Paris, Ernest Leroux éditeur: 322-362.
- FRAIPONT J., 1895a. La race "imaginaire" de

- Cannstadt ou de Néanderthal. *Bulletin de la Société d'Anthropologie de Bruxelles*, **14**: 32-41.
- FRAIPONT J., 1895b. *Les cavernes et leurs habitants*. Bibliothèque scientifique contemporaine. Paris, J.-B. Baillière et fils: 334 p.
- FRAIPONT J., 1903. Essai de reconstitution des rapports de la face avec le crâne chez l'Homme de Spy. *Comptes-rendus de l'Association des Anatomistes*: 3 p.
- FRAIPONT J. & LOHEST M., 1886. La race humaine de Néanderthal ou de Canstadt, en Belgique. Recherches ethnologiques sur des ossements humains, découverts dans des dépôts quaternaires d'une grotte à Spy et détermination de leur âge géologique. Note préliminaire. *Bulletin de l'Académie royale des Sciences de Belgique*, 3^{ème} série, **XII**: 741-784.
- FRAIPONT J. & LOHEST M., 1887. La race humaine de Néanderthal ou de Canstadt en Belgique. Recherches ethnologiques sur des ossements humains, découverts dans des dépôts quaternaires d'une grotte à Spy et détermination de leur âge géologique. *Archives de Biologie*, 7/1886: 587-757.
- FRAYER D., 2006. *The Krapina Neandertals. A Comprehensive, Centennial, Illustrated Bibliography*. Zagreb, Croatian Natural History Museum: 219 p.
- FUHLROTT C., 1859. Menschliche Ueberreste aus einer Felsengrotte des Düsselthals. Ein Beitrag zur Frage über die Existenz fossiler Menschen. *Verhandlungen des Naturhistorischen Vereins der Preußischen Rheinlande und Westphalens*, **16**: 131-153.
- GENOVÉS S., 1954. The problem of the sex of certain fossil hominids, with special reference to the Neandertal skeletons from Spy. *Journal of the Royal Anthropological Institute of Great Britain and Ireland*, **84**: 131-144.
- GORJANOVIĆ-KRAMBERGER D., 1902. Der palaeolithische Mensch und seine Zeitgenossen aus dem Diluvium von Krapina in Kroatien. *Mitteilungen der Anthropologischen Gesellschaft Wien*, **32**: 187-207.
- HAMAL-NANDRIN J., SERVAIS J., FRAIPONT C., LECLERCQ S. & LOUIS M., 1939. La grotte de Spy (Province de Namur – Belgique). In: *Mélanges de Préhistoire et d'Anthropologie offerts par ses collègues, amis et disciples au Professeur Comte H. Begouën*. Toulouse, Université de Toulouse: 143-148.
- HAMAL-NANDRIN J., SERVAIS J., FRAIPONT C., LECLERCQ S. & VAN HEULE H., 1932. Quelques remarques faites au cours des fouilles entreprises en 1927 dans la grotte de Spy. In: J. DUMONT & P. HARSIN (ed.), *Fédération Archéologique et Historique de Belgique. Annales de la XXIX^e session du Congrès*, Liège: 99-102.
- HOTTON F., KLEINER S., BOLLAERT A. & TWIESSELMANN F., 1976. Le rocher des Néandertaliens de Spy. Étude radioanatomique. *Journal Belge de Radiologie*, **59**: 39-50.
- HRDLIČKA A., 1930. *The skeletal remains of early man*. Smithsonian Miscellaneous Collections, **83**: 379 p.
- KING W., 1864. The reputed fossil man of the Neanderthal. *Quarterly Journal of Science*, **1**: 88-97.
- LEGUEBE A., 1986. Importance des découvertes de Néandertaliens en Belgique pour le développement de la paléontologie humaine. *Bulletin de la Société royale belge d'Anthropologie et de Préhistoire*, **97**: 13-31.
- LOHEST M., JULIN C. & RUTOT A., 1925. Notice sur Julien Fraipont, membre de l'Académie. *Annuaire de l'Académie royale des Sciences, des Lettres et des Beaux-Arts*, **91**: 131-197.
- MAYER F., 1864. Ueber die fossilen Ueberreste eines menschlichen Schädels und Skelettes in einer Felsenhöhle des Düssel- oder Neander-Thales. *Archiv für Anatomie, Physiologie und wissenschaftliche Medicin*: 1-26.
- MCCOMB P., 1989. Upper Palaeolithic Osseous Artifacts from Britain and Belgium. An Inventory and Technological Description. *British Archaeological Reports International Series*, **481**. Oxford, Archaeopress: 361 p.
- OTTE M., 1974. *Les pointes à retouches plates du Paléolithique supérieur initial de Belgique*. Études et Recherches Archéologiques de l'Université de Liège, **2**. Liège: 24 p.
- OTTE M., 1979. *Le Paléolithique supérieur ancien en Belgique*. Bruxelles, Musées royaux d'Art et d'Histoire, Monographies d'archéologie nationale, **5**: 684 p.

