SCHOLARS, SOLDIERS, CRAFTSMEN, ELITES?: ANALYSIS OF FRENCH COLLECTION OF HUMAN REMAINS FROM QUMRAN*

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Introduction

Physical anthropologists "look for life in patterns of death"[1] by synthesizing biology and culture into a biocultural framework for viewing the past. Skeletal and dental remains offer a unique perspective on antiquity because they provide a composite record of humans as biological entities within a cultural and environmental setting. When this evidence is merged with the historical and/or archaeological records of a people, a powerful tool for understanding life in the past becomes available. The purpose of this study was thus to explore the possibility of such synthesis for the community at Qumran.

There has long been a call in the literature for a detailed anthropological analysis of the human remains from Qumran exhumed by Roland de Vaux, OP in the 1950s.[2] In 1999, that call was answered

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[1] D. Martin et al., *Black Mesa Anasazi Health: Reconstructing Life from Patterns of Death and Disease* (Carbondale, IL: University of Illinois Press, 1991) 27.

[2] "Of all the skeletons found, only one was studied in detail and reports of all the

by O. Röhrer-Ertl and colleagues when they published their findings for a segment of the collection, curated in Germany.[3] As will be described later in this paper, additional segments of the de Vaux collection were shortly thereafter revealed in Jerusalem and Paris. The forty-plus-year disappearance of the remains furthered the mystique of this collection. Although the rediscovered collection is small, its possible relation to the Dead Sea Scrolls provided a basis for considerable interest in the results.[4]

This paper will describe the Paris and Jerusalem segments of the Qumran collection (hereafter referred to as the French collection),[5]

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others have been published only in cursory form," M. Broshi, "The Archaeology of Qumran: A Reconsideration," *The Dead Sea Scrolls: Forty Years of Research* (eds D. Dimant and U. Rappaport; STDJ 10; New York: Brill, 1992) 112; "Publish all anthropological materials still in existence . . .," Z. Kapera, "Some Remarks on the Qumran Cemetery," *Methods of Investigation of the Dead Sea Scrolls and the Khirbet Qumran Site: Present Realities and Future Prospects* (eds M.O. Wise, N. Golb, J.J. Collins, and D.G. Pardee; Annals of the New York Academy of Sciences 722; New York: New York Academy of Sciences, 1994) 110; "The opening of more of the tombs should provide greater clarity about the marriage/celibacy dispute," J.C. VanderKam, *The Dead Sea Scrolls Today* (Grand Rapids, MI: Eerdmans, 1994) 91; "Detailed anthropological examination of these skeletal remains have, unfortunately, never been published," S. Steckoll, "The Community of the Dead Sea Scrolls," *Atti del Centro studi e documentazione sull'Italia romana 5: Convegno internazionale sui metodi di studio della città antica* (1974) 230.

[3] O. Röhrer-Ertl, F. Rohrhirsch, and D. Hahn, "Über die Gräberfelder von Khirbet Qumran, insbesondere die funde der campagne 1956. I: Anthropologische datenvorlage und erstauswertung aufgrund der collectio Kurth," *RevQ* 19 (1999) 3–46 (reprinted in B. Mayer (ed.), *Jericho Und Qumran: Neues Zum Umfeld Der Bibel* [Regensburg: Verlag Friedrich Pustet) 165–226.

[4] Several authors have discussed in detail the possible connection (or lack thereof) between the site of Qumran, the cemetery, and the Dead Sea Scrolls. Please see the following works for details of this debate: C.M. Murphy, *Wealth in the Dead Sea Scrolls and the Qumran Community* (STDJ 40; Leiden: Brill, 2002) 293–360; Y. Hirschfeld, "The Architectural Context of Qumran," *The Dead Sea Scrolls: Fifty Years After Their Discovery: Proceedings of the Jerusalem Congress, July 20–25, 1997* (eds L.H. Schiffman, E. Tov, and J.C. VanderKam; Jerusalem: Israel Exploration Society and The Shrine of the Book, Israel Museum, 2000) 673–83; J. Magness, "A Reassessment of the Excavations at Qumran," *The Dead Sea Scrolls: Fifty Years After Their Discovery* (eds Schiffman et al.) 708–19; J. Zangenberg, "The 'Final Farewell': A Necessary Paradigm Shift in the Interpretation of the Qumran Cemetery," *QC* 8 (1999) 213–18; R. Donceel and P. Donceel-Voûte, "The Archaeology of Khirbet Qumran," *Methods of Investigation of the Dead Sea Scrolls* (eds Wise et al.) 1–38; J.-B. Humbert, "L'espace sacré à Qumrân," *RB* 101 (1994) 161–214; VanderKam, *The Dead Sea Scrolls Today*; N. Golb, "Khirbet Qumran and the Manuscripts of the Judean Wilderness: Observations on the Logic of Their Investigation," *JNES* 49 (1980) 103–14; R. de Vaux, *Archaeology and the Dead Sea Scrolls* (London: Oxford University Press, 1973).

[5] Both the Jerusalem and Paris collections are under curation by French research institutes. The remains from eighteen graves comprise the French collection. Another

providing a summary of their reemergence, rationale for study, survey of the methods used to date the material, location of the tombs on a new cemetery map, description of the demographic, anthropometric, and genetic analyses conducted to date, and comparison to published regional counterparts.[5] Finally, the utility of a biocultural synthesis will be discussed, as well as future directions for the research.

Theoretical Approach

The biocultural model emerges from the interaction of data culled from a variety of sources (Figure 1). This holistic approach to antiquity recognizes biological (physiological, environmental) constraints on the human animal, reflected in cultural practices both symbolic and material. The model conversely discerns the importance of culture as a mechanism available to humans for adapting to their physical surroundings.

Just as patterns of disease affecting the human being cannot be divorced from the cultural context in which the group exists—the rituals and values, art and technology, symbol and myth of a people can not be fully understood without an appreciation for the biological constraints on its individuals. The cultural account facilitates interpretation of questions biological, and conversely, the skeletal "catalogue" provides evidence to spark inquiry undeveloped in the textual and material archives.

The biocultural approach has allowed anthropologists, theologians, and historians alike to address questions related to political/economic change, social stratification, differential access to limited resources, child-

twenty-two are housed in Germany (please see Röhrer-Ertl et al., "Über die Gräberfelder von Khirbet Qumran," for more information on this segment of the collection).

[5] Sincere thanks to the École Biblique et Archéologique Française in Jerusalem for providing access to the collection and laboratory space in their museum to conduct the research. Additional thanks to the Dorot Foundation, Scandinature Films, the Dead Sea Scrolls Foundation, the W.F. Albright Institute of Archaeological Research in Jerusalem, the Orion Center for the Study of the Dead Sea Scrolls and Associated Literature at the Hebrew University-Jerusalem, and the University of Notre Dame's Institute for Scholarship in the Liberal Arts, the Graduate School, the Department of Theology, and the Department of Anthropology for generously funding this research. Particular thanks to Profs James VanderKam, Eugene Ulrich, Julia Douthwaite, Chris Fox, and John Cavadini (University of Notre Dame), Wesson Fields (Dead Sea Scrolls Foundation), Sterling Van Wagenen (Florida State University), Ernest Frerichs and Michael Hill (Dorot Foundation), Esther Chazon (Orion Center), and Seymour Gitin and John Spencer (AIAR) for their help in securing the funds for this analysis.

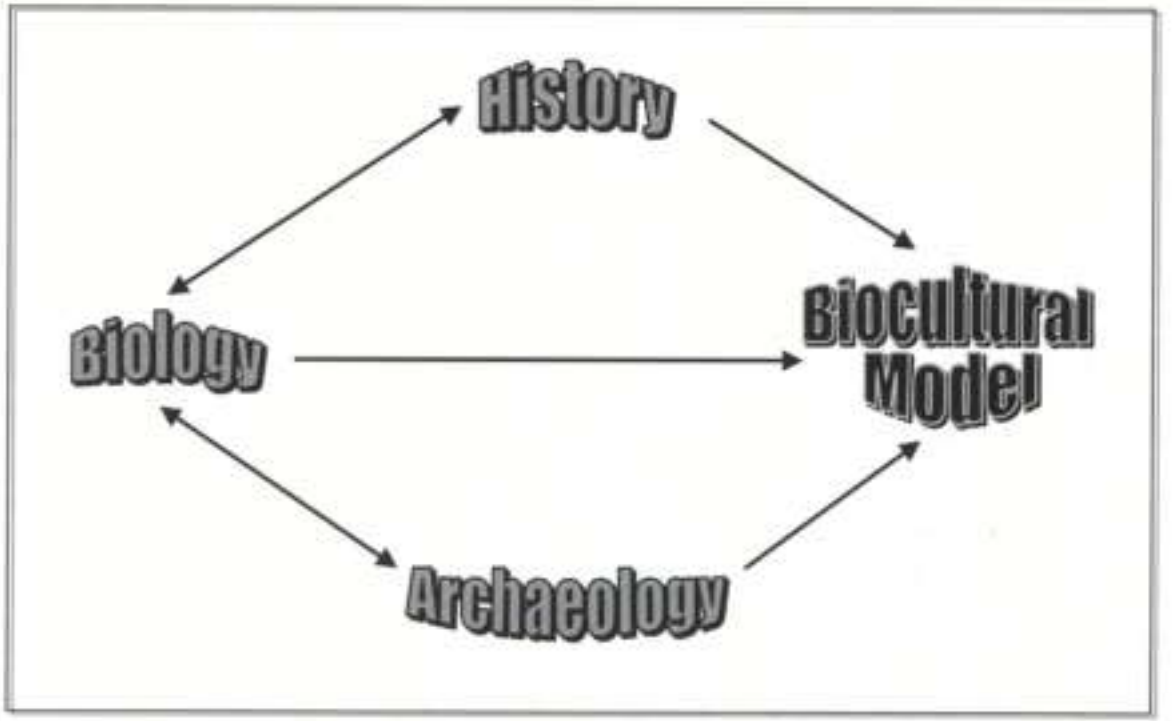

Figure 1. A biocultural model for the human remains from Qumran. The biological component is enhanced by data related to diet, demography, and disease; the historical contribution by the writings of Pliny the Elder, Philo of Alexandria, Flavius Josephus, the Dead Sea Scrolls, and the Babatha archives; and the archaeological aspect by various dating methods, associated artifacts, tomb orientation and typology, and regional comparisons to temporal correlates.

hood health and adaptability, occupational stress, demographic shifts, and quality of life issues such as longevity and health status for past populations.[7] For Qumran, the detailed historical record of the period, region and site, combined with the abundant archaeological record now amassed, provides a rich cultural lens for studying the biological archive frozen in the skeletons of the site's inhabitants.

Sadly however, the French collection does not cooperate with this model. The current skeletal series is too small and incomplete[8] for the reconstruction of community diet, demography, or disease profiles. Nevertheless, the data collected for the current study were gathered with an eye towards such a biocultural synthesis for comparison to regional correlates and possible future exhumations from the site.

Cemetery Assemblages: A cemetery is by definition a suspect sampling of the living community from which it drew. Indeed, it has been argued that these "death assemblages"[9] often skew demographic data towards those individuals less adapted. Furthermore, migration, conflict, exploration, trade and other activities can remove members of an extant population at the time of death, resulting in absence from their representative graveyard.

[7] For examples of biocultural reconstructions, see S. Sheridan, "'New Life the Dead Receive': The Relationship between Human Remains and the Cultural Record for Byzantine St. Stephen's," *RB* 106 (1999) 574–611; idem, "Morbidity and Mortality in a Classic-period Hohokam Community," *Ancient Burial Practices in the American Southwest* (eds D.R. Mitchell and J. Brunson-Hadley; Albuquerque, NM: University of New Mexico Press, 2001) 191–221; A. Goodman and T. Leatherman (eds), *Building a New Biocultural Synthesis: Political-Economic Perspectives on Human Biology* (Ann Arbor, MI: University of Michigan Press, 1998); C. Larsen, *Bioarchaeology: Interpreting Behavior from the Human Skeleton* (New York: Cambridge University Press, 1997); D. Van Gerven, S. Sheridan, and W. Adams, "The Health and Nutrition of a Medieval Nubian Population," *American Anthropologist* 97 (1995) 468–80; D. Van Gerven and S. Sheridan (eds), *The Bioethnography of a Classic Period Hohokam Population* (The Pueblo Grande Project 6; Phoenix: SSI Publications in Archaeology, 1994); A. Goodman, "On the Interpretation of Health from Skeletal Remains," *Current Anthropology* 34 (1993) 281–88; Martin et al., *Black Mesa Anasazi Health*; M. Iscan and K. Kennedy (eds), *Reconstruction of Life from the Skeleton* (New York: Liss, 1989); M. Cohen and G. Armelagos, *Paleopathology at the Origins of Agriculture* (New York: Academic Press, 1984); D. Ortner, "Biocultural Interaction in Human Adaptation," *How Humans Adapt: A Biocultural Odyssey* (ed. D.J. Ortner; Washington, DC: Smithsonian Institution Press, 1983) 127–62.

[8] In the majority of cases only the cranium and pelvis were collected for analysis. See Figure 4 for an illustration of this point.

[9] S. Hillson, *Dental Anthropology* (New York: Cambridge University Press, 1996) 70.

As explained by S. Hillson, however, "this does not necessarily preclude . . . the assessment of general biological relationships, but it inevitably reduces the expectations for such approaches."[10] The above concerns—when added to a biased excavation scheme, incomplete exhumations, and inconsistent curation methods—render the representative nature of the French collection questionable at best.[11]

Justification: In addition to the concerns listed above, sample size must also be addressed. De Vaux, É. Puech, and E. Schuller[12] among others, observed that the exhumed sample size is insufficient for detailing aspects of community adaptation, daily life, group health, or demography. There may be as many as 1100 burials at Qumran,[13] for which published documentation exists on fifty-three exhumations.[14] Of those, only thirty-nine have undergone modern anthropological analysis, representing approximately 3.5% of the total interred collection.

The great interest in Qumran has amplified the importance of this sparse collection, especially in light of the numerous and varied hypotheses generated from the remains. P. Davies warned that "preconceptions lead to over-interpretation"[15]—a truism evidenced by the, at times fanciful, reconstructions of the Qumran material. These have ranged from a barefoot man, to Roman soldiers, to horsemen. Tales of torture and

[10] Hillson, *Dental Anthropology*, 70.

[11] I. Morris, *Death, Ritual and Social Structure in Classical Antiquity* (New York: Cambridge University Press, 1992) 70–102.

[12] ". . . the small number of tombs excavated does not permit us to draw any statistics from them which can validly be applied to the cemetery as a whole" (de Vaux, *Archaeology and the Dead Sea Scrolls*, 47); "Certainly statistics or generalizations would be untimely based on only 43 tombs excavated by DeVaux among the about 1200 numbered burials . . ." É. Puech, "The Necropolises of Khirbet Qumrân and 'Ain el-Ghuweir and the Essene Belief in the Afterlife," *BASOR* 312 (1998) 25; "Given the present state of our knowledge, it is far from certain whether any conclusions can be drawn from the cemetery. The proportion of the graves excavated is statistically so small . . ." E. Schuller, "Women in the Dead Sea Scrolls," *The Dead Sea Scrolls After Fifty Years: A Comprehensive Assessment* (eds P.W. Flint and J.C. VanderKam; Leiden: Brill, 1999) 2.141.

[13] C. Clermont-Ganneau, "Letters from Clermont-Ganneau III," *PEQ* (1874) 83 (reprinted in idem, *Archaeological Researches in Palestine During the Years 1873-1874* [trans. J. McFarlane; London: Palestine Exploration Fund, 1896] 2.14-16); de Vaux, *Archaeology and the Dead Sea Scrolls*, 46; G. Vermes, *Discovery in the Judean Desert: The Dead Sea Scrolls and Their Meaning* (New York: Desclee Company, 1956) 16.

[14] Of the fifty-three skeletons, de Vaux exhumed forty-three, Steckoll nine, and Clermont-Ganneau one.

[15] P. Davies, "How Not to Do Archaeology: The Story of Qumran," *BA* 52 (1988) 206.

dismemberment, nuclear families and celibacy, warriors and farmers have been reconstructed . . . often from the same remains![16]

Therefore, the study of the human bones from Qumran is not only justified but necessary due to the range of speculation about these skeletons, combined with the continuing call in the literature for their analysis. As Röhrer-Ertl and colleagues warned, however, we must remember we are describing individuals, which cannot conclusively be extrapolated to patterns for the community at large.[17] When cognizant of this distinction, such study does indeed add to the present state of knowledge about Qumran.

