CHAPTER XXVIII-4

TWO HUMAN COSTAL REMAINS IN THE ORIGINAL SPY COLLECTION

Asier GÓMEZ-OLIVENCIA

Abstract

The original collection of human remains from Spy included 24 costal fragments. Unfortunately, 14 of them have been lost and reassessment of the remaining collection has led to the identification of only two of these specimens as human ribs. They correspond to two adult rib fragments: a) the head and neck of a left second rib; and b) part of the non-articular tubercle and a shaft portion including the posterior angle of a right third rib. The small size of these specimens precludes any clear taxinomic identification.

INTRODUCTION

Spy was the second site to provide Neandertal costal remains after that of Feldhofer in 1856. A total of 24 fragments were listed by Fraipont & Lohest (1887) although they were unable to determine to which of the two adult skeletons these remains belonged. According to Fraipont & Lohest (1887: 650), the Spy ribs are rounded in cross-section and show an abrupt (marked?) curve, characters also found in the Feldhofer Neandertal and indicating "exceptionally powerful" thoracic muscles after Schaaffhausen (1858).

In an unpublished inventory made in 1935 at the time of the deposit of the Spy collection at the Royal Belgian Institute of Natural Sciences (RBINS), 10 rib fragments were listed (Rougier *et al.*, this volume: chapter XIX). Fourteen remains were thus lost, as were other specimens such as the vertebrae. The 10 rib fragments present at the RBINS are labelled 20A to 20J. In the Catalogue of Fossil Hominids, Twiesselmann (1971) mentioned only three rib fragments: two very fragmentary specimens that he associated to "Spy 1" and one fragment associated to "Spy 2". There is however no indication of which particular rib fragments this author refers to. Recent reassessment of the 10 fragments labelled as human ribs led to the identification of only three specimens as human –two rib fragments were identified by the author and a pathological metacarpal was identified by I. Crevecoeur (see Crevecoeur, this volume: chapter XXVII). The other seven specimens are faunal rib fragments. The objective of this chapter is to describe the two human rib fragments.

MATERIALS AND METHODS

The newly recognised specimens, labelled 20E and 20G, are housed at the RBINS. In order to compare these specimens metrically, we used three original Neandertal specimens. Two of them (Kebara 2 and Shanidar 3) are traditionally regarded as male individuals (Trinkaus, 1983; Gómez-Olivencia *et al.*, 2009) while the sex of the third one (Regourdou 1) has been determined as either male (Vallois, 1965; Gómez-Olivencia *et al.*, 2007) or indeterminate (Vandermeersch & Trinkaus, 1995). A modern Euroamerican comparative sample from the Cleveland Museum of Natural History (Hamann-Todd collection) and from the Department of Anthropology of the University of Iowa was also used. The measurements used are described in Gómez-Olivencia *et al.* (2010) and are in most part similar to those proposed by Franciscus & Churchill (2002).

RESULTS

The two new human costal remains are described synthetically in Table 1 and their metrics are given and compared in Tables 2 and 3.

Spy 20E

This specimen corresponds to the head and neck of a left second rib (Figure 1). The anatomical determination is based on the length and shape of the neck and comparison to Neandertal specimens such as Kebara 2. Spy 20E shows slight erosion on the head, which has exposed the trabecula in certain parts. The head is completely fused providing a minimum age-at-death of 17-18 years based on modern standards (Ríos & Cardoso, 2009).

Only three standard measurements can be taken on Spy 20E. The cranio-caudal diameters of the head and neck are similar to Regourdou 1 and smaller than Kebara 2, and are closer to the modern human female mean than to the male mean. Regarding the neck thickness, Spy 20E's value is close to Kebara 2 and is in between the modern human male and female means.

Spy 20G

This specimen preserves part of the non-articular tubercle and a shaft portion including the posterior angle of a right third rib (Figure 2). The anatomical determination is based on the proximity of the posterior angle to the non-articular tubercle (typical of 3rd ribs), the strong curvature of the vertebral-most shaft fragment (a feature typical of ribs 2 to 4) and the orientation of the shaft typical of the upper ribs 3 to 5. In cranial view, it is possible to ascertain the presence of two parallel lines of small tubercles that correspond to the insertion points of the intercostal muscles.