- RAHIR E., 1928. *Vingt-cinq Années de Recherches, de Restaurations et de Reconstitutions*. Bruxelles, Musées Royaux du Cinquantième.
- ROUGIER H., CREVECOEUR I., FIERS E., HAUZEUR A., GERMONPRÉ M., MAUREILLE B. & SEMAL P., 2004. Collections de la *Grotte de Spy*: (re)découvertes et inventaire anthropologique. *Notae Praehistoricae*, **24**: 181-190.
- RUCQUOY A., 1886-1887. Note sur les fouilles faites en août 1879 dans la caverne de la Bèche-aux-Roches, près de Spy. *Bulletin de la Société d'Anthropologie de Bruxelles*, **V**: 318-328.
- RUTOT A., 1904a. *Le Préhistorique dans l'Europe Centrale. Coup d'œil sur l'état des connaissances relatives aux industries de la pierre en 1903, à l'exclusion du néolithique*. In: Compte-rendu du Congrès de Dinant, 1903. *Annales de la Fédération Archéologique et Historique de Belgique*: 3-255.
- RUTOT A., 1904b. Sur les gisements paléolithiques de lœss éolien de l'Autriche-Hongrie. *Mémoires de la Société d'Anthropologie de Bruxelles*, **22** (7): 1-36.
- SCHAAFFHAUSEN H., 1888. *Der Neanderthaler Fund*. Bonn, Adolph Marcus: 49 p.
- SCHMERLING P.-C., 1833-1834. *Recherches sur les ossements fossiles découverts dans les cavernes de la province de Liège*. P. J. Collardin, Librairie - Imprimeur de l'Université de Liège, **1**: 167 p.; **2**: 195 p.
- SEMAL P., JUNGELS C., CREVECOEUR I., ROUGIER H. & PIRSON P., 2009. Acquisition de la collection de Spy de François Beaufays (dit "l'Horloger") par l'Institut royal des Sciences naturelles de Belgique. *Notae Praehistoricae*, **29**: 157-164.
- SEMAL P., TWIESELMANN F., HAUZEUR A. & DEWEZ M., 1996. Étude d'une face humaine découverte dans les niveaux "gravettiens" des dépôts de pente de la grotte de Spy. Fouilles de F. Twieselmann (1950-1954). *Notae Praehistoricae*, **16**: 171-181.
- SERVAIS J., 1940. Marcel De Puydt. 1855-1940 (Notice biographique). *Bulletin de l'Institut archéologique liégeois*, **64**: 199-135.
- THIRY A., 1986. Sondage dans la couche CX de la "Basse Terrasse" à Spy (Paléolithique moyen). *Anthropologie et Préhistoire*, **97**: 147-152.
- THOMA A., 1975a. Les hommes de Spy et les Cro-magnons. *Compte-rendu de l'Académie des Sciences de Paris*, série D, **280**: 1785-1788.
- THOMA A., 1975b. Were the Spy fossils evolutionary intermediates between Classic Neandertal and Modern Man? *Journal of Human Evolution*, **4** (5): 387-410.
- THOMA A., 1986. Une mandibule d'enfant de Spy. *Anthropologie et Préhistoire*, **97**: 179-182.
- TOURNAL P., 1829. Considérations théoriques sur les cavernes à ossements de Bize, près de Narbonne (Aude), et sur les ossements humains confondus avec des restes d'animaux appartenant à des espèces perdues. *Annales des sciences naturelles*, **28**: 242-258.
- TOUSSAINT M. & PIRSON S., 2006. L'exploration en galeries souterraines, une pratique méconnue de l'histoire des fouilles préhistoriques en grottes au XIX^e siècle: l'exemple de la caverne de la Naulette (Belgique). *Paléo*, **18**: 293-312.
- TOUSSAINT M., PIRSON S. & BOCHERENS H., 2001. Les Néandertaliens de Belgique. *Anthropologica et Praehistorica*, **112**: 21-38.
- TRINKAUS E., 1978. Les métatarsiens et les phalanges du pied des Néandertaliens de Spy. *Bulletin de l'Institut royal des Sciences naturelles de Belgique*, **51** (7): 1-18.
- TRINKAUS E. & RUFF C., 1989. Diaphyseal cross-sectional morphology and biomechanics of the Fond-de-Forêt 1 femur and the Spy 2 femur and tibia. *Anthropologie et Préhistoire*, **100**: 33-42.
- ULRIX-CLOSSET M., 1975. *Le Paléolithique moyen dans le bassin mosan en Belgique*. Wetteren, Éditions Universa: 221 p.
- VIRCHOW R., 1872. Untersuchung des Neanderthal-Schädels. *Verhandlungen der Berliner Gesellschaft für Anthropologie, Ethnologie und Urgeschichte*, **4**: 157-165.
- WALKHOFF O., 1903. Sechste Lieferung: die diluvialen menschlichen Kiefer Belgiens und ihre pithekoiden Eigenschaften. In: E. SELENKA (ed.), *Menschenaffen (Anthropomorphae). Studien über Entwicklung und Schädelbau*. Wiesbaden, C. W. Kreidel's Verlag: 373-415.

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