The Qumran Skeletal Collection

In 1874 C. Clermont-Ganneau described the exhumation of a grave at Qumran, from which he removed a portion of mandible for later study.[18] Seventy-five years later, systematic excavation of the site (ruins and cemetery) began under the direction of de Vaux, and archaeologists from the École Biblique et Archéologique Française de Jérusalem. By 1955, forty-three graves in the cemetery had been exhumed.[19] The remains disappeared shortly thereafter, not to reemerge for analysis for forty-plus years.

S. Steckoll excavated nine more skeletons in 1966.[20] Haas and

[16] J. Zias, "The Cemeteries of Qumran and Celibacy: Confusion Laid to Rest?" *DSD* 7 (2000) 220–53; Röhrer-Ertl et al., "Über die Gräberfelder von Khirbet Qumran"; M. Broshi, "A Day in the Life of Hananiah Nothos," *Ariel* 106 (1998) 54–64; N. Golb, "The Major Anomalies in the Qumran-Sectarian Theory and their Resolution," *QC* 2 (1993) 161–82; Steckoll, "The Community of the Dead Sea Scrolls"; N. Haas and H. Nathan, "Anthropological Survey on the Human Skeletal Remains from Qumran," *RevQ* 6 (1968) 345–52.

[17] Röhrer-Ertl et al., "Über die Gräberfelder von Khirbet Qumran," 6.

[18] Clermont-Ganneau ("Letters from Clermont-Ganneau," 83) reports removing "a bit of a jawbone, with teeth adhering" that he hoped to submit for anthropological analysis. It appears the results of said analysis were never published.

[19] R. de Vaux, "Fouilles au Khirbet Qumrân, rapport préliminaire," *RB* 60 (1953) 83–106; idem, "Fouilles au Khirbet Qumrân, rapport préliminaire sur la deuxième campagne," *RB* 61 (1954) 206–36; idem, "Fouilles au Khirbet Qumrân, rapport préliminaire sur les 3e, 4e, et 5e campagnes," *RB* 63 (1956) 533–77; idem, *Archaeology and the Dead Sea Scrolls*.

[20] S. Steckoll, "Preliminary Excavation Report in the Qumran Cemetery," *RevQ* 6 (1968) 323–43; idem, "Marginal Notes on the Qumran Excavations," *RevQ* 7 (1969) 33–40; idem, "The Community of the Dead Sea Scrolls"; S. Steckoll, Z. Goffer, H. Nathan, and N. Haas, "Red-Stained Human Bones from Qumran," *Israel Journal of Medical Sciences* 7 (1971) 1219–23. Steckoll reports opening ten tombs ("The Community of the Dead Sea Scrolls," 200).

Nathan published a reconstruction of one of the skeletons in 1968, with cursory descriptions of age and sex for the eight others.[21] Steckoll subsequently engaged in additional reconstructions of these remains in an obscure 1974 Italian publication.[22]

In 1999, a German team of scholars published an article detailing their analysis of a collection of twenty-two skeletons (or portions thereof) from Qumran[23] These remains were transported to Germany in the 1950s and remained in storage until their curation in the early 90s.[24] Comparable study of the contents of seventeen tombs under French jurisdiction began in the late summer of 1999.

The French Collection: The remainder of this paper will deal with specifics related to the Paris and Jerusalem segments of the collection. In mid-July 1999, I was invited by Sir Jean-Baptiste Humbert, OP[25] to analyze the articulated remains of the man from Tomb 18.[26] The bones were "glued" to a cardboard and plaster base, and covered with a thick layer of paraffin preservative.[27] Initial curation began by removing the waxy matrix and reassembling the skeleton in proper anatomical order (several bones were out of place). The nearly-complete skeleton was accompanied by one very long piece of wood,[28] hundreds of smaller wood fragments, and approximately thirty metal nails.

In December 1999, Prof. Humbert presented the remains of nine

[21] Haas and Nathan, "Anthropological Survey"; reference to Haas and Nathan's findings are also outlined in Steckoll, "Preliminary Excavation Report."

[22] In English, Steckoll talks of torture and dismemberment ("The Community of the Dead Sea Scrolls," 228–31), making reference to the work of Haas and Nathan, "Anthropological Survey." However, they never make such suppositions in print. This 1974 work is highly convoluted, with those sections discussing the skeletal remains based on little accepted anthropological methodology. Special thanks to Magen Broshi for providing a copy of this manuscript.

[23] Röhrer-Ertl et al., "Über die Gräberfelder von Khirbet Qumran."

[24] Details of provenience for the German collection can be found in the introduction of Röhrer-Ertl et al., "Über die Gräberfelder von Khirbet Qumran."

[25] Professor of Archaeology, École Biblique et Archéologique de Jérusalem.

[26] This study would not have been immediately possible were it not for the help of students working with me that summer on another collection—Jaime Ullinger, Jerremy Ramp, and William Brennan. Special thanks to the University of Notre Dame's Institute for Scholarship in the Liberal Arts, Department of Theology, and Graduate School for providing immediate funding, thereby allowing us to extend our stay in Jerusalem by a month.

[27] The skeleton had been on display for decades at the Rockefeller Museum in East Jerusalem.

[28] The largest piece of (presumably) coffin wood from Tomb 18 measures 152 × 12 × 2 cm (L × H × W). Donceel and Donceel-Voûte ("The Archaeology of Khirbet Qumran," 14) report that the wood is cypress (*Cypressus semper virens*).

more Qumran graves for analysis.[29] The Jerusalem portion includes remains from Tombs 12, 13, 15, 16a, 16b, 17, 18, 19, and Tombs A and B.[30] Permission was granted in August 2000 to analyze the eight individuals housed at the Museé de l'Homme in Paris,[31] which included remains from Tombs 3, 4, 5, 6, 7, 8, 10, and 11.[32]

Table 1: Individuals in the French Collection of Human Remains from Qumran

Tomb	DeVaux Catalogue	Year Exhumed	Original Investigator	Current Location
3	Q 3	1951	Vallois	Paris
4	Q 4	1951	Vallois	Paris
5	Q 5	1951	Vallois	Paris
6	Q 6	1951	Vallois	Paris
7	Q 7	1951	Vallois	Paris
8	Q 8	1951	Vallois	Paris
10	Q 10	1951	Vallois	Paris
11	Q 11	1951	Vallois	Paris
12	Q 12	1953	Kurth	Jerusalem
13	Q 13	1953	Kurth	Jerusalem
15	Q 15	1953	Kurth	Jerusalem
16a	Q 16–I	1953	Kurth	Jerusalem
16b	Q 16–II	1953	Kurth	Jerusalem
17	Q 17	1953	Kurth	Jerusalem
18	Q 18	1953	Kurth	Jerusalem
19	Q 19	1953	Kurth	Jerusalem
A	QN 01	1955	Kurth	Jerusalem
B	QN 02	1955	Kurth	Jerusalem

[29] The bones were stored in small clearly marked boxes, inside a large unmarked box, which may explain how they went unnoticed in the École's extensive archaeological collection. Renovation of the École Biblique et Archéologique Française library began in August 1999, which required the movement of all materials in the archaeological laboratories adjacent to the library holdings. In the process of reorganizing the archaeology museum in Fall 1999, the additional Qumran remains were uncovered.

[30] Only pieces of wood and approximately fifteen nails were found in the box for Tomb 17. No bones were present.

[31] Special thanks to Dr Mario Chech of the Museé de l'Homme for access to the remains in Paris, and to Profs James Phillips (University of Illinois-Chicago) and Jean-Baptiste Humbert (École Biblique et Archéologique Française-Jerusalem) for their help in securing permission from the Museum.

[32] Much of the information in Table 1 was gleaned from the catalogue in Röhrer-Ertl et al., "Über die Gräberfelder von Khirbet Qumran," on the insert following p. 46. Any mistakes in translation are mine.

Bones from Tombs 1, 2, 9, 14, and 17 are missing from the sequence.[33] Photos at the École Biblique (Figure 2) show the skeletons interred therein;[34] however, the remains have not yet resurfaced for analysis.

Provenience: Figure 3 illustrates the multiple lines of evidence used to establish provenience for this collection. In some cases there was a clear match with de Vaux's original photographic record. Enclosed packing materials and handwritten notes, inscribed masking tape found under the paraffin preservative, writing directly on bones, and consistency with the field notes of de Vaux and the original osteologists help build a strong circumstantial case of provenience for this collection.

For the remains in Jerusalem, each individual (except Tomb 18) was presented in storage boxes labeled with a tomb designation. Most of the bones were wrapped in toilet paper. Pieces of wood from Tombs 17, 18, and 19 were packaged in plastic bags. Metal nails were wrapped in paper and stored in small Jordanian cigarette boxes. Notes with the site name and dates were often enclosed with the remains.

In Paris, the bones were presented in small open cardboard storage trays. Most of the large pieces of bone were labeled with India ink indicating the site ("Kh. Qumran"), location ("Palestine"), a date of exhumation, a tomb number, and a catalogue number specific to the Musée de l'Homme.

It appears that some of the remains in Paris were commingled during curation. Mixed with the bones of Tombs 4, 5, and 8 were the possible portions of the Tomb 3 skeleton. Written on several bones directly, and located under the paraffin covering, were rather large "3"s. All such pieces represent redundancies of body parts for a given

[33] Recently Zias ("The Cemeteries of Qumran and Celibacy," 250) published his interpretation of the Qumran skeletal collection, including results for "Tomb 9." Due to a lack of citation, it is unclear whether this designation is based upon the original classification of Vallois or our findings offered upon his visit to the Jerusalem collection. Our notes originally mislabeled Tomb A as 9(A) and Tomb B as 10(B). Regardless of the source of error, the remains for Tomb 9 have not resurfaced (though photographs exist illustrating excavation of the tomb—see Figure 2).

[34] Photographs from the de Vaux archive are published with the generous permission of the École Biblique et Archéologique Française de Jérusalem. Profs Jean-Baptiste Humbert, OP, and Jean-Michel de Tarragon, OP. They first appear in a forthcoming chapter on the French skeletal series by Sheridan et al., "Anthropological Analysis of the Human Remains from Khirbet Qumran." The photograph of the skeleton from Tomb 17 was published in J.-B. Humbert and A. Chambon, *Fouilles de Khirbet Qumrân et de Aïn Feshka* (NTOA Series Archaeologia 1; Freiburg: Universitätsverlag; Göttingen: Vandenhoeck & Ruprecht, 1994) 222.

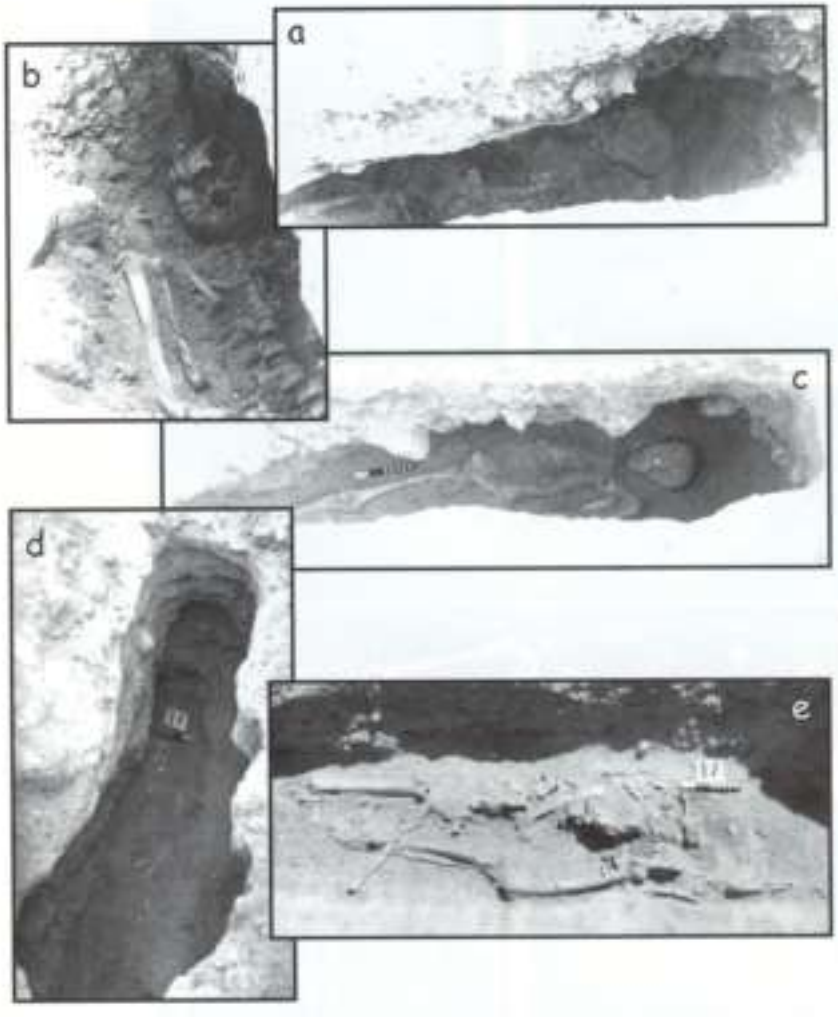

Figure 2. Photographic evidence for skeletons missing in the "rediscovered" French collection sequence. These include: a) Tomb 1 [9849]; b) Tomb 2 [9845]; c) Tomb 9 [13]; d) Tomb 14 [1831]; e) Tomb 17 [11797]. *Bracketed numbers refer to the École Biblique's photo archive designation.*

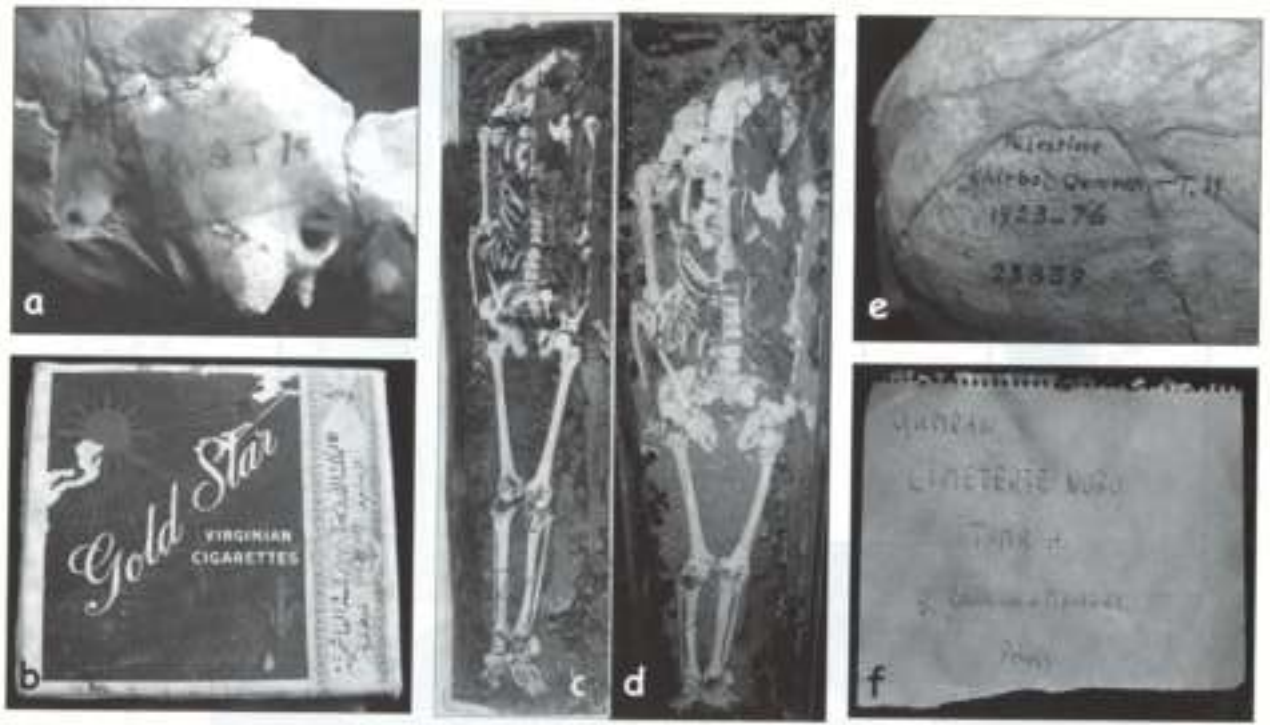

Figure 3. Evidence used to establish provenience of the French collection of human remains from Qumran, including: a) masking tape on skeletal fragments [Tomb 15]; b) packaging materials such as Jordanian cigarette boxes [Tomb 17]; c & d) comparison of preserved remains to de Vaux's photo archive [Tomb 18]—photo of remains just after exhumation and upon receipt in 1999]; e) writing directly on bones indicating location, exhumation date, and catalogue number [Tomb 11]; and, f) notes enclosed with the remains [Tomb A].

individual, and often did not match the other remains in the box for robusticity.

