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Attorneys for Plaintiff

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF OREGON

ROBSON BONNICHSEN, C. LORING BRACE,)
GEORGE W. GILL, C. VANCE HAYNES JR.,)
RICHARD L. JANTZ, DOUGLAS W. OWSLEY,) USDC No. CV 96-1481 JE
DENNIS J. STANFORD and D. GENTRY)
STEELE,) **AFFIDAVIT OF DOUGLAS W. OWSLEY**
Plaintiffs,)

v.

UNITED STATES OF AMERICA,)
DEPARTMENT OF THE ARMY,)
U.S. ARMY CORPS OF ENGINEERS,)
ERNEST J. HARRELL, DONALD R. CURTIS)
and LEE TURNER,)
Defendants.)

STATE OF _____)
County of _____)ss.

I, Douglas W. Owsley, being first duly sworn, do depose and state as follows:

ALAN L. SCHNEIDER
1437 SW Columbia, #200
Portland, Oregon 97201
(503) 274-8444

1 1. I am a forensic anthropologist and a skeletal biologist. I am currently employed
2 as a curator and the division head for physical anthropology at the National Museum of
3 Natural History, Smithsonian Institution, Washington D.C. I am an expert in the study and
4 analysis of human skeletal remains.

5 2. My professional qualifications are as follows: I hold a Ph.D. degree in physical
6 anthropology from the University of Tennessee (1978). I have taught skeletal analysis and
7 identification at two universities, and I have assisted federal, state and local law enforcement
8 agencies in numerous cases requiring examination of human remains to determine identity
9 and cause of death. Particular examples include the Jeffrey Dahmer serial murder case and
10 the Branch Davidian Compound near Waco, Texas. A significant portion of my career has
11 been devoted to the study of prehistoric and early historic North American skeletal remains.
12 Together with Dr. Richard Jantz of the University of Tennessee, I have compiled extensive
13 data bases of skeletal remains from all parts of the United States. In addition to other
14 sources, our data bases contain the results of examinations conducted by myself or Dr. Jantz
15 on more than 6,000 human remains. These remains range in age from the historic to more
16 than 9,000 years before present. I have authored or co-authored more than 130 scientific
17 articles, and I have co-edited two books (one is currently in preparation) on skeletal and
18 bioarchaeological subjects. I currently hold a grant from the Joint American-Croatian Science
19 Board to train Croatian pathologists and anthropologists in the techniques for investigating
20 battlefield and war crimes remains.
21

22 3. Dr. Jantz's affidavit describes the cranial and postcranial measurements we wish
23 to take as part of our examination protocol, and how these measurements can be used to
24 assess the Kennewick Man's biological affinities to modern and other prehistoric peoples.
25 Our computerized data bases permit us to compare the Kennewick Man to many different
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PAGE 2 AFFIDAVIT OF DOUGLAS W. OWSLEY

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DOI 01584

1 groups from different time periods and geographic areas. These comparative groups can
2 range from the very large scale (i.e., Asian, European, Native American, etc.) to much smaller
3 tribal, ethnic and regional subgroups. The different comparisons can be ranked to determine
4 which group (or groups) Kennewick Man most closely resembles and which groups he least
5 resembles. Such rankings will reflect the degree to which there is (or is not) a biological
6 relationship.

7
8 4. As Dr. Jantz's affidavit notes, our examination protocol is not limited to just
9 morphometric measurements. In addition to such measurements, we also normally take and
10 record very detailed dental and bone observations. These observations should also be
11 supplemented by: (a) a complete image record; (b) a mold for casts of the cranial and selected
12 postcranial bones; and (c) bone histology. Descriptions of these procedures are given below.
13 Their purpose is to develop as complete a record as possible of the physical characteristics of
14 this very important skeleton. Well-preserved Paleo-American remains are extremely rare. The
15 Kennewick Man skeleton represents an irreplaceable source of information about early New
16 World populations, and as much data should be obtained from it as possible.