Labels	*Anatomical position*	*Side*	*Number of fragments*	*Head*	*Neck*	*Tubercle*	*Shaft*	*Posterior angle*	*Shaft*	*Sternal end*
20E	2	L	1	C	C					
20G	3	R	1			P	C	C	P	

L = left; R = right; C = complete; P = partial.

Table 1. Synthetic anatomical representation of the Spy ribs.

Variable		*Spy*	*Regourdou 1*	*Kebara 2*		*Euroamerican males (2L)*			*Euroamerican females (2L)*		
		20E (2L)	2L	2R	2L	Mean ± SD	Range	n	Mean ± SD	Range	n
0a	Preserved length (PrL)	31.6									
0b	Preserved external arc (PrExA)	21.0									
0c	Preserved external arc ventral to the tubercle (PrExAVT)	21.0									
0d	Preserved internal arc (PrInA)	27.0									
4a	Head cranio-caudal diameter (HCCD)	8.3	8.1	10.8		11.04 ± 1.26	8.6-14.1	31	8.90 ± 1.60	6.5-13.0	31
6	Neck minimum cranio-caudal diameter (NMnCCD)	5.6	5.9	6.7	6.1	6.44 ± 0.94	5.1-8.5	31	5.51 ± 0.90	3.2-8.3	31
7	Neck thickness (NTh)	6.4	7.5	7.2	6.7	7.07 ± 1.49	4.6-11.5	31	5.87 ± 1.03	4.3-7.6	31

L = left; R = right.

Table 2. Raw dimensions (mm) of the left second rib Spy 20E compared to Neandertal and modern samples.

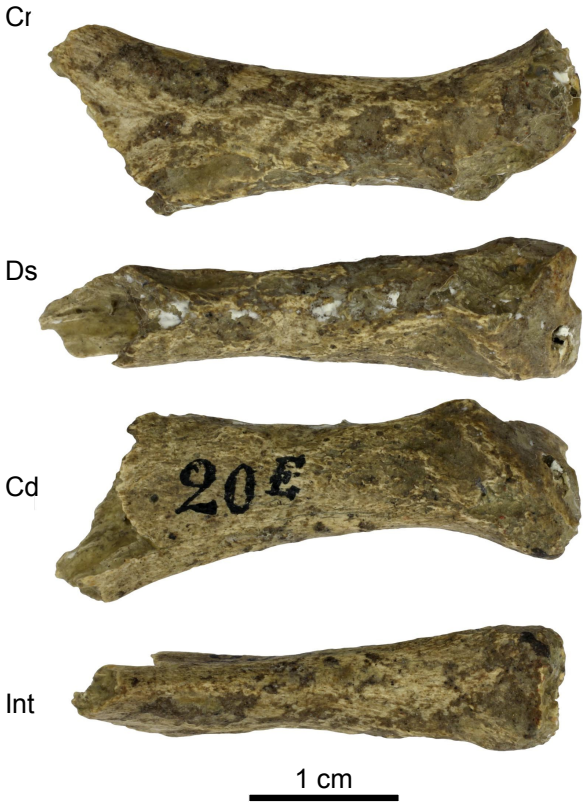

Figure 1. Cranial (Cr), dorsal (Ds), caudal (Cd) and internal (Int) views of the left second rib Spy 20E.

Four standard measurements were taken on Spy 20G: at the vertebral-most part of the shaft (between the tubercle and posterior angle) and at the posterior angle. The vertebral-most part of the shaft of Spy 20G is slightly larger cranio-caudally than the modern male sample and is below the male Neandertal specimens, while its thickness is similar to Shanidar 3 and the modern male sample but below Kebara 2 and Regourdou 1.