Preservation: The cranium and innominates were the apparent skeletal elements of choice for exhumation by de Vaux's team. Presumably the majority of each skeleton was left in the grave. Figure 4 provides a schematic of the remains *in situ* as photographed by de Vaux,[35] compared with the bones currently available for study.

In the schematics the dark gray regions indicate curated bones, lighter gray illustrates those portions visible in the photographs, and the white areas represent missing or obstructed bones. As seen in this figure, even when evidence exists that the entire skeleton was preserved, the pelvis and cranium were usually the only segments removed for analysis. J. Zias suggested that those individuals for whom we have more skeletal material available provide evidence of differential preservation—e.g., later burials, possibly Bedouin intrusions.[36] While some skeletons may indeed be of more recent interment, this supposition cannot be made based on differential representation of remains in the curated collection.

The Cemetery

A new survey of the Qumran cemetery was directed by J. Rosenberg in the Spring 2001,[37] prompted by a generalized request in the

[35] Previously published photographs appeared in Humbert and Chambon, *Fouilles*, including: Tomb B (#451, p. 217), Tomb 5 (#456, p. 219), Tomb 7 (#458, p. 220), Tomb 8 (#461, p. 221), Tomb 17 (#463, p. 222), Tomb 18 (#465–66, p. 223), and Tomb 19 (#469, p. 224). Photographs of the skeletons *in situ* for Tombs A, 3, 4, and 11–16b can be found in Figure 8 of Sheridan et al., "Anthropological Analysis of the Human Remains from Khirbet Qumran." Currently, no photos of the interred skeletons for Tombs 6 and 10 have been found in the de Vaux archive.

[36] Zias states, "Methodologically, it would appear that the material that was complete and in an exceptional state of preservation or deemed important had been selected out by de Vaux for further study and sent to Europe, whereas much of the material that was fragmentary and thereby necessitating extensive laboratory reconstruction was reburied at the site. . . . This in and of itself is telling and arouses suspicion as to the chronology of the material" ("The Cemeteries of Qumran and Celibacy," 235–36). As outlined above, photographs of several of the interred skeletons were published in 1994 by Humbert and Chambon, illustrating their degree of completeness upon excavation. Preservation and exhumation do not seem intricately connected in this case.

[37] Kapera challenged anthropologists to prepare a "map of the Qumran cemetery with the exact location of already opened tombs" ("Some Remarks on the Qumran Cemetery," 110). Special thanks to J. Rosenberg (W.F. Albright Institute of Archaeol-

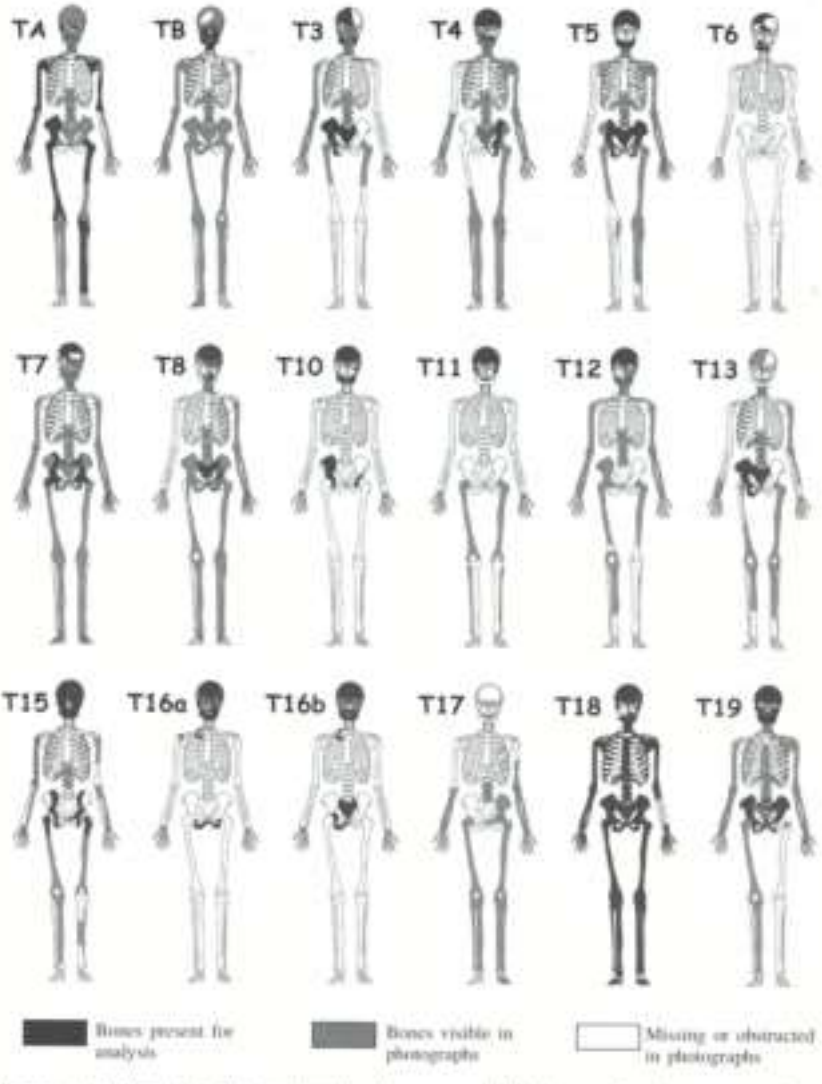

Figure 4. Schematics illustrating the bones available for analysis, compared to those seen in de Vaux's photos of each individual *in situ*. No photographs of the interred individuals from Tombs 6 or 10 were found.

literature, increasing concerns about looting at the site, as a means to determine the location of some of the questionable burials (Tombs A and B), and to assess the actual number of graves at Qumran. Figure 5 illustrates the re-survey, with the excavated tombs of the French collection clearly indicated.

Most of the individuals in the French collection were from what de Vaux called the main cemetery ("Cimetière Principal").[38] In addition, one was from the central extension ("Extension Médiane"), one from the northern cemetery ("Cimetière Nord"), and two from a cemetery "a few minutes north of the ruins."[39] Although de Vaux's terminology for these segments of the cemetery has been called into question, they are utilized in this discussion to avoid confusion, as they are the most common scheme found in the literature.

All the skeletons in the French collection were single interments, save Tomb 16a and 16b. All were buried in a south/north orientation, except Tomb 4. Three individuals were presumably buried with coffins as evidenced by preserved wood and nails (Tombs 17, 18, and 19). One skeleton was a clear re-interment (Tomb 11).

Some of the original tombs are no longer evident in the re-survey due to the construction of the Visitor's Center and associated parking lot at Qumran (Tombs 7, 8 and 14). Each of these appear in the aerial photographs of the site taken in the later 1950s by the Royal Jordanian Air Force[40] but are no longer visible above ground.

Several additional pits now appear on the map, some likely due to the excavations of Steckoll in 1966, most due to looting.[41] One pit

ogical Research in Jerusalem) and Elaine Myers (University of Toronto) for the new survey of the cemetery. Addition thanks to the Dorot Foundation for funding this aspect of the project, and Prof. Hanan Eshel (Bar Ilan University) for acquiring the proper permission and topographical maps needed for the survey.

[38] Numerous publications discuss the layout of the Qumran cemetery. For detailed discussions of the cemetery, please see J. Taylor, "The Cemeteries of Khirbet Qumran and Women's Presence at the Site," *DSD* 6 (1998) 286–326; Kapera, "Some Remarks on the Qumran Cemetery," 96–113; Puech, "The Necropolises of Khirbet Qumrân"; Zangenberg, "The 'Final Farewell'"; R. Hachlili, "The Qumran Cemetery: A Reconsideration," *The Dead Sea Scrolls: Fifty Years After Their Discovery* (eds Schiffman et al.) 661–72.

[39] De Vaux states that the northern cemetery was "a quelque minutes au nord de Khirbet Qumrân" ("Fouilles au Khirbet Qumrân" [1956], 569).

[40] See Humbert and Chambon, *Fouilles*, 9, 213.

[41] H. Shanks, "Religious Jews: Save the Bones of Your Ancestors," *BAR* 27/2 (Mar/Apr 2001) 19. Taylor ("The Cemeteries of Khirbet Qumran," 285) likewise makes reference to "clandestine diggers" following Clermont-Ganneau.

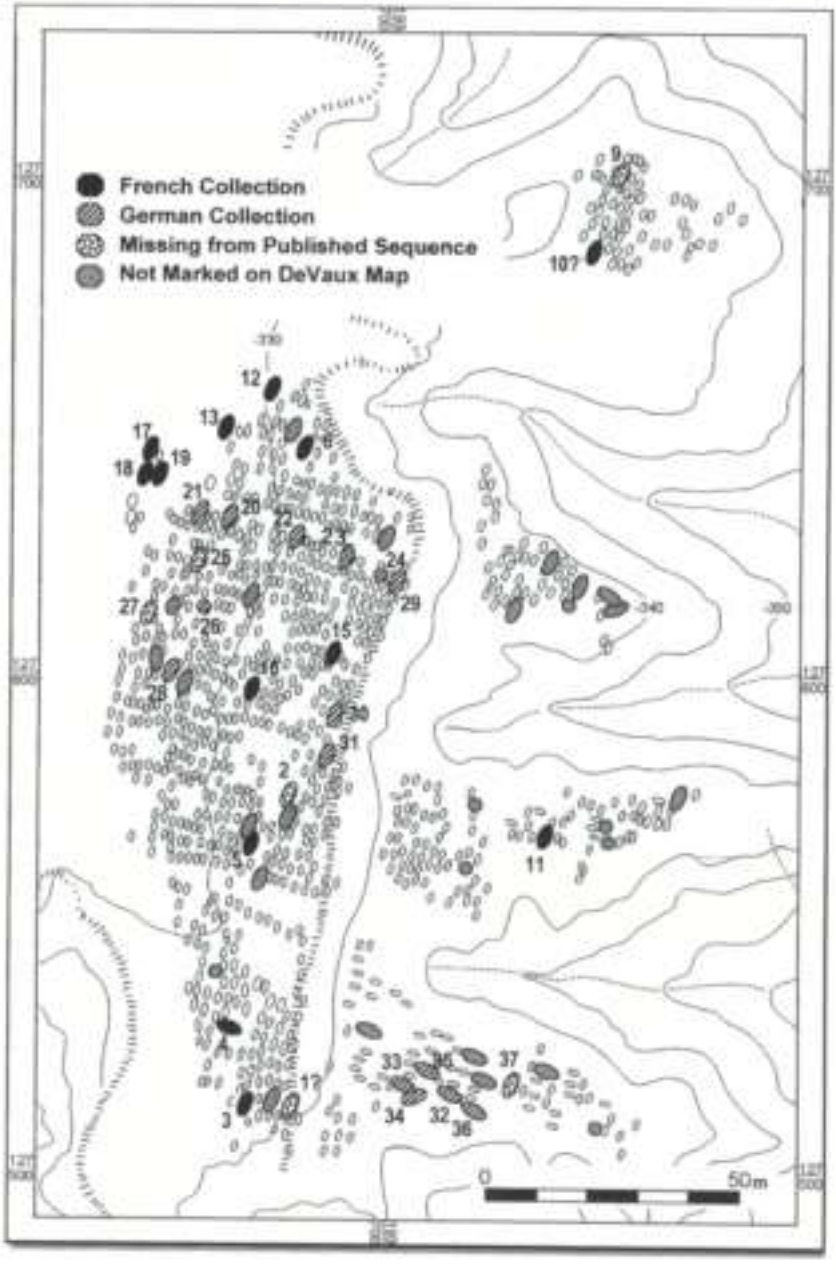

Figure 5. New survey map of the cemetery at Qumran, with all opened tombs indicated. Missing from this diagram are Tombs 7 and 8, which are no longer evident above ground, and Tombs A and B, for which conflicting information exists as to location. *Survey by J. Rosenberg.*

possibly reflects the work of Clermont-Ganneau[42] (though this is rather unlikely given the time elapsed since his visit to the site).

There is some confusion as to the location of Tomb 1 on the southern edge of the main cemetery.[43] Two pits now appear in that region, but neither is as far south as indicated by de Vaux. Also, two pits are indicated near the designation for Tomb 14 in de Vaux's map, with no corresponding number for the second grave. This duplication does not appear in the re-survey, and Tomb 14 is no longer visible.

An additional discrepancy includes the location of Tomb 10 in the northern cemetery ("Cimetière Nord"). This tomb is either now missing (and the current pit represents more recent "activity") or it was improperly drawn in the original mapping. De Vaux's diagram shows the grave in the southeast corner of the northern cemetery; today, however, a pit appears in-line with Tomb 9 and much more centrally located.

Another possibility is that Tombs 9 and 10 belong in the "northern extension" (there are indeed several excavated pits in this area, as shown in the new survey map), and Tombs A and B are located in the "northern cemetery." Two notes tucked in the Tomb A box of bones make reference to its location in the "Cimetière Nord" (see Figure 3). J. Taylor also questioned the location of Tombs 9 and 10, although she placed them in the northern corner of the "main cemetery."[44]

The location of the "forgotten northern cemetery"[45] that included Tombs A and B (if indeed it is not "Cimetière Nord"), is still a mystery. É. Puech of the École Biblique et Archéologique Française published a possible location for this small cemetery, and Dr Röhrer-Ertl and colleagues subsequently postulated a slightly different location.[46] The only specific information available beyond de Vaux's cryptic reference is a photograph of the graveyard.[47]

A detailed magnetometer survey was completed during the Summer

[42] Clermont-Ganneau, "Letters from Clermont-Ganneau."

[43] Tomb 1 is either slightly farther north than indicated on de Vaux's map, or has been destroyed (and the pit now labeled as "17" is thus a "new" addition).

[44] Taylor, "The Cemeteries of Khirbet Qumran," 287.

[45] Taylor, "The Cemeteries of Khirbet Qumran," 287.

[46] Puech, "The Necropolises of Khirbet Qumrân," 22; Röhrer-Ertl et al., "Über die Gräberfelder von Khirbet Qumran," 35.

[47] A photograph of this small cemetery is seen in Humbert and Chambon, *Fouilles*, 216, #448.

2001 by a team led by Hanan Eshel.[48] The results of their survey are included in this volume and provide a more accurate count of the number of tombs remaining at Qumran.

Dating Methods

Investigators have tried to accurately date the cemetery at Qumran using a variety of measures. This has not been an easy process as little material culture was found in direct association with the graves. A few tombs contained fragmentary grave goods, such as the lamp from Tomb 4, a small piece of textile in Tomb 1, scattered jewelry, wood, nails, and broken pottery.[49] Taylor reported a date of Period Ib for the material remains in Tomb 4, Period II for the lamp in Tomb 26. Steckoll placed charcoal found in his grave 9 at 120 CE ± 210 years, and Zias believed the beads of "T 32 and TS 1" were of recent Bedouin origin.[50]

Steckoll attempted to directly date the skeletal remains but was unsuccessful due to a lack of preserved bone collagen.[51] Comparable frustration was reported by Taylor in dating associated wood samples, due to contamination by the paraffin preservative.[52]

Chronometric Dating: For the current study, bone samples from all of the individuals in the Jerusalem portion of the French collection were submitted to two independent laboratories for radiocarbon dating.[53]

[48] The team included Magen Broshi (Israel Museum), Richard Freund (University of Hartford), Dennis Walker (California State University-Long Beach) and others.

[49] Taylor presented a useful table of grave goods (Taylor, "The Cemeteries of Khirbet Qumran," 307). A piece of fabric associated with Tomb 1 is currently being analyzed by Mireille Bélis (researcher at the École Biblique et Archéologique Française de Jérusalem) and has been submitted for radiocarbon dating.

[50] Taylor, "The Cemeteries of Khirbet Qumran," 297; Steckoll, "The Community of the Dead Sea Scrolls," 211; Zias, "The Cemeteries of Qumran and Celibacy," 226–27.

[51] Steckoll ("Marginal Notes," 34–35) claimed to have sent a specimen for dating, although Taylor's follow-up to this reference yielded conflicting information ("The Cemeteries of Khirbet Qumran," 296). He stated in a later publication that "there were no traces at all of collagen left on the Qumran bones" ("The Community of the Dead Sea Scrolls," 210). The German team likewise attempted C14 analysis without success.

[52] Steckoll, "The Community of the Dead Sea Scrolls," 210; Taylor, "The Cemeteries of Khirbet Qumran," 296 n. 33, following up on a test by Donceel and Donceel-Voûte.

[53] Beta Analytic (Miami, FL) and the University of Arizona (Tucson, AZ). It was hoped that recent advances in the instrumentation and contamination control proce-

Each lab found that there was not enough carbon in the bone samples to permit even accelerator mass spectroscopy (AMS) analysis. Wood from Tomb 18 was also submitted, but the material was so impregnated with wax that the carbon in the cellulose was indistinguishable from the carbon in the paraffin. Additional attempts to find a "clean" sample of wood will continue as funding permits.