17 DENTAL AND BONE OBSERVATIONS

18 5. The human skeleton, depending upon its completeness and state of preservation,
19 can tell us much about an individual and the conditions he or she experienced. Among other
20 things, skeletal remains can provide information for discerning patterns and trends in ancient
21 population demography, health, origin, migrations, gene flow, microevolutionary change,
22 sociocultural interactions, activity patterns and lifestyle. For this reason, our examination of
23 a skeleton normally involves detailed observations and recording of all significant dental and
24 bone characteristics.
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6. Examples of the types of information we look for and record include:

A. Sex. The characteristics of the pelvis and cranium provide key indicators of the individual's sex.

B. Age. Indicators of age include: degree of union of the long bone epiphyses; pubic symphyses; auricular surface morphology; bone histology; cranial suture closure; dental wear; and the presence or absence of degenerative bone diseases (such as osteoarthritis). Determining the age of skeletal remains is important not only for demographic purposes, but also because certain health conditions can cause progressive changes to the skeleton as an individual grows older. External bone morphology alone cannot provide a precise determination of age and should be supplemented by bone histology (see description below).

C. Health. Osteological evidence of disease or trauma can suggest cause of death, provide insights into overall health (e.g., whether an individual suffered from iron deficiency anemia or infection), indicate limitations in mobility, and in some instances, show whether medical intervention occurred. Bones and teeth can also reflect congenital defects and anomalies. Carious lesions, alveolar bone pathology (e.g., dental abscessing and predeath tooth loss), calculus deposits, dental wear and evidence of periodontal disease can give clues to diet and food processing techniques. Health related information is important for demographic purposes, and for uncovering conditions that may affect morphometric measurements. In addition, such information can have implications for the treatment and control of disease in contemporary populations. For example, skeletal studies could provide clues as to why modern Native Americans suffer from a high rate of rheumatoid arthritis.

D. Activity Patterns. The development of muscle attachment sites and enthesophytes (projections or irregular ridges of ossification) at muscle, tendon and ligament attachments can provide evidence of handedness or of biomechanical stress resulting from repetitive

1 activities or occupations. Artificially induced modifications in human bone and teeth can also
2 offer insights into sociocultural practices such as cranial deformation and surgical procedures.

3 E. Taphonomy. Certain types of bone modifications can provide important
4 information about the environmental conditions to which a skeleton was exposed. For
5 example, the presence or absence of bleaching, cracking, abrasion, marks of carnivore
6 scavenging and other characteristics can indicate whether a skeleton was exposed to surface
7 conditions prior to burial, and if so, how long. Other characteristics, such as the presence of
8 invasive vegetation, pollens and insect remains can indicate the season in which death
9 occurred. Information about these matters can provide important insights concerning the
10 circumstances of the skeleton's interment or deposition at the location where it was
11 discovered. Among other things, it has yet to be determined whether the skeleton represents
12 a deliberate burial at this location. The possibility exists, for example, that the Kennewick
13 Man may have died elsewhere and that his body may have subsequently floated downriver
14 prior to deposition and later decomposition at this site. Taphonomic study of the skeleton
15 may help to answer questions such as this.
16

17 7. Our dental and bone observations are completely nondestructive, and will not harm
18 the skeleton in any way. Dr. Robson Bonnicksen of the Center for the Study of the First
19 Americans will assist with the taphonomic observations. He is an expert in these matters, and
20 his analyses will be extremely valuable.

21 8. A printout of our observations can be produced within approximately 30 days after
22 completion of the examination. A preliminary report setting out any conclusions derived from
23 our dental and bone observations can be provided when our biological affinity report is
24 delivered.
25
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IMAGE RECORD

1
2 9. Measurement and observation of the Kennewick Man skeleton should be
3 supplemented by the development of a complete image record. To permit maximum data
4 preservation and retrieval, this record should consist of:

- 5 (a) 35 mm color slides and black and white photographs of the cranium and
6 postcranial skeleton
7 (b) digital photographs for three dimensional computer models
8 (c) X-rays of the cranium and postcranial skeleton
9 (d) cross-sectional CAT scans of the cranium and postcranial skeleton
10

11 The color slides and photographs should include the cranium in standard anatomical position
12 (i.e., the Frankfort horizontal) and closeups of the dentition and pathology. The digital
13 photographs consist of a specially positioned series of images that can be stitched together
14 via computer to create high resolution, three dimensional computer models. The resulting 3D
15 files permit observations to be made that are not possible with other imaging systems.