DISCUSSION AND CONCLUSIONS

From a historical standpoint, it is interesting to note that some of the ribs originally assigned to the Spy Neandertals are, in fact, faunal remains. It is thus not possible to know whether the characteristics of the ribs noted by Fraipont & Lohest (1887: 650) as Neandertal-like, i.e. that the Spy ribs were rounded in cross-section and strongly curved, relied on human remains or, on the contrary, were based on faunal

Figure 2. Cranial (Cr), internal (Int), caudal (Cd) and external (Ext) views of the right third rib Spy 20G.

remains. Moreover, these were plain observations with no attempt at quantification. The Spy costal specimens studied here are too fragmentary to clearly provide taxinomic (*sensu* Tardieu, 2011) information in order to identify them as belonging to Neandertals. The measurements taken neither prove nor refute this attribution.

Yet, many observations provided by classic authors have been corroborated once proper comparative studies have been performed. However this has not been a clear and straightforward path. For example, in the case of the Neandertal thorax that was traditionally considered as large, the discovery and study of the most complete Neandertal thorax found to date (i.e. Kebara 2) led to propose that "ribs of Kebara man are quite similar in metric and morphological respects to those of ribs in present human populations" (Arensburg, 1991: 142). In contrast, more recent studies on the costal skeletons of different Neandertals, including Kebara 2, have found significant differences in the size and shape of the Neandertal thorax when compared to modern human samples (Franciscus & Churchill, 2002; Gómez-Olivencia *et al.*, 2009). Most of the differences found by these authors relate to the overall dimensions and/or shaft thickness of certain ribs.

Variable		*Spy*	*Kebara 2*		*Regourdou 1*	*Shanidar 3*	*Euroamerican males (3R)*			*Euroamerican females (3R)*		
		20G (3R)	3R	3L	3L	3R	Mean ± SD	Range	n	Mean ± SD	Range	n
0a	Preserved length (PrL)	75.3										
0b	Preserved external arc (PrExA)	79.0										
0c	Preserved external arc ventral to the tubercle (PrExAVT)	79.0										
0d	Preserved internal arc (PrInA)	72.0										
15	Shaft maximum diameter at dorsal end (DSMxD)[a]	9.8			11.8	11.1	8.71 ± 1.03	6.2-11.3	29	8.02 ± 0.85	6.4-10.1	29
16	Shaft minimum diameter at dorsal end (DSMnD)[a]	7.7		9.7	9.4	7.2	7.83 ± 1.03	5.4-10.4	29	6.17 ± 0.79	4.8-8.2	29
17	Shaft maximum diameter at posterior angle (SMxD)[a]	10.0	(15.5)[b]		(15.0)[b]	14.9	10.26 ± 1.14	7.3-12.2	29	9.27 ± 0.97	6.7-11.7	29
18	Shaft minimum diameter at posterior angle (SMnD)[a]	7.6	7.9	7.8	8.5	7.4	8.37 ± 1.04	6.1-10.4	28	6.66 ± 1.22	4.6-9.1	29

L = left; R = right.
[a] Maximum values were taken cranio-caudally and minimum values interno-exteriorly.
[b] Values in parentheses are estimated.

Table 3. Raw dimensions (mm) of the right third rib Spy 20G compared to Neandertal and modern samples.

In sum, from the original collection of 24 ribs associated to Spy I and II, 14 have been lost, and from the remaining 10, seven are faunal remains and one is a pathological metacarpal. This leaves only two ribs from the original collection identified as human and they correspond to a second and a third rib. The small size of these specimens precludes any clear taxinomic identification.