To determine the level of carbon in the bones, samples from all individuals were tested using stable isotope analysis.[54] Fresh bone contains approximately 15% carbon and 5% nitrogen, and the carbon/nitrogen ratio is between 3.0 and 3.2. The major constituent of protein in human bone is nitrogen. Therefore, when values for carbon approach the expected percentage (15%) but no nitrogen is found in the sample, the carbon is most likely a contaminant. This is seen in samples from Tombs 8, 16a, and 19.

Table 2 lists carbon and nitrogen isotope values for all tested samples. The results indicate a significant loss of proteinacous carbon, thus explaining the negative results from the radiocarbon dating.[55] Indeed, the bones are so denatured that the nearly complete skeleton from Tomb 18 could be utilized in its entirety and not yield enough carbon to permit dating by current chronometric methods.

The bone samples of the French collection are denatured beyond current radiometric capabilities. Heat, salinity, pH, and other environmental factors have conspired to mask the organic signals of interest. Conservation methods employed in the field have likewise contaminated the coffin-wood samples.

Relative Dating: Bone samples were tested for fluoride content, a means of relatively dating the skeletons.[56] Steckoll tried fluoride dat-

dures utilized for radiocarbon dating would overcome past disappointments. For general reading about C14 methodology, please see R. Taylor, "Fifty Years of Radiocarbon Dating," *American Scientist* 88 (2000) 60–67; and R. Burleigh, "Radiocarbon Dating: Some Practical Considerations for the Archaeologist," *Journal of Archaeological Sciences* 1 (1974) 69–87.

[54] Special thanks to Dr Mark Schurr for conducting the stable isotope analysis. Samples were tested using the archaeometry facilities of the Laboratory for Biocultural Studies in the Department of Anthropology and the Center for Environmental Science and Technology at the University of Notre Dame.

[55] Using significantly less sophisticated technology, Steckoll reported the same results in 1974 ("The Community of the Dead Sea Scrolls," 210).

[56] Steckoll, "The Community of the Dead Sea Scrolls," 210. Thanks to Dr Mark Schurr and Jennifer Clark for conducting the fluoride analysis. Samples were analyzed in the Fluoride Dating Center in the Department of Anthropology's Laboratory for Biocultural Studies at the University of Notre Dame.

Table 2: Stable Isotope Results for the French Collection of Human Remains from Qumran

Tomb	Mass (mg)	C WT %	N	Ratio C/N
4	1.3	7.9	0	N/A
5	1.0	4.9	0.3	16.3
7	1.1	9.1	0	N/A
8	1.2	18.5	0	N/A
10	1.2	8.4	0	N/A
11	1.0	3.3	0	N/A
12	1.1	6.3	0	N/A
15	1.0	1.4	0.2	7.0
16a	1.0	13.2	0	N/A
16b	0.9	9.8	0	N/A
18	0.9	2.9	0.3	9.7
19	0.7	27.2	0	136.0
A	1.1	1.5	0.2	7.9
B	1.5	1.9	0	N/A
Fresh Bone =		*15%*	*5%*	*3.0–3.2*

ing in the 1970s without success.[57] As with radiocarbon dating, methods have improved since his analysis and were thus applied to the collection.

Fluoride dating is based on the premise that remains interred in a similar environmental context for comparable duration should demonstrate equivalent fluoride concentrations. Fluoride content (%F) in buried bone increases with time as fluoride ions replace hydroxyapatite (crystal matrix of bone). The subsequent fluoroapatite is more stable in the depositional environment than the original bone mineral and is thus a useful measure of relative interment time when applied to a discrete group of bones buried in a similar environmental context.[58]

[57] "We tried fluorine dating of the bones but the results were inconclusive because of the high amount of salt in the soil beside the Dead Sea" (Steckoll, "The Community of the Dead Sea Scrolls," 210).

[58] M. Schurr, "Fluoride Dating of Prehistoric Bones by Ion Selective Electrode," *Journal of Archaeological Science* 16 (1989) 265–70; K. Oakely, "Analytical Methods for Dating Bones," *Science in Archaeology* (eds D. Brothwell and E. Higgs; New York: Basic Books, 1963) 24–34.

As seen in Table 3, samples from fourteen tombs of the French collection were tested. The %F values concentrated in three groups that demonstrated significant between group difference ($df = 21$; $F = 81.1$; $p = 0.0001$).

Table 3: Fluoride Concentrations (%F) for the French Collection of Human Remains from Qumran

Tomb	n	Mean	Std. Error	Group
4	3	0.412 ± 1.80E-02	1.80E-02	high
5	3	0.222 ± 6.70E-03	3.87E-03	moderate
7	3	0.232 ± 5.09E-02	2.94E-02	moderate
8	3	0.344 ± 1.55E-02	8.97E-03	moderate
10	3	0.336 ± 4.88E-02	2.82E-02	moderate
11	3	0.295 ± 4.52E-02	2.61E-02	moderate
12	3	0.546 ± 9.41E-02	5.43E-02	high
13	3	0.078 ± 3.09E-02	1.78E-02	low
15	3	0.241 ± 1.78E-02	1.03E-02	moderate
16a	3	0.087 ± 5.03E-03	2.90E-03	low
16b	3	0.137 ± 7.10E-03	4.10E-03	low
18	3	0.019 ± 5.58E-03	3.22E-03	low
19	3	0.115 ± 1.41E-02	8.16E-03	low
A	3	0.523 ± 3.48E-02	2.01E-02	high
B	3	0.696 ± 4.29E-02	2.48E-02	high

Tombs 4, 10, 12, A, and B contained the highest fluoride levels, Tombs 5, 7, 8, 11, and 15 a moderate amount by comparison, and Tombs 13, 16a, 16b, 18, and 19 demonstrated low levels (Figure 6). To determine the potential relationship between these graves, their location is highlighted on the new cemetery survey map (Figure 7). There appears to be no discernable pattern of concentration related to tomb location (save the similarity in levels between 16a and 16b, which were buried in the same grave).

This may be a real phenomenon reflecting varied use of the cemetery through time. It is *far* more likely, however, a result of the small sample size and preservation methods. Also, the sparse nature of most of the exhumed remains precluded selection of similar tissue types—in other words, it was not possible to choose the same type of bone (i.e., femoral cortex) for each tomb and thus different bone tissues (cortical versus cancellous) may have likewise conspired to confuse %F patterns.

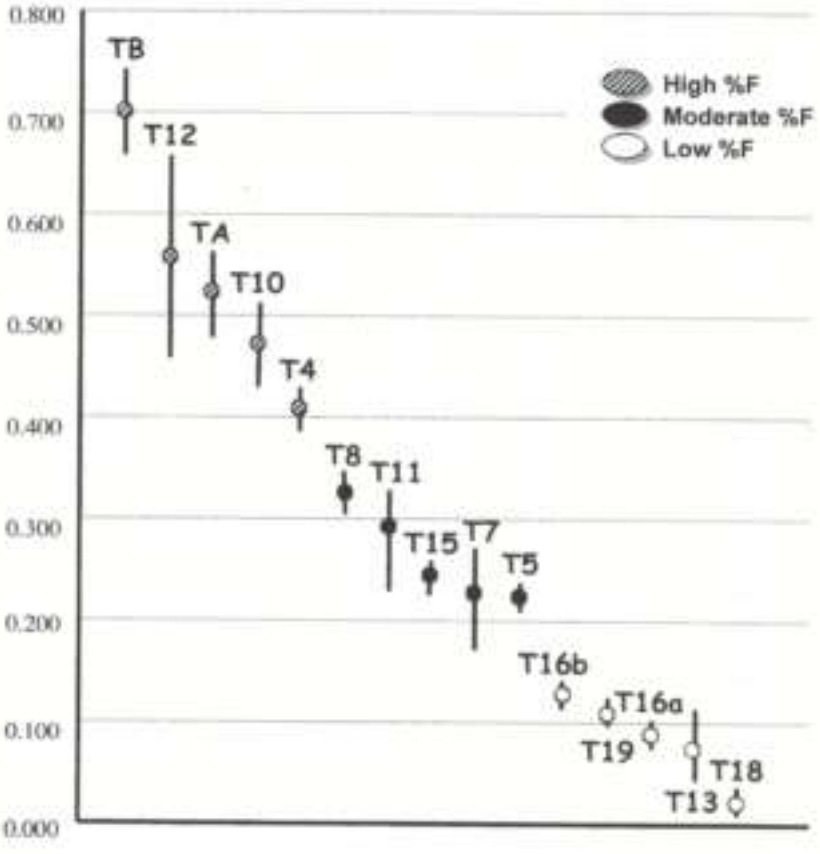

Figure 6. Graph of fluoride concentrations (%F) for the graves in the French collection of human remains from Qumran. Concentrations cluster in three relative groups that demonstrate significant segregation ($p = 0.001$).

Nail/Spike Typology: Analysis of the metal nails and spikes from Tombs 17–19 was begun to aid in temporal placement of the associated remains. As stated by R. Nagy, "While nails by themselves have little to say about social processes . . . in keeping with the evolutionary nature of nail manufacturing techniques, archaeological nail assemblages can be used to infer temporal parameters for historic period sites and structures."[39] Although a systematic nail typology

[39] R. Nagy, "Nails and Metal Artifacts," *Michigan Archaeologist* 35 (1989) 177. Also see L. Nelson, "Nail Chronology as an Aid to Dating Old Buildings," *History*

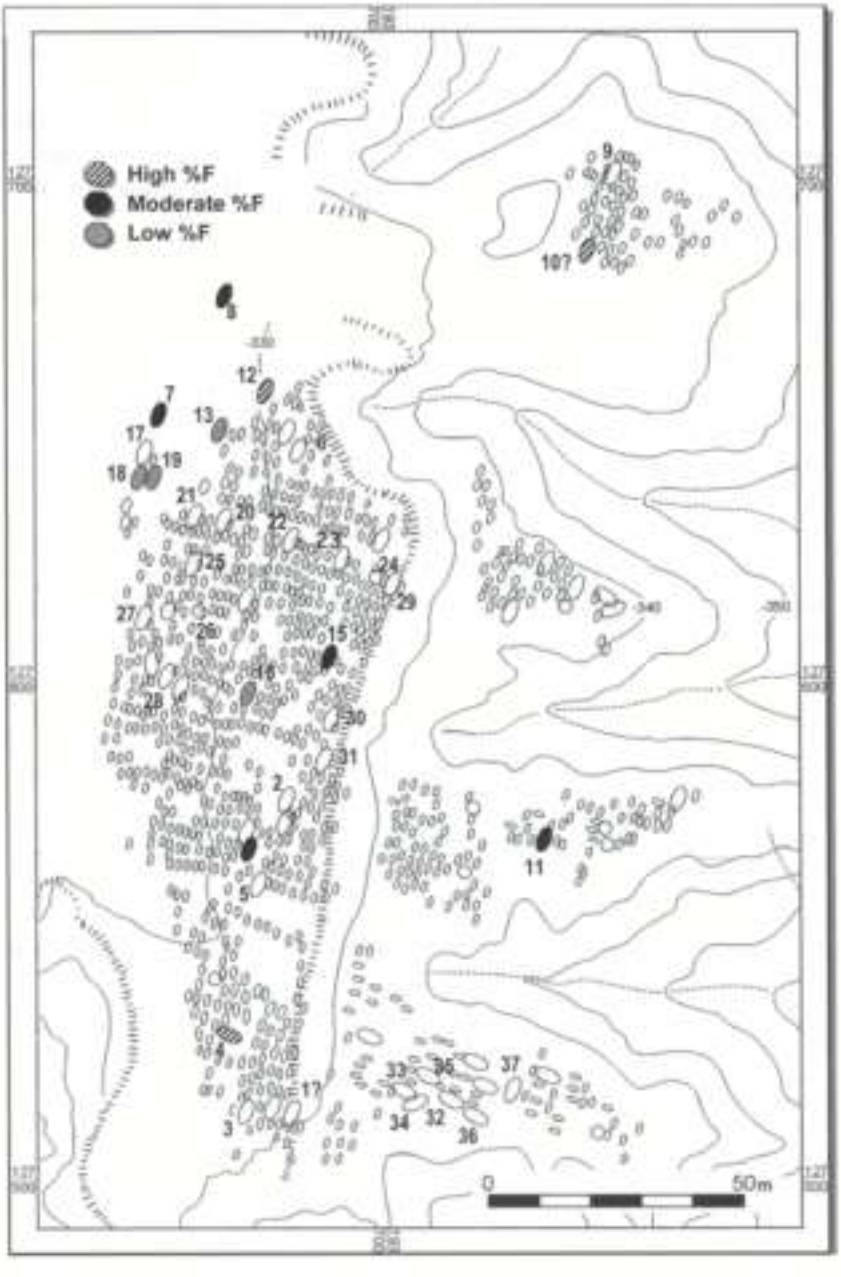

Figure 7. Location of tombs and associated fluoride (%F) levels. Tombs 7 and 8 are drawn in to indicate %F relative to other graves; however, they were not found in the new survey.

does not seem to exist for Hellenistic or Roman Palestine,[60] there appears enough distinction in morphology in the literature to determine whether they are of early or recent manufacture.

Gross morphological analysis of the Tomb 17 and 18 nails indicates possible Roman-period construction, given the shape of the shafts[61] (Figure 8). Chemical analysis of the metal is next scheduled to provide insights on construction.[62]

Demographic Reconstruction

Age Determination: For ancient populations, inferences are made about survival from patterns of morbidity and mortality. During the period of growth and development, age estimation is usually quite precise. With the cessation of growth and complete eruption of the permanent dentition, assessment of age becomes more difficult, relying on evidence of degenerative processes such as wear and arthritic response.

When multiple bones are available for a single individual, determination of age using intersecting lines of evidence can be highly accurate, even for older adults.[63] When based on a few skeletal elements,

News 23 (1968) 203–14. Special thanks to Edward Maher (Dept. of Anthropology, University of Illinois-Chicago) for suggesting this future study.

[60] Personal communication with Hanan Eshel (Bar Ilan University), Robert Mullins (The Hebrew University of Jerusalem), Jodi Magness (Tufts University), Samuel Wolff (Israel Antiquities Authority), Jürgen Zangenburg (Bergishe Universität/Gesanthochschule Wuppertal), and Ann Killebrew (Pennsylvania State University). While reference to nails appears in several works, a specific typology has not been developed for the period or region. For a discussion of wooden coffins and the possible use of nails in a burial context, see R. Hachlili, "The Wooden Coffins," *Jericho: The Jewish Cemetery of the Second Temple Period* (eds R. Hachlili and A. Killebrew; Jerusalem: Israeli Antiquities Authority, 1999) 60–88. For a discussion of nails found at contemporaneous sites, see J. Muhly and P. Muhly, "Metal Artifacts," *Excavations at Tel Michal, Israel* (eds Z. Herzog, G. Rapp, Jr. and O. Negbi; Minneapolis: University of Minnesota Press and the Sonia and Marco Nadler Institute of Archaeology, Tel Aviv University, 1989) 275–80; Y. Yadin, *The Finds from the Bar Kokhba Period of the Cave of the Letters* (Jerusalem: Israel Exploration Society, 1963) 89–90.

[61] Hanan Eshel, personal communication.

[62] A. Lupu, "Chemical Investigations of Metal Artifacts," *Excavations at Tel Michal* (eds Z. Herzog et al.) 296–313; O. Cohen and I. Roman, "Metallurgical Aspects of Iron Nails and Staples," *Atiqot* 19 (1990) 77–80.