ACKNOWLEDGEMENTS

I would like to thank P. Semal (RBINS) for the kind access to the Spy material, and H. Rougier, P. Semal and I. Crevecoeur for the invitation to participate in this monograph. Discussion with I. Crevecoeur was extremely useful during the identification of the two rib fragments. Thanks to H. Rougier for the edition of previous versions of this chapter and for information on the Spy past inventories. Photographs were kindly provided by Éric Dewamme (RBINS). Thanks to C. Couture and B. Maureille (*Université Bordeaux 1*/UMR 5199 du CNRS-PACEA) for access to Regourdou 1, to Y. Rak (Tel Aviv University) for access to Kebara 2, to R. Potts (Smithsonian Institution) for access to Shanidar 3, to Y. Haile-Selassie (Cleveland Museum of Natural History) for access to the Hamann-Todd collection, and to R. G. Franciscus for access to the modern human collection in his care. Thanks also to Lyman Jellema for curatorial assistance. AGO has a Marie Curie Intra-European Fellowship and has also received support from the Ministerio de Economía y Competitividad (project CGL2012-38434-C03-01).

BIBLIOGRAPHY

ARENSBURG B., 1991. The vertebral column, thoracic cage and hyoid bone. *In*: O. BAR-YOSEF & B. VANDERMEERSCH (ed.), *Le squelette moustérien de Kébara 2*. Paris, Éditions du CNRS: 113-147.

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.

FRANCISCUS R. G. & CHURCHILL S. E., 2002. The costal skeleton of Shanidar 3 and a reappraisal of Neandertal thoracic morphology. *Journal of Human Evolution*, **42** (3): 303-356.

GÓMEZ-OLIVENCIA A., CARRETERO J. M., ARSUAGA J. L., RODRÍGUEZ-GARCÍA L., GARCÍA-GONZÁLEZ R. & MARTÍNEZ I., 2007. Metric and morphological study of the upper cervical spine from the Sima de los Huesos site (Sierra de Atapuerca, Burgos, Spain). *Journal of Human Evolution*, **53** (1): 6-25.

GÓMEZ-OLIVENCIA A., CARRETERO J. M., LORENZO C., ARSUAGA J. L., BERMÚDEZ DE CASTRO J. M. & CARBONELL E., 2010. The costal skeleton of *Homo antecessor*: preliminary results. *Journal of Human Evolution*, **59** (6): 620-640.

GÓMEZ-OLIVENCIA A., EAVES-JOHNSON K. L., FRANCISCUS R. G., CARRETERO J. M. & ARSUAGA J. L., 2009. Kebara 2: new insights regarding the most complete Neandertal thorax. *Journal of Human Evolution*, **57** (1): 75-90.

RÍOS L. & CARDOSO F. V., 2009. Age estimation from stages of union of the vertebral epiphyses of the ribs. *American Journal of Physical Anthropology*, **140** (2): 265-274.

SCHAAFFHAUSEN D., 1858. Zur Kenntnis der ältesten Rassenschädel. *Archiv für Anatomie, Physiologie und Wissenschaftliche Medicin*, **25**: 453-478.

TARDIEU C., 2011. La bonne orthographe du mot taxinomie. Un concept important dont l'orthographe est malmenée. *Paleo*, **22**: 331-334.

TRINKAUS E., 1983. *The Shanidar Neandertals*. New York, Academic Press: 502 p.

TWIESSELMANN F., 1971. Belgium. *In*: K. P. OAKLEY, B. G. CAMPBELL & T. I. MOLLESON (ed.), *Catalogue of Fossil Hominids. Part II: Europe*. London, Trustees of the British Museum: 5-13.

VALLOIS H. V., 1965. Le sternum néandertalien du Regourdou. *Anthropologische Anzeitung*, **29**: 273-289.

VANDERMEERSCH B. & TRINKAUS E., 1995. The postcranial remains of the Regourdou 1 Neandertal: the shoulder and arm remains. *Journal of Human Evolution*, **28** (4): 439-476.

AUTHOR'S AFFILIATION

Asier GÓMEZ-OLIVENCIA
Équipe de Paléontologie Humaine
UMR 7194
Département de Préhistoire
du Muséum national d'Histoire naturelle
Musée de l'Homme
17, place du Trocadéro
75016 Paris
France
agomezolivencia@mnhn.fr
and
Centro Mixto UCM-ISCIII
de Evolución y Comportamiento Humanos
Avda. Monforte de Lemos 5
28029 Madrid
SPAIN