[63] Please consult an osteology textbook such as W. Bass, *Human Osteology: A Laboratory and Field Manual* (Columbia, MO: Missouri Archaeological Society, 1995[4]); J. Buikstra and D. Ubelaker, *Standards for Data Collection from Human Skeletal Remains* (Archaeological Survey Research Series 44; Fayetteville, AR: Arkansas Archaeological Survey, 1994); and T. White, *Human Osteology* (San Diego:

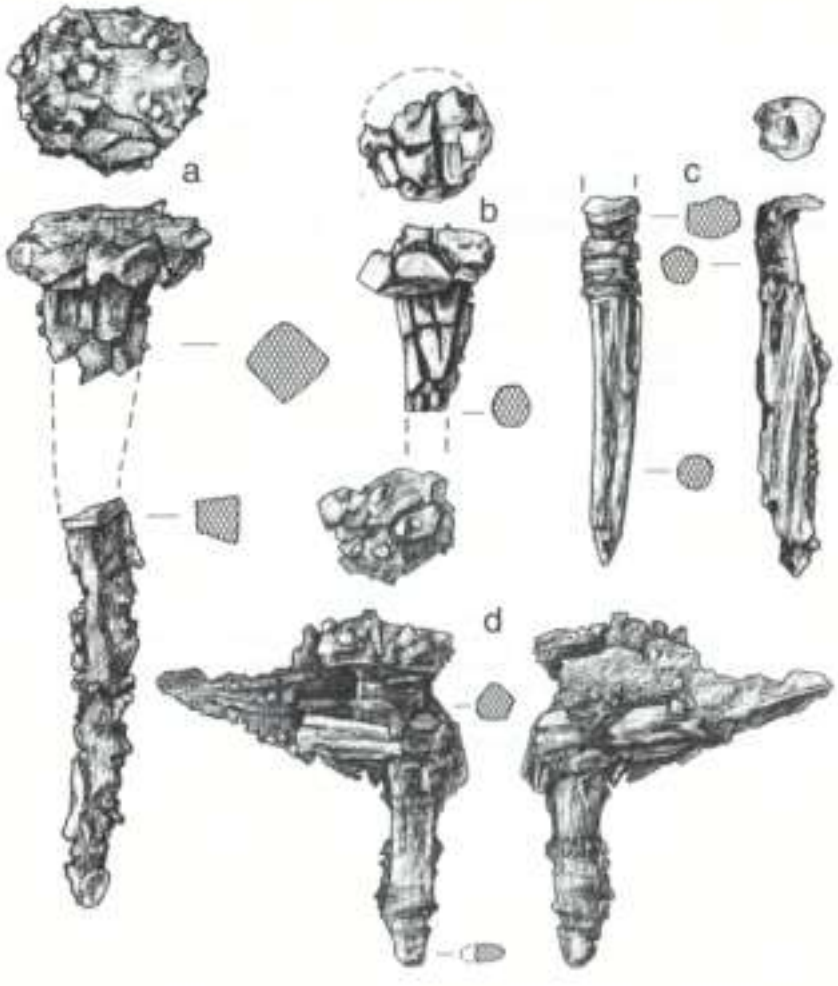

Figure 8. Iron nails from Qumran Tombs 17 and 18 [scale 1:1]: a) a large nail from Tomb 17; b) a nail head from Tomb 17; c) two views of a smaller nail from Tomb 17; and, d) a large nail with adhering wood from Tomb 18. *Drawings by Marina Zeltzer.*

however, definitive appraisal becomes more difficult. For the Qumran collection, while only a few bones were exhumed for each individual, they were often those skeletal elements most diagnostic for age and sex reconstruction.

Academic Press, 2000) or consult the descriptions and diagram in Sheridan et al., "Anthropological Analysis of the Human Remains from Khirbet Qumran."

Many refinements in aging techniques have been made since the 1950s when G. Kurth and H.-V. Vallois[64] made their original estimations for the individuals in the French collection.[65] The current analysis drew upon as many techniques as possible, including: epiphyseal union (fusion of the growth plate to the bone shaft); dental eruption;[66] public symphysis morphology (changes in features of the pubic face);[67] auricular surface morphology (changes in the articular surface of the

[64] Prof. Dr. Gottfried Kurth (Professor, Technical University of Braunschweig) curated the German collection of human remains from Qumran until his death. Prof. Dr. Henri-V. Vallois (Director, Museé de L'Homme, Paris) originally curated the Qumran collection still housed at the museum.

[65] C. Lovejoy, R. Meindl, R. Mensforth, and T. Barton, "Multifactorial Determination of Skeletal Age at Death: A Method and Blind Tests of Its Accuracy," *American Journal of Physical Anthropology* 68 (1985) 1–14; C. Lovejoy, R. Meindl, T. Pryzbeck, and R. Mensforth, "Chronological Metamorphosis of the Auricular Surface of the Ilium: A New Method for the Determination of Adult Skeletal Age at Death," *American Journal of Physical Anthropology* 68 (1985) 15–28; C. Lovejoy, "Dental Wear in the Libben Population: Its Functional Pattern and Role in the Determination of Adult Skeletal Age at Death," *American Journal of Physical Anthropology* 68 (1985) 47–56; R. Meindl and C. Lovejoy, "Ectocranial Suture Closure: A Revised Method for the Determination of Skeletal Age at Death Based on the Lateral-Anterior Sutures," *American Journal of Physical Anthropology* 68 (1985) 57–66; P. Webb and J. Suchey, "Epiphyseal Union of the Anterior Iliac Crest and Medial Clavicle in a Modern Multiracial Sample of American Males and Females," *American Journal of Physical Anthropology* 68 (1985) 457–66; D. Lucy, A. Pollard, and C. Roberts, "A Comparison of Three Dental Techniques for Estimating Age at Death in Humans," *Journal of Archaeological Sciences* 22 (1995) 417–28; D. Brothwell, *Digging Up Bones* (Ithaca, NY: Cornell University Press, 1981³); S. Brooks and J. Suchey, "Skeletal Age Determination Based on the OS Pubis: A Comparison of the Acsadi-Nemeskéri and Suchey-Brooks Methods," *Human Evolution* 5 (1990) 227–38; D. Ubelaker, "Skeletal Evidence for Kneeling in Prehistoric Ecuador," *American Journal of Physical Anthropology* 51 (1979) 679–86; idem, "Estimating Age at Death from Immature Human Skeletons: An Overview," *Journal of Forensic Sciences* 32 (1987) 1254–63; B. Smith, "Patterns of Molar Wear in Hunter-Gatherers and Agriculturist," *American Journal of Physical Anthropology* 63 (1984) 39–56; G. Scott, "Dental Wear Scoring Technique," *American Journal of Physical Anthropology* 51 (1979) 213–18; S. Molnar, "Human Tooth Wear, Tooth Function, and Cultural Variability," *American Journal of Physical Anthropology* 34 (1971) 175–90; E. Kerley, "The Microscopic Determination of Age in Human Bone," *American Journal of Physical Anthropology* 23 (1965) 149–63; E. Kerley and D. Ubelaker, "Revisions in the Microscopic Method of Estimating Age at Death in Human Cortical Bone," *American Journal of Physical Anthropology* 49 (1978) 545–46.

[66] D. Ubelaker, *Human Skeletal Remains: Excavation, Analysis, Interpretation* (Washington, DC: Taraxacum, 1978).

[67] Several methods have been developed, and we used two in the current study: T. Todd, "Age Changes in the Pubic Bone. I: The White Male Pubis," *American Journal of Physical Anthropology* 3 (1920) 285–334; idem, "Age Changes in the Pubic Bone. III: The Pubis of the White Female," *American Journal of Physical Anthropology* 4 (1921) 1–70; Brooks and Suchey, "Skeletal Age Determination Based on the

innominate with the sacrum);[68] cranial suture closure (fusion of the joints between bones of the skull);[69] and dental attrition (tooth wear).[70]

Not all aging techniques are equivalent, and thus more weight is given to some methods over others. For example, techniques controlled largely by genetic influences are weighted most heavily. By employing aspects of bone growth, dental development and attrition, and changes in the morphology of the pelvis, several of the original age estimates were amended. Table 4 illustrates that the average age category for this sub-sample of Qumran inhabitants was 35–40 years. Several new additions have been made to the list of original age estimates, and the ages for two individuals (Tombs 19 and A) have been adjusted. Specific ages could not be calculated for the individuals in Tombs 3, 11, and 17 based on inadequate preservation/exhumation of needed skeletal indicators.[71] They are thus listed only as "adult."

Sex Determination: For the French collection of Qumran remains, sex determination was made on the basis of standard osteological features of the cranium, appendicular skeleton, and pelvis.[72] W. Krogman

OS Pubis." Also consult: R. Meindl, C. Lovejoy, R. Mensforth, and L. Carlos "Accuracy and Direction of Error in Sexing of the Skeleton: Implications for Paleodemography," *American Journal of Physical Anthropology* 68 (1985) 79–85; and J. Suchey and D. Katz, "Applications of Pubic Age Determination in a Forensic Setting," *Forensic Osteology: Advances in the Identification of Human Remains* (ed. K.J. Reichs; Springfield, IL: Thomas, 1998) 204–36.

[68] Lovejoy et al., "Chronological Metamorphosis of the Auricular Surface of the Ilium."

[69] Meindl and Lovejoy, "Ectocranial Suture Closure."

[70] A. Miles, "Dentition and the Estimation of Age," *Journal of Dental Research* 42 (1963) 255–63. Also see S. Mays, *The Archaeology of Human Bones* (London: Routledge, 1998) 57–66, for an overview of the utility of dental wear and aging. Smith, "Patterns of Molar Wear"; Scott, "Dental Wear Scoring Technique"; Brothwell, *Digging Up Bones*; Molnar, "Human Tooth Wear." Also see Hillson, *Dental Anthropology*, 231–53, for a review of tooth wear and modification.

[71] Tomb 17 "adult" age estimation is based on photographic evidence.

[72] It is important to clarify that this discussion deals with sex determination, not gender. The two terms are not mutually exclusive; as gender is a cultural application, "a socially imposed division of the sexes" (G. Rubin, "The Traffic in Women: Notes on the 'Political Economy' of Sex," *Toward an Anthropology of Women* [ed. R.R. Reiter, New York: Monthly Review Press, 1975] 179). For a discussion of the biological ramifications of the distinction between sex and gender, see P. Walker and D. Cook, "Gender and Sex: Vive la difference," *American Journal of Physical Anthropology* 106 (1998) 255–59. For an overview of the debate within archaeology, see M. Pearson, *The Archaeology of Death and Burial* (College Station, TX: Texas A&M University Press, 1999) 95–123.

Table 4: Original and Current Age Estimations for the French Qumran Collection *[ages in years]*

Tomb	Original	Current
3	–	adult
4	–	30–35
5	–	40–50
6	–	35–45
7	–	40–45
8	–	40–45
10	–	40–45
11	–	adult
12	30	30–35
13	–	40–45
15	16	15–16
16a	30	30–40
16b	30–40	30–40
17	–	adult
18	30	30–33
19	30–40	40–42
A	30–35	45–50
B	<50	60+

ranked accuracy in sex determination using the pelvis at 95%, followed by the skull at 92%, the mandible alone at 90%, and long bone measures at 80%.[73] As was true for aging methods, many techniques have been refined and/or introduced since the 1950s.[74]

For use in sex determination, as well as reconstruction of general robusticity and stature, a suite of measurements of the skull and post-

[73] W. Krogman, *The Human Skeleton in Forensic Medicine* (Springfield, IL: C.C. Thomas, 1962) 112. T. Stewart ("Medico-legal Aspects of the Skeleton. I: Age, Sex, Race, and Stature," *American Journal of Physical Anthropology* 6 [1948] 315–21) indicated slightly lower yields, however the order of accuracy was the same.

[74] J. Andersson, *The Human Skeleton: A Manual for Archaeologists* (Ottawa: Department of Northern Affairs and National Resources, 1962); T. Phenice, "A Newly Developed Visual Method of Sexing in the Os Pubis," *American Journal of Physical Anthropology* 30 (1969) 297–301; G. Acsádi and J. Nemeskéri, *History of Human Life Span and Mortality* (Budapest: Akedémiai Kiadó, 1970); T. Black, "A New Method for Assessing the Sex of Fragmentary Skeletal Remains: Femoral Shaft Circumference," *American Journal of Physical Anthropology* 48 (1978) 227–32; T. Stewart, *Essentials of Forensic Anthropology* (Springfield, IL: Thomas, 1979); Meindl et al., "Accuracy and Direction of Error in Sexing of the Skeleton"; T. Holland, "Sex Assessment Using the Proximal Tibia," *American Journal of Physical Anthropology* 85 (1991) 221–27; D. Mittler and S. Sheridan, "Sex Determination in Subadults Using Auricular Surface Morphology: A

cranial skeleton were made.[75] Metric and non-metric methods of sex determination provided comparable results for this collection, an expected outcome "so long as care and skill are employed."[76]

Although determination of age is relatively clear-cut in subadults and increases in difficulty among adults, the opposite trend is true when determining sex.[77] In general, men tend to be more robust than women. Establishing the sex of subadult remains below the age of ten years, however, is problematic, as most features of sexual dimorphism do not begin to appear until the onset of puberty. Fortunately, only one individual in the study collection fell within the subadult age range (Tomb 15). Although the youth in Tomb 15 had not reached skeletal maturity, those features that had developed were distinctively male.

Sex-related markers were scant for some individuals (Tombs 6, 11, 13, and B), while plentiful for others (Tombs 18 and A). Although the bones most useful for sex determination were collected from the majority of individuals in the French collection, poor preservation and the ravages of time conspired to damage or obliterate features of interest.

Remains for Tomb B were the most incomplete. Nevertheless, the size and shape of the hyoid bone, robusticity of the edentulous mandible, and presence of ossified thyroid cartilage were indicative of a

Forensic Science Perspective," *Journal of Forensic Science* 37 (1992) 1068–75; R. Rogers and S. Saunders, "Accuracy of Sex Determination Using Morphological Traits of the Human Pelvis," *Journal of Forensic Science* 39 (1994) 1047–56; Buikstra and Ubelaker, *Standards for Data Collection*; G. Maat, R. Mastwijk, and E. Van der Velde, "On the Reliability of Non-metrical Morphological Sex Determination of the Skull Compared to That of the Pelvis in the Low Countries," *International Journal of Osteoarchaeology* 7 (1997) 575–80; D. France, "Observational and Metric Analysis of Sex in the Skeleton," *Forensic Osteology* (ed. Reichs) 163–86; P. Murail, J. Bruzek, and J. Braga, "A New Approach to Sexual Diagnosis in Past Populations: Practical Adjustments from Van Vark's Procedure," *International Journal of Osteoarchaeology* 9 (1999) 39–53; S. Safont, A. Malgosa, and M. Subirà, "Sex Assessment on the Basis of Long Bone Circumference," *American Journal of Physical Anthropology* 113 (2000) 317–28.

[75] A. Porter, "The Prediction of Physique from the Skeleton," *International Journal of Osteoarchaeology* 9 (1999) 102–15. A complete list of these measures can be found in Sheridan et al., "Anthropological Analysis of the Human Remains from Khirbet Qumran," Tables 7 and 8. These values were likewise used to determine a variety of robusticity measures not detailed in the current analysis. Please see Tables 9–13 in the aforementioned paper for details.

[76] Meindl et al., "Accuracy and Direction of Error in Sexing of the Skeleton."

[77] L. Scheuer and S. Black, *Developmental Juvenile Osteology* (San Diego: Academic Press, 2000) 15–17.

male.[78] In addition, photographic evidence for this skeleton *in situ* illustrates a male pubis (though photographic evidence of this sort should never preclude actual osteological analysis).

In the original estimations by Kurth and Vallois, two females were reported, several individuals for whom sex was not determined, and the remainder were classified as males. The current reassessment identifies the originally indeterminate individuals and changes (with caution) one classification (Table 5).

Table 5: Original and Current Sex Estimations for the French Qumran Collection

Tomb	Original	Current
3	–	M
4	–	M
5	–	M
6	–	M
7	F?	M?
8	–	M
10	–	M
11	–	M
12	M	M
13	M	M
15	M	M
16a	M	M
16b	M	M
17	–	–
18	M	M
19	M	M
A	F	F
B	M	M

The individual from Tomb 7 was originally listed as a "Female?" by Vallois and now appears in this re-classification as a "Male?" Please note that the question mark remains. Based on those features currently available, this individual appears rather definitively male. The narrowness of the sciatic notch, lack of elevation of the auricular surface, and robusticity of the partial mandible and the brow ridge were all decidedly male in aspect.

Caution is advised because one of the femoral head diameters is

[78] E.M. Reesink, A.A.H. Van Immerseel, R. Brand, and Tj.D. Bruintjes, "Sexual Dimorphism of the Hyoid Bone?" *International Journal of Osteoarchaeology* 9 (1999) 357–60.

indeterminate (the other is male), and Vallois may have had considerably more of the skeleton from which to make his determination (Figure 8).[79] It is not clear whether Vallois conducted his sex estimation at graveside with the entire skeleton to draw upon, from photographs, or was limited to examining the exhumed remains at a later time.[80] Since important parts of the puzzle are missing that may have been available to the original investigator (not to mention the credentials of the original investigator),[81] the question mark remains in place.

A regional comparison of the Qumran sex profile is provided in Table 6. The ratio of males to females for each of the Qumran collections, and the combined German/French collection are presented for comparison to regional and temporal correlates (Figure 10). The percentage of indeterminate individuals (those for whom sex could not be identified due to poor preservation and/or chronological age) is likewise listed for each collection cited. Temporal distinctions (period classification) were taken directly from each indicated publication.

Table 6: Comparison of Sex Ratios for Regional and Temporal Counterparts to the Qumran Community.

	Region/Site	Period	Sample Sizes				Sex Ratio	%
			n	*m*	*f*	*o*		
Dead Sea Region/ Jordan Valley	Jericho[82]	Late Hellenistic/Roman	192	86	52	54	1.7 : 1	28%
	Ein Gedi II[83]	Early Roman	164	52	27	8	1.9 : 1	5%
	Ein Gedi[84]	Hellenistic	65	40	25	–	1.6 : 1	–
	Ein Gedi & Jerusalem[85]	Roman	49	30	19	–	1.6 : 1	–
	Goliath Family Tomb[86]	Herodian	31	11	7	13	1.6 : 1	42%

[79] Special thanks to Therese Fitzpatrick for creating the sketch of the Tomb 7 skeleton *in situ*.

[80] De Vaux's notes, as published by Humbert and Chambon, *Fouilles*, indicate that on 28 November 1951, only the very large pelvis and skull were removed: "Nous avons enlevé le pelvis qui est très large! et le crâne" (p. 347).

[81] For a brief biographical sketch of Vallois' accomplishments, please see the insert to his article "Anthropometric Techniques." *Current Anthropology* 6 (1965) 127.

[82] B. Arensburg and P. Smith, "Appendix: The Jewish Population of Jericho (100 BC–70 AD)," *PEQ* 14 (1983) 133.

[83] B. Arensburg and A. Belfer-Cohen, "Preliminary Report on the Skeletal Remains from the 'En Gedi Tombs," *Atiqot* 24 (1994) 13*.

[84] B. Arensburg, M. Goldstein, H. Nathan and Y. Rak, "Skeletal Remains of Jews from the Hellenistic, Roman and Byzantine periods in Israel. I—Metric Analysis," *Bulletins et Memoires de la Societe d'Anthropologie de Paris* 7 (1980) 178.

[85] Arensburg et al., "Skeletal Remains of Jews," 180.

[86] R. Hachlili and P. Smith, "The Genealogy of the Goliath Family," *BASOR* 235 (1979) 68.

Table 6 (*cont.*)

	Region/Site	Period	Sample Sizes				Sex Ratio	%
			n	*m*	*f*	*a*		
	En el-Ghuweir[87]	Roman	20	13	6	1	2.2 : 1	5%
	Cave of the Letters[88]	Bar Kokhba	19	4	9	6	0.4 : 1	32%
	Nahal Hever[89]	Bar Kokhba	10	4	3	3	1.3 : 1	30%
	Hiam el-Sagha[90]	Roman	2	1	–	1	–	50%
Jerusalem/Judean Hills	Akeldama Tombs[91]	Hellenistic/Late Roman/Byzantine	115	8	16	91	0.5 : 1	79%
	French Hill[92]	Late Hellenistic/Roman	64	15	10	39	1.5 : 1	61%
	Caiaphas' Tomb[93]	Second Temple period	64	11	7	46	1.6 : 1	72%
	Beit Safafa[94]	Herodian	47	15	10	17	1.5 : 1	36%
	Givat Ha-Mivtar[95]	Roman	35	11	12	12	0.9 : 1	34%
	French Hill 2[96]	Late Hellenistic	33	10	8	15	1.3 : 1	45%
	City of David (Area H)[97]	Herodian	18	5	12	1	0.4 : 1	6%
	Ramot[98]	Second Temple period	9	3	3	3	1.0 : 1	33%
	Mount Scopus[99]	Roman	6	2	1	3	2.0 : 1	50%

[87] P. Bar Adon, "Another Settlement of the Judean Desert Sect at 'En el-Ghuweir on the Shores of the Dead Sea," *AASOR* 227 (1977) 16.

[88] Y. Yadin, *The Finds from the Bar Kokhba Period*, 34, 36.

[89] H. Nathan, "The Skeletal Material from Nahal Hever: Cave No 8—The 'Cave of the Horrors,'" *Atiqot* (English Series) 3 (1961) 169.

[90] D. Reshef and P. Smith, "Two Skeletal Remains from Hiam el-Sagha," *RB* 100 (1993) 261.

[91] J. Zias, "Anthropological Analysis of Human Skeletal Remains," *The Akeldama Tombs: Three Burial Caves in the Kidron Valley* (eds G. Avni and Z. Greenhut; Jerusalem, Ahava Press: 1996) 119–20.

[92] B. Arensburg and Y. Rak, "Skeletal Remains from an Ancient Jewish Population from French Hill, Jerusalem," *BASOR* 219 (1975) 70–71.

[93] J. Zias, "Human Skeletal Remains from the 'Caiaphas' Tomb," *Atiqot* 21 (1992) 79.

[94] B. Zissu, "'Qumran type' graves in Jerusalem: Archaeological Evidence of an Essene Community?" *DSD* 5 (1998) 160.

[95] N. Haas, "Anthropological Observations on the Skeletal Remains from Giv'at ha-Mivtar," *IEJ* 20 (1970) 41.

[96] P. Smith and J. Zias, "Skeletal Remains from the Late Hellenistic French Hill Tomb," *IEJ* 29 (1980) 110.

[97] P. Smith, L. Horwitz, and L. Dujovny, "Appendix: The Human Remains from Area H," *Excavations at the City of David 1978–1985*, vol. III: *Stratigraphical, Environmental and Other Reports* (eds A. DeGrout and D.T. Ariel; Qedem 33; Jerusalem: Institute of Archaeology, Hebrew University of Jerusalem, 1992) 58.

[98] J. Zias, "A Rock-Cut Tomb in Jerusalem," *BASOR* 245 (1982) 54–55.

[99] J. Zias, "Anthropological Evidence of Interpersonal Violence in First-Century-AD Jerusalem," *Current Anthropology* 24 (1983) 233–34.

Table 6 (*cont.*)

	Region/Site	Period	Sample Sizes				Sex Ratio	%
			n	*m*	*f*	*o*		
	Nahal Raqafot[100]	Late Roman	5	3	–	2	–	40%
	Manahat[101]	Roman (3rd C)	2	2	–	–	–	–
	Shmuel ha-Navi St[102]	Roman (3rd C)	2	1	1	–	1.0 : 1	–
Outliers (North/South)	Hesban *[D, F, G, K]* (Moab)[103]	Roman	257	67	68	122	1.0 : 1	47%
	Queen Alia Airport (Amman)[104]	Roman	88	39	26	23	1.5 : 1	26%
	Wadi ed-Daliyeh (Samaria)[105]	Hellenistic	47	31	16	–	1.9 : 1	–
	Gesher Haziv [Acco][106]	Roman (2nd C)	23	2	12	9	0.2 : 1	39%
	Rafidiya/Shechem [Samaria][107]	Roman (2-3 C)	3	0	1	1	–	33%
Later Periods	Abila (Gilead)[108]	Roman/Byzantine	247	30	21	196	1.4 : 1	79%
	Meiron (Upper Galilee)[109]	Roman/Early Byzantine	197	22	35	140	0.6 : 1	71%

[100] L. Rahmani, "Roman Tombs in Nahal Raqafot, Jerusalem," *Atiqot* 11 (1976) 78–81.

[101] J. Gath and L. Rahmani, "A Roman Tomb at Manahat Jerusalem," *IEJ* 27 (1977) 209.

[102] L. Rahmani, "Roman Tombs in Shmuel ha-Navi Street, Jerusalem," *IEJ* 10 (1960) 143, 147; D. Ferembach, "Note sur deux crânes trouvés à Jérusalem dans une sépulture d'époque Romaine," *Mordecai Narkiss Memorial Volume* (eds M. Avi-Yonah et al.; *Erlsr* 6; Jerusalem: Israel Exploration Society, 1960) 7*–8*.

[103] R. Little, "An Anthropological Preliminary Note on the First Season at Tell Hesban," *AUSS* 7 (1969) 236–37; J. Sterling, "The Human Skeletal Remains from Hesban's Cemeteries," *AUSS* 16 (1978) 254, 256; J. Kritzeck and E. Nitowski, "The Rolling Stone Tomb F. 1 at Tell Hesban," *AUSS* 18 (1980) 83.

[104] B. Frolich, "Appendix D: The Human Skeletal Series," *A Cemetery at Queen Alia International Airport* (eds M.M. Ibrahim and R.L. Gordon; Wiesbaden: Otto Harrassowitz, 1987) 56.

[105] W. Krogman, "Cranial material," *Discoveries in the Wadi ed-Daliyeh* (eds P. Lapp and N. Lapp; AASOR 41; Cambridge, MA: American Schools of Oriental Research, 1974) 89.

[106] M. Faerman, J. Verdene, and P. Smith, "Human Remains from the Roman Cemetery at Gesher Haziv," *Atiqot* 25 (1994) 100.

[107] H. Hizmi, "Two Burial Caves in Rafidya (Shechem)," *Atiqot* 32 (1997) 45*.

[108] V. Haskins, "Human Skeletal Remains from Abila: The 1986 Season," *Near East Archaeological Society Bulletin* (New Series) 30 (1988) 73.

[109] P. Smith, E. Bornemann, and J. Zias, "The Skeletal Remains," *Excavations at Ancient Meiron, Upper Galilee, Israel 1971–71, 1974–75, 1977* (eds E. Meyers, J.F. Strange, and C.L. Meyers; Meiron Excavation Project 3; Cambridge, MA: ASOR, 1981) 111.

Table 6 (*cont.*)

	Region/Site	Period	Sample Sizes				Sex Ratio	%
			n	*m*	*f*	*o*		
	Yasileh (Golan/Bashan)[110]	Roman/Byzantine	141	41	17	83	2.4 : 1	59%
	Pella (Gilead)[111]	Late Roman	140	51	43	46	1.2 : 1	33%
	Wadi Faynan (Aravah)[112]	Late Roman/Byzantine	55	31	18	6	1.7 : 1	11%
	Aqaba (Edom)[113]	Late Roman/Byzantine	19	4	6	9	0.7 : 1	47%
	Umm Al-Jimal (Gilead)[114]	Roman/Byzantine	14	1	3	10	0.3 : 1	71%
Qumran	Qumran (Steckoll)[115]	Hellenistic/Roman	8	6	4	3	1.5 : 1	38%
	Qumran (German Collection)[116]	Hellenistic/Roman	22	9	8	5	1.1 : 1	23%
	Qumran (French Collection)[117]	–	17	16	1	0	16.0 : 1	0%
	Combined French/German[118]	–	39	23	9	7	2.6 : 1	18%

[110] Z. Al-Muheisen and M. El-Najjar, "An Anthropological Study of the Human Remains from Yasileh: A Classical Site in Northern Jordan," *Mu'tah Journal for Research and Studies* 9 (1994) 19.

[111] S.J. Bourke, "First Preliminary Report on the Excavation and Study of Human Remains," *Pella in Jordan 2: The Second Interim Report of the Joint University of Sydney and College of Wooster Excavations at Pella, 1982–1985* (A.W. McNicoll, P.C. Edwards, J. Hanbury-Tenison, J.B. Hennessy, T.F. Potts, R.H. Smith, A. Walmsley, and P. Watson; Mediterranean Archaeology Supplement 2; Sydney: Meditarch, 1992) 217–20.

[112] M. El-Najjar and A. Al-Shiyab, "Skeletal Biology and Pathology of the People of Wadi Faynan," *Mu'tah Lil-Buhuth wad-Diranat* 13 (1998) 13–14.

[113] S. Parker, "The Roman 'Aqaba Project: The 1997 and 1998 Campaigns," *ADAJ* 44 (2000) 382.

[114] J. Brashler, "The 1993 and 1994 Seasons at Umm al-Jimal: The 1994 Umm al-Jimal Cemetery Excavations of Areas AA and Z," *ADAJ* 34 (1995) 462.

[115] Steckoll, "Preliminary Excavation Report," 335; Röhrer-Ertl et al., "Über die Gräberfelder von Khirbet Qumran," 47.

[116] Röhrer-Ertl et al., "Über die Gräberfelder von Khirbet Qumran," 47.

[117] S. Sheridan, J. Ullinger, and J. Ramp, "Anthropological Analysis of the Human Remains from Khirbet Qumran: The French Collection," *The Archaeology of Qumran, Vol. II*. (eds J-B Humbert, OP and J. Gunneweg; Presses Universitaires de Fribourg, Suisse and the École Biblique et Archéologique Française, forthcoming) Table 6.

[118] Röhrer-Ertl et al., "Über die Gräberfelder von Khirbet Qumran," 47; Sheridan et al., "Anthropological Analysis of the Human Remains from Khirbet Qumran," Table 6.

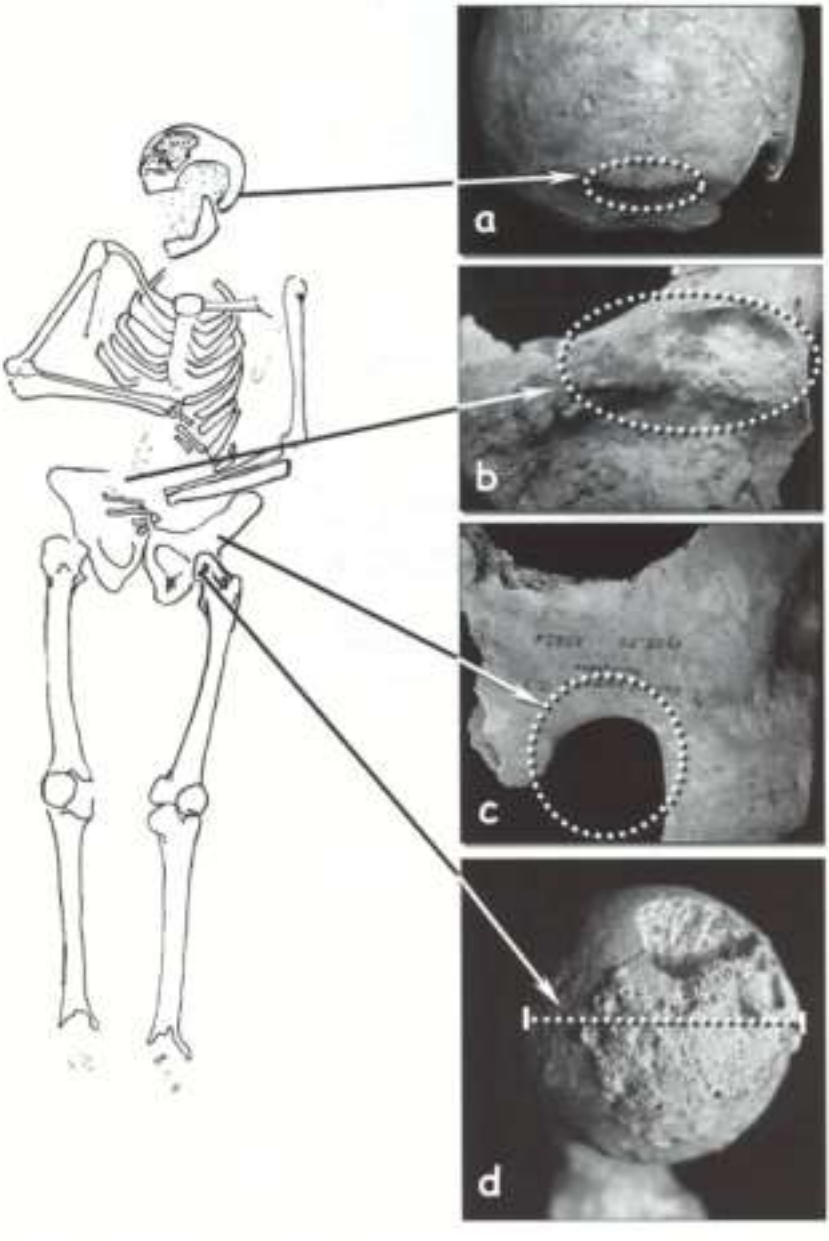

Figure 9. Diagram of the Tomb 7 remains *in situ*, representing the materials possibly available to Vallois for analysis. The reclassification of this individual was based on a variety of measures, including: a) robusticity of the nuchal crest; b) lack of complete surface elevation (adhering paraffin matrix also visible); c) narrowness of the sciatic notch; and d) large femoral head diameter. *Diagram of skeleton* in situ *drawn by Therese Fitzpatrick.*

Figure 10. Location of sites mentioned throughout the text and in tables. Sites indicated by smaller typeface are for reference only.

Stature Estimation

Adult stature results from the complex interplay of genetic and environmental influences. The high correlation between parental and offspring height, and the comparable heights attained by identical twins provide evidence for a genetic component to stature.[119] Conversely, numerous studies have demonstrated the importance of nutrition, work intensity, and disease stress on the growing subadult.[120] Comparisons of immigrant parents and their "transplanted" children demonstrate that while the genotype (genetic makeup) of the individual sets the limits of terminal height, the environment plays a crucial role in the achievement of genetic potential. Adult height is thereby influenced by the subadult environmental context of growth.[121]

Variation by Sex: For the current study, stature was reconstructed using the regression formulae of M. Trotter and G. Gleser for the long bones.[122] The overall stature for each individual in the current study is

[119] L. Wolfe and J. Gray, "A Cross-Cultural Investigation into the Sexual Dimorphism of Stature," *Sexual Dimorphism in* Homo Sapiens: *A Question of Size* (ed. R. Hall; New York: Praeger, 1982) 197–230.

[120] See B. Bogin, *Patterns of Human Growth* (New York: Cambridge University Press, 1988) for a discussion of chronic conditions affecting subadult growth. R. Huss-Ashmore, A. Goodman, and G. Armelagos, "Nutritional Inference from Paleopathology," *Advances in Archaeological Method and Theory* 5 (ed. M.B. Schiffer; New York: Academic Press, 1982) 395–474; A. Goodman, D. Martin, G. Armelagos, and G. Clark, "Indications of Stress from Bone and Teeth," *Paleopathology at the Origins of Agriculture* (eds M. Cohen and G.J. Armelagos; New York: Academic Press, 1984) 13–39; C. Larsen, "Bioarchaeological Interpretations of Subsistence Economy and Behavior from Human Skeletal Remains," *Advances in Archaeological Method and Theory* 10 (ed. M.B. Schiffer; New York: Academic Press, 1987) 339–445; R. Steckel, "Stature and the Standard of Living," *Journal of Economic Literature* 33 (1995) 1903–40; A. Albert and D. Greene ("Bilateral Asymmetry in Skeletal Growth and Maturation as an Indicator of Environmental Stress," *American Journal of Physical Anthropology* 110 [1999] 341–49) and others provide excellent reviews of the role of nutrition, disease stress, activity patterns and other environmental constraints on the growing skeleton.

[121] Larsen, *Bioarchaeology*, 13–19. "The close ties between stress—especially poor nutrition—and stature are abundantly documented in research developing out of a growing interest in anthropometric history" (p. 13).

[122] M. Trotter and G. Gleser, "Estimation of Stature from Long Bones of American Whites and Negroes," *American Journal of Physical Anthropology* 10 (1952) 463–514; idem, "A Re-evaluation of Estimation Based on Measurements of Stature Taken during Life and of Long Bones after Death," *American Journal of Physical Anthropology* 16 (1958) 79–123; idem, "Corrigenda to 'Estimation of Stature,'" *American Journal of Physical Anthropology* 47 (1977) 355–56. Additional methods using the vertebra (D. Jason and K. Taylor, "Estimation of Stature from the Length of the Cervical, Thoracic, and Lumbar Segments of the Spine in American Whites and Blacks," *Journal of Forensic Sciences* 40 [1995] 59–62), bones of the foot (T. Holland, "Brief

listed in Table 7 and compared to the results of previous investigations as reported by Röhrer-Ertl and colleagues.[123]

Table 7: Stature Estimates (cm) for Individuals from Qumran

Collection	Males		Females	
	mean	*n*	*mean*	*n*
Qumran (Vallois)	160.0*	1	–	–
Qumran (Kurth)	–	–	159.0	1
Qumran (German Collection)	165.7	9	158.3	9
Qumran (French Collection)	174.4	1	154.3	1

* Vallois reported this individual as a "female (?)"

Figure 11 illustrates male and female stature for the combined Qumran collection, demonstrating the high degree of consistency of height *within* each sex. Male stature ranged from 159.0–177.0 cm, females from 152.0–163.0 cm. Variation within each group was low for both males (CV = 3.6; n = 11) and females (CV = 2.1; n = 10).

Male versus female variation, however, was highly significant (p = 0.001; t = 3.5; *df* = 19). The mean male stature in the combined de Vaux collection was 165.7 ± 5.9 cm (n = 11) and 158.3 ± 3.3 cm (n = 10) for the females.[124] While within-sex differences were not dis-

Communication: Estimation of Adult Stature from the Calcaneus and Talus," *American Journal of Physical Anthropology* 96 [1995] 315–20), the metacarpals (L. Meadows and R. Jantz, "Estimation of Stature from Metacarpal Lengths," *Journal of Forensic Sciences* 37 [1992] 147–54), and fragmentary remains (T. Holland, "Estimation of Adult Stature from Fragmentary Tibias," *Journal of Forensic Sciences* 37 [1992] 1223–29) are also available. These methods have not undergone the rigorous testing of the Trotter and Gleser formulae and are thus not used in the current study.

[123] Röhrer-Ertl et. al., "Über die Gräberfelder von Khirbet Qumran," table insert. It is important to note that the method used for Vallois' estimate is not indicated. It is unclear if he used a discriminate function such as Trotter and Gleser, or whether this estimate is based on a full body measurement (the "anatomical method") taken from head to toe at graveside. Based on the notes from de Vaux, the later is quite possible (for information on the utility of the later method, please see M.C. De Mendonça, "Estimation of Height from the Length of Long Bones in a Portuguese Adult Population," *American Journal of Physical Anthropology* 112 (2000) 40; and V. Formicola, "Stature Reconstruction from Long Bones in Ancient Population Samples: An Approach to the Problem of its Reliability," *American Journal of Physical Anthropology* 90 [1993] 351). Also of note, Vallois designated this individual (Tomb 7) as "female?", although it appears in Table 7 as a male based on our reclassification.

[124] Please note that the German team did not report standard deviations with their male and female stature estimates, hence their absence in Table 7. For the combined

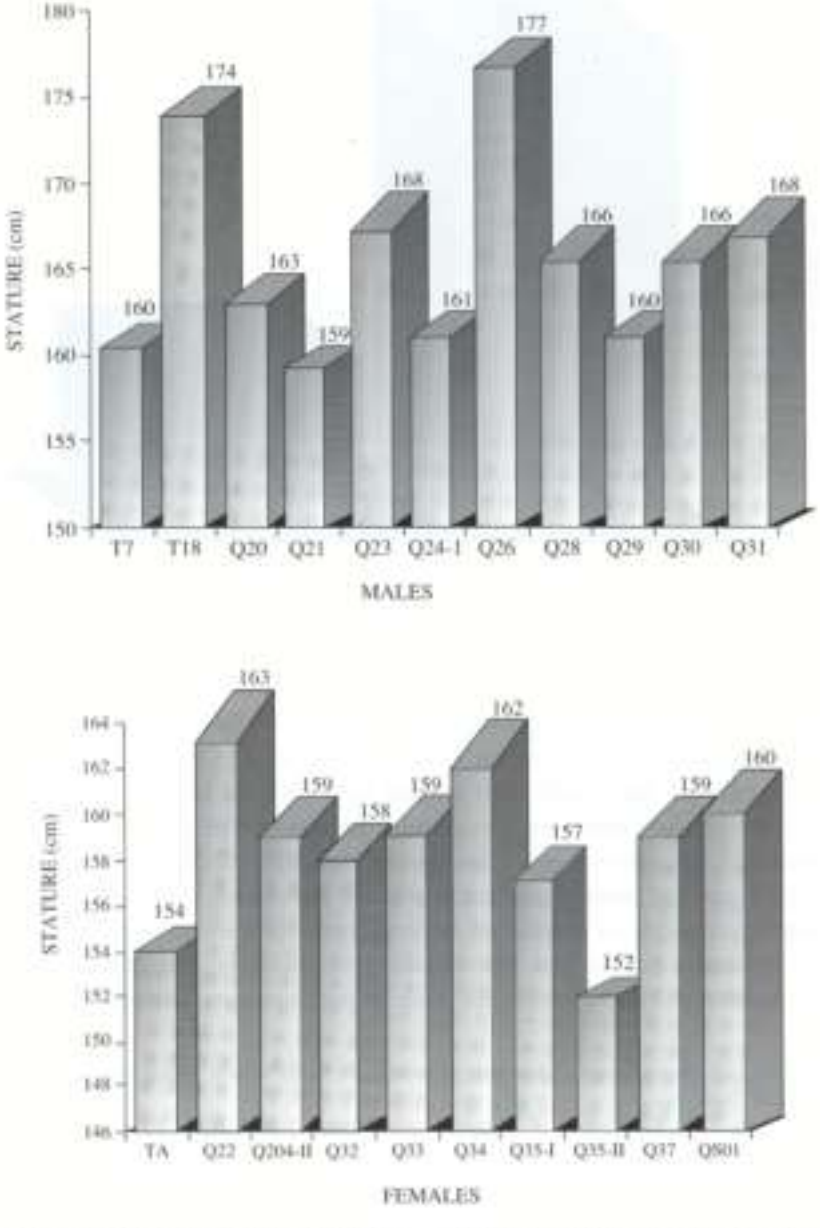

Figure 11. Stature estimates for males and females in the combined de Vaux Qumran collection (German, Paris and Jerusalem segments).

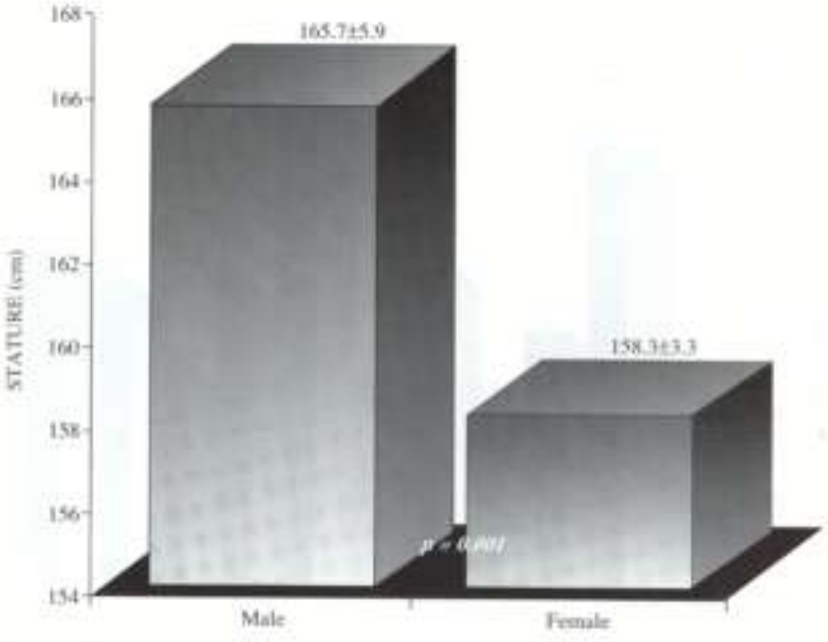

Figure 12. Comparison of Male and Female average stature for the combined de Vaux Qumran collection.

tinct, as shown by the low coefficients of variation listed above, *between*-sex variation was highly significant (Figure 12).

Zias stated that "individual stature is a variable largely controlled by genetics, and therefore, the endogamous nature of ancient societies tended to limit the range of biological variability within these groups as compared to today's modern world."[125] He subsequently used slight stature variations as a pillar of his argument for the reclassification of sex estimates for several individuals. Unfortunately, the plasticity of the human skeleton precludes such generalizations without careful

German and French average, however, I calculated these values, which appear in the text and Table 8.

[125] Zias, "The Cemeteries of Qumran and Celibacy," 233. While this statement is true, the importance of genetics is over-emphasized in his model for sex determination. Ironically, the very next line in the reference cited by Zias states, "it is also clear from numerous studies that the health of the individual is also a significant component affecting stature" (D.J. Ortner and W.G.J. Putschar, *Identification of Pathological Conditions in Human Skeletal Remains* [Washington, DC: Smithsonian Institution Press, 1981] 33). Given the emphasis Zias placed on the estimation of stature in classifying sex determination, it seems a shame more credence was not given to the subsequent passage.

analysis, especially for a collection of such limited size.[126] For example, the 160 cm height provided by Vallois for Tomb 7 was used by Zias to reclassify the individual as male. This individual was quite likely male—for reasons outlined above, but not due to height alone. Indeed, Tomb 7 falls at the low end of the male height range when viewed in isolation (see Figure 11).

Similar arguments were made for reclassifying individuals in the German sequence.[127] Little within-group difference, however, was found for the males or females in the combined Qumran collection using the German sex estimates as published, while variation between males and females was highly significant. Given these data, and the regional comparisons to follow, there appears no reason to doubt the German designation of sex difference based on stature. Those individuals classified as male fall well within the male range, as do the females, for both within- and between-group comparisons.

Regional Comparisons: To gauge the relative stature of the combined collection, the Qumran remains were compared to several regional/temporal counterparts. Table 15 lists published stature estimates for Late Hellenistic and Roman period collections from sites relatively near Qumran, including Ein Gedi[128] (n = 24), Jericho,[129] Naḥal Ḥever[130]

[126] As Brothwell (*Digging Up Bones*, 77) has observed, "even in comparatively small collections of skeletal material, there may be considerable variability in measurement or general form within a group. . . ."

[127] Admittedly, Zias has seen the German collection first-hand, and I have not. Unfortunately, he does not present metric or substantial non-metric data collected on his visit to the German remains to support his reclassifications. For example, Zias points to a photograph in the German publication for one adjustment in sex determination—never an adequate substitute when the remains are at hand. Also, he uses singular stature estimates for sex determination. As was discussed previously, the use of one stature data point is not a viable anthropological method for sex determination. In summary, all of Zias's claims may be correct; however, in the absence of original and substantive data to support these suppositions, the reader is left wanting.

[128] Arensburg et al., "Skeletal Remains of Jews," 178. Method of stature estimation not provided in the literature. B. Arensburg and A. Belfer-Cohen, "Preliminary Report on the Skeletal Remains from the 'En Gedi Tombs,'" *Atiqot* 24 (1994) 12*–14*.

[129] Arensburg and Smith, "The Jewish Population of Jericho," 134. The number of individuals used in stature estimation is not provided, nor is the method used for estimation of stature.

[130] Nathan, "The Skeletal Material from Nahal Hever," 171.

(n = 9), Givat Ha-Mivtar[131] (n = 17), City of David,[132] Mount Scopus[133] (n = 12), and Shmuel Ha-Navi Street[134] (n = 1). They are likewise compared to a wider geographic and temporal cohort, moving from the Upper Galilee, through Ammon, Moab, and the Aravah. These sites include Meiron[135] (n = 13), Queen Alia Airport in Amman[136] (n = 34), Hesbon,[137] and Wadi Faynan.[138]

Table 8: Stature Estimates (cm) for the Combined Qumran Collection Compared to Regional Counterparts

Site	Period	Males				Females				Method
		x	std	range	n	x	std	range	n	
Ein Gedi[139]	H	165.9 ± 5.1		157–174	12	151.0 ± 4.9		141–165	12	—
Jericho[140]	H/R	160.0		—	—	—		—	—	—
Givat Ha-Mivtar[141]	H/R	165.0		149–181	10	160.5		151–170	7	—
City of David[142]	R	178.0 ± 4.0		—	—	151.0 ± 4.5		—	—	Trotter & Glesser
Mount Scopus[143]	R	166.0		155–174	5	149.0		144–153	7	Trotter & Glesser
Nahal Hever[144]	R	162.4 ± 3.3		158–167	5	154.2 ± 4.0		150–159	4	Trotter & Glesser
Shmuel Ha-Navi St.[145]	R	168.0		—	1	—		—	—	—

[131] Haas, "Anthropological Observations on the Skeletal Remains from Giv'at ha-Mivtar," 40–49. The method used for stature estimation is not provided.

[132] Smith et al., "The Human Remains from Area H," 61. The number of individuals used in stature estimation is not provided.

[133] Zias, "Human Skeletal Remains from the 'Caiaphas' Tomb," 78–80.

[134] Rahmani, "Roman Tombs in Shmuel ha-Navi Street," 148. The method used to estimate the stature of the individual is not provided.

[135] Smith et al., "The Skeletal Remains," 114.

[136] Frolich, "Appendix D: The Human Skeletal Series," 52, 54–56.

[137] Little, "An Anthropological Preliminary Note on the First Season at Tell Hesban," 237. The method used to estimate the stature of the individual is not provided.

[138] El-Najjar and Al-Shiyab, "Skeletal Biology and Pathology of the People of Wadi Faynan," 15; L. Karaki, *The Skeletal Biology of Wadi Faynan: A Bioarchaeological Study* (Irbid, Jordan: Yarmouk University, Institute of Archaeology and Anthropology M.A. Thesis, 1991).

[139] Arensburg et al., "Skeletal Remains of Jews," 178.

[140] Arensburg and Smith, "The Jewish Population of Jericho," 134.

[141] Haas, "Anthropological Observations," 40–49.

[142] Smith et al., "The Human Remains from Area H," 61.

[143] J. Zias, "Human Skeletal Remains from the Mount Scopus Tomb," *Atiqot* 21 (1992) 100.

[144] Nathan, "The Skeletal Material from Nahal Hever," 171.

[145] Rahmani, "Roman Tombs in Shmuel ha-Navi Street, Jerusalem," 148.

Table 8 (cont.)

Site	Period	Males				Females				Method
		x	std	range	n	x	std	range	n	
Meiron[146]	R	164.2		162–169	6	148.0		143–152	7	Trotter & Gleser
Hesbon (Area D)[147]	R	—		—	—	160.0		—	—	—
Queen Alia Airport[148]	R	166.2 ±	6.1	154–176	22	152.9 ±	5.2	146–166	12	Trotter & Gleser
Wadi Faynan[149]	R/B	169.6		178–157	—	160.7		170–155	—	Trotter & Gleser
Qumran (Combined)[150]		165.7 ±	5.9	159–177	11	158.3 ±	3.3	152–163	10	Trotter & Gleser

H = Late Hellenistic; R = Roman; B = Early Byzantine

Figure 13 graphically demonstrates this relationship, illustrating comparable peaks and valleys of height by location. The difference in stature between males and females for all regions combined is again highly significant ($p = 0.0001$; $df = 19$; $t = 5.8$).

Genetic Affinity

Several studies of genetic affinity have begun for the French collection. Scott Woodward and co-workers report success in extracting ancient DNA from the dentin of teeth from the Jerusalem remains.[151] In addition, metric analyses of dental, cranial and post-cranial metrics are underway for comparison to regional/temporal counterparts. And, analysis of non-metric traits of the French collection dentition is complete, as outlined below.[152]

[146] Smith et al., "The Skeletal Remains," 114.

[147] Little, "An Anthropological Preliminary Note on the First Season at Tell Hesban," 237.

[148] Frohlich, "The Human Skeletal Series," 52, 54–56.

[149] El-Najjar and Al-Shiyab, "Skeletal Biology and Pathology of the People of Wadi Faynan," 15.

[150] Röhrer-Ertl et al., "Über die Gräberfelder von Khirbet Qumran."

[151] Personal communication with Prof. Scott Woodward, Brigham Young University. Results expected in the summer of 2002.

[152] Jaime Ullinger completed this segment of the analysis. Additional details related

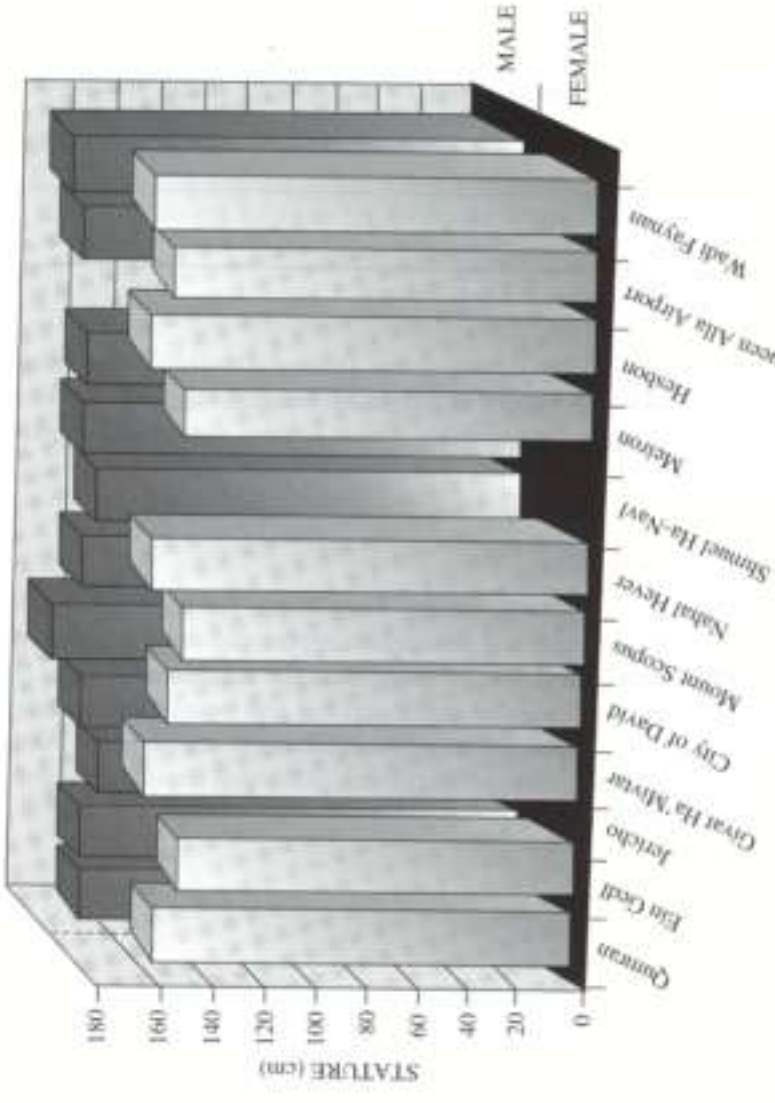

Figure 13. Variation in stature by site.

Non-metric traits embody a large, diverse set of skeletal and dental features that are not measured, rather scored for presence/absence or degree of expression. They are not indicative of disease; indeed, most go unnoticed during the lifetime of the individual.[153] These traits are often used to help assess the genetic composition of archaeological skeletal collections, as there seems to be a high correlation of occurrence among related individuals.[154]

Dental morphology for the French collection was scored according to the Arizona State University Dental Anthropology System.[155] This system classifies features of the dentition generally free of sex, age or environmental bias, such as cusp number or degree of shoveling on the incisors (presence of mesial/distal ridges on lingual surface). These traits are assumed to accurately represent underlying genetic composition.

In total, eleven individuals from the French collection were suitable for study (represented by eight maxillae, eight mandibles, and several loose teeth). Antemortem loss, postmortem loss, and attrition affected six individuals in the collection, thus excluding them from the current study sample. A detailed summary of dental features for this collection (metric and non-metric) can be found elsewhere.[156]

In general, the collection exhibited a simplified pattern of dentition found in populations of the Near East, South Asia, and Europe, which differs strongly from that seen in East Asia, the Americas, and Sub-Saharan Africa. The Qumran features were thus compared to a

to this study can be found in the article she co-authored (Sheridan et al., "Anthropological Analysis of the Human Remains from Khirbet Qumran"). Special thanks to Prof. Christy Turner II and Dr Diane Hawkey, both of the Arizona State University Department of Anthropology, for their help with this analysis.

[153] They range in expression from abnormalities of bone fusion, to variations in tooth form, to bony exostoses, to extra facets for articulation.

[154] Mays, *Archaeology of Human Bones*, 102–21; A. Berry, "Factors Affecting the Incidence of Non-metric Skeletal Variants," *Journal of Anatomy* 120 (1975) 519–35; M. Goldstein, B. Arensburg, and H. Nathan, "Skeletal Remains of Jews from the Hellenistic and Roman Periods in Israel. II: Non-metric Morphological Observations," *Bulletins et Memoires de la Societe d'Anthropologie de Paris* 7 (1980) 279–95.

[155] C. Turner II, C. Nichol, and G. Scott, "Scoring Procedures for Key Morphological Traits of the Permanent Dentition: The Arizona State University Dental Anthropology System," *Advances in Dental Anthropology* (eds M.A. Kelley and C.S. Larsen; New York: Wiley-Liss, 1991) 13–31.

[156] Sheridan et al., "Anthropological Analysis of the Human Remains from Khirbet Qumran."

collection from Ein Gedi,[157] a Natufian sample,[158] an Early Near East group,[159] and a Native American sample.[160]

Frequencies of the traits were analyzed using Smith's Mean Measure of Divergence (MMD) statistic.[161] Results are presented in Table 9, with significant differences listed in bold type. A large MMD indicates greater biological distance between groups. The North America sample is present as an outlier to illustrate such distance.

A score of <.100 indicates two closely related groups. The Qumran and Near East comparison and the Qumran and Ein Gedi comparison

[157] Data collected in J. Lipschultz, *Who Were the Natufians? A Dental Assessment of their Population Affinities* (Tempe, AZ: Arizona State University M.A. Thesis, 1996) 37. The Ein Gedi collection dated from the Late Hellenistic through the Byzantine periods (200 BCE–640 CE) and was the most regionally and temporally equivalent to the Qumran collection.

[158] Lipschultz, *Who Were the Natufians?* The Natufian sample was taken from multiple sites dating to the Late Epipaleolithic (20,000–12,800 years ago).

[159] Data collected in the following works: V. Alexandersen, "Sukas V: A Study of Teeth and Jaws from a Middle Bronze Age Collective Grave on Tall Sukas," *Det Kongelige Danske Videnskabernes Selskab Biologiske Skrifter* 22 (1978) 1–56; V. Carbonell, *The Dentition of the Kish Population, 3,000 BC* (Chicago: University of Chicago M.A. Thesis, 1958); Lipschultz, *Who Were the Natufians?*; M. Senyurek, "A Study of the Dentition of the Ancient Inhabitants of Alaca Hoyuk," *Turk Tarih Kurumu Belleten* 16 (1952) 153–224; and idem, "The Dentition of the Chalcolithic and Copper Age Inhabitants of Anatolia. Part I: A Morphological Study of the Lower Permanent Molars," *Ankara Universitesi Dil ve Tarih-Cografya Fakultesi Derigisi* 10 (1952) 57–77; compiled by D. Hawkey, *Out of Asia: Dental Evidence for Affinities and Microevolution of Early Populations from India/Sri Lanka* (Tempe, AZ: Arizona State University Ph.D. Dissertation, 1998) Table 3.3. The Early Near East group was a composite collection representing a number of sites from Jordan, Israel, Palestine, Turkey, Syria, Lebanon, and Iraq, ranging from the Neolithic to the Early Bronze Age.

[160] Data collected in the following works: A. Dahlberg, "The Dentition of the American Indian," *The Physical Anthropology of the American Indian* (eds W.S. Laughlin and S.L. Washburn; New York: Viking Press, 1951) 138–76; K. Enoki and A.A. Dahlberg, "Rotated Maxillary Central Incisors," *Orthodontic Journal of Japan* 17 (1958) 157–69; D. Morris, "Bushman Maxillary Canine Polymorphism," *South African Journal of Science* 71 (1975) 333–35; D. Morris, S. Hughes, and A. Dahlberg, "Uto-Aztecan Premolar: The Anthropology of a Dental Trait," *Development, Function and Evolution of Teeth* (eds P.M. Butler and K.A. Joysey; London: Academic Press, 1978) 69–79; P. Sciulli, K. Schneider, and M. Mahaney, "Morphological Variation of the Permanent Dentition in Prehistoric Ohio," *Anthropologie* 22 (1984) 211–15; G. Scott, *Dental Morphology: A Genetic Study of American White Families and Variation in Living Southwest Indians* (Tempe, AZ: Arizona State University Ph.D. Dissertation, 1973); and compiled by Hawkey, *Out of Asia*. The North American group was largely collected from the American Southwest, dating to both the historic and prehistoric periods.

[161] The analysis was completed using a "Mean Measure of Divergence program" written by Robert Williams. The program includes a correction for small samples. The limited number of unworn teeth was problematic for the French collection.

suggest that either the samples are indeed from the same biologically coherent population, or larger samples are needed. As the later point is most definitely true, assessment of genetic affinity is, while intriguing, only speculative at this juncture.

Table 9: MMD Values for the French Collection Teeth

	QUM	ENE	EGD	NAT	NAM
QUM	0				
ENE	0.170	0			
EGD	0.281	0.219	0		
NAT	0.561	0.388	0.073	0	
NAM	0.690	0.709	0.637	0.967	0

QUM = Qumran
ENE = Early Near East
EGD = Ein Gedi
NAT = Natufian
NAM = Native North American

Conclusions

Considerable information could be gleaned from the French collection of Qumran remains; nevertheless, severe limitations on sample size, preservation, and representative skeletal elements hampered the creation of a detailed biocultural model. The findings of the current analysis are listed below:

- There is ample evidence that the bones of the French collection were exhumed by de Vaux at Qumran. Remains from Tombs 1, 2, 9, 14, and 17, however, are still missing from this sequence.[103]
- The new cemetery survey demonstrates on-going degradation of the

[103] A reference in Taylor ("The Cemeteries of Khirbet Qumran," 303 n. 64) may hint at the location of two missing individuals: "Joe Zias has now discovered partial remains of two further skeletons in the Rockefeller's Qumran storage area but these are unlabelled and it is therefore unsure where they come from." These two skeletons could not be found on a search of the collections by Sheridan or Humbert in the Spring 2001. Continued investigation will hopefully reveal these and other missing remains from the Qumran collection. If provenience can be verified, this will fill in some of the missing pieces and provide vitally needed additions to the overall sample size.

site since the time of de Vaux. Several excavated tombs have been obliterated and looting is of considerable concern.

- The new surface survey of Resonberg and Myers indicates discrepancies in the original mapping of the graveyard, which can hopefully be corrected by re-evaluation of de Vaux's maps and field notes read in concert with the more sensitive mapping by Eshel and colleagues.
- Evidence for significant differential preservation was not found in the French collection. Rather, variation in skeletal elements available for study apparently resulted from the discretion of the original excavators.
- Bone samples were denatured beyond current radiometric capabilities due to the effects of heat, salinity, pH, and other factors that have conspired to mask the organic signals of interest. Stable carbon and nitrogen isotope analysis demonstrated the lack of remnant protein in the bones of the French collection.
- Fluoride analysis of individuals in the French collection proved inconclusive. While variation was found between graves, they do not appear to represent a discernable burial pattern and are most likely the result of postmortem contamination.
- Preliminary analysis of nail morphology indicates Roman period construction. Approximately fifty nail and spike fragments are available for the French collection from Tombs 17 and 18.
- The French Qumran collection is composed of a woman (over fifty years of age), one teenage male (15–16 years old), one elderly man by Qumran standards (over sixty years old), and fourteen 30–50 year old males.
- The average male height at Qumran was 165.7 ± 5.9 cm and the average female height was 158.3 ± 3.3 cm. These measures fit well with previous estimates, showing no significant difference in height within each sex, yet a highly significant difference between the sexes. These estimates fit the statistical bounds of neighboring groups.
- Although the small sample size and degradation of the dental samples precluded definitive analysis of genetic affinity, data from the French Qumran collection hint at genetic relatedness to regional and temporal contemporaries.

Future Possibilities: Additional study should begin with a synthesis of data for the combined Qumran sample, including the collection of complementary cranial, dental, and postcranial metric sets, compara-

ble scoring of non-metric traits,[164] and review of photographic evidence of *in situ* skeletons in the German collection weighed against available remains.[165]

Efforts to chronometrically date the material should be continued, including the possible analysis of protein in the dentin (teeth) and persistent attempts to secure a "clean" sample of coffin wood. In addition, methods are currently being developed to try to separate paraffin contamination from the bone prior to a re-analysis of fluoride concentrations. Organic analysis of the paraffin composition is likewise underway, with preliminary results indicating a "bee's wax" constituent in the preservative. Finally, chemical investigation of the nails and spikes may provide additional information of use in assessing datable metallurgical processes.

Microscopic analysis of bone cross-sections may aid in more accurate age assessment for some individuals. Likewise, DNA analysis might provide important information related to sex determination. Application of "experimental" aging and sexing methods may likewise enhance the demographic reconstruction. Gathering additional data for regional and temporal correlates is imperative to a fuller understanding of the Qumran results. This impacts several areas of investigation, from stature to robusticity to demographics.

As outlined above, a multi-faceted genetic reconstruction of the combined collection will aid in understanding the degree of relatedness of individuals in the group, as well as provide perspective for biological distance studies.

Analysis of diet and disease patterns will help interpret individual health patterns. For example, examination of dental microwear (microscopic attrition) may enlighten broad categories of consumption, and phytolith analysis of dental calculous (hardened tartar) could inform discussion about available plant resources.[166] Examination of pathological conditions related to iron-deficiency anemia or calcium deficiency (osteopenia/osteoporosis), and evaluation of dental caries (cavities) will likewise enhance our understanding of individual nutrition.[167] Furthermore, a survey of pathological indicators such as neoplasias

[164] The Germans present a detailed list of such traits in their publications.

[165] Photographs for most of these skeletons have been found in the de Vaux photo archive.

[166] B. Arensburg, "Ancient Dental Calculus and Diet," *Human Evolution* 11 (1996) 139–45.

[167] M. Lewis and C. Roberts, "Growing Pains: The Interpretation of Stress Indicators," *International Journal of Osteoarchaeology* 7 (1997) 581–86.

(cancers), congenital abnormalities (birth defects), degenerative lesions (arthritis), and trauma will permit a glimpse into the adaptive success of the represented Qumranites.

While anthropological evaluation of *community* trends are not possible given the scant sample size, interesting life histories (albeit incomplete) can be constructed for some of the individuals in the French collection. Continued analysis of the Qumran collection (both the French and German components), comparison to regional and temporal contemporaries, and perhaps eventual expansion of the sample size, may one day permit the construction of a biocultural framework to enhance our understanding of this desert community located on the shores of the Dead Sea.