16 10. Development of a complete image record is absolutely imperative for a skeleton
17 as important as the Kennewick Man. If the skeleton is ultimately repatriated and buried, this
18 record will be the only means by which it can be studied in the future to confirm the work
19 done before repatriation and to test new concepts suggested by future research developments.
20 Even if the skeleton is not repatriated, the image record will be critical for future study,
21 analysis and instruction on the part of researchers, students and scholars who are unable to
22 view the skeleton in person. Nothing else (other than the skeleton itself) is an adequate
23 substitute for a good image record. Measurements and written descriptions, no matter how
24 detailed, cannot convey the subjective impressions and the volume of information that the
25 human eye and brain can gather from images. While artists' illustrations can convey some
26

1 of this information, they are not as accurate as scaled photographs, X-rays and CAT scans.
2 Forensic, medical and other scientific publications customarily include high-definition images
3 of the key skeletal remains (or portions thereof) discussed in their text. Such images are
4 particularly crucial where the remains in question are significant because of their age or
5 where there is a need to illustrate skeletal pathology, morphological variation, or forensic
6 observations.

7 11. The X-rays and CAT scans have other important uses. Among other things, they
8 permit observations to be made of embedded dental roots (which can be important for
9 discrete trait analyses). In addition, X-rays and CAT scans permit analyses of cortical bone
10 thickness, skeletal pathology and geometric characteristics.
11

12 12. The procedures involved in creating this image record are noninvasive, and will
13 not harm the skeleton in any way.

14 13. The color slides, black and white photographs and digital photographs can be
15 taken at the skeleton's present location while our examination is being conducted. Our
16 examination team includes technicians skilled in the appropriate techniques. The X-rays and
17 CAT scans should be taken at a medical facility having the necessary equipment and trained
18 personnel. Dr. Chatters has offered to make arrangements with a local facility.

19 BONE CASTS

20 14. A mold should be taken of the skull so one or more casts can be made of the
21 cranium and dentition to supplement the photographic, X-ray and CAT scan image record.
22 Molds should also be taken of key postcranial bones. Casts made from these molds can be
23 important for a number of reasons. First, well-made casts provide physical models that can
24 be physically measured. While not as accurate as the original object, they do serve as a cross-
25 check against the image record and they can be used as a tool for future restudy of the
26

1 skeleton. Second, a well-made cast can be used to prepare a full facial reconstruction of the
2 Kennewick Man so we can recreate what he looked like in life. The accuracy of this
3 reconstruction can be gauged in part by merging an image of the skull with an image of the
4 reproduction so the integrity of the fit can be evaluated.

5 15. Casts are made of plaster or epoxy from a silicon rubber mold. Preparation of the
6 mold is nondestructive, and will not injure the skull in any way.

7 16. At least two cranial casts should be made as one cast will be needed for the facial
8 reproduction. The mold can be made at the present location of the skeleton, and will take
9 approximately two days. The casts and the facial reconstruction will be made off-site. It
10 should be possible to complete the facial reproduction within approximately four months after
11 a cast has been provided to the sculptor.

12 17. If permission is given for preparation of a mold, I will make arrangements to
13 retain an individual qualified to undertake a project of this importance.

14 BONE HISTOLOGY

15 18. Examination of the Kennewick Man skeleton should also be supplemented by a
16 microscopic analysis of the bone cortex. Such an analysis (or bone histology) will provide an
17 independent assessment of the Kennewick Man's age at time of death. As noted above, age
18 at death is important for demographic purposes and for assessment of factors that may relate
19 to the accuracy or significance of other observations and measurements. In the case of
20 Kennewick Man, multiple criteria must be used to determine his age at death since any single
21 factor could be misleading. For example, methods based on external morphology, such as age-
22 related changes in the pubic symphysis and auricular surface, are based on modern
23 populations whose lifestyles (e.g., diets and levels of activity) may differ significantly from
24 those of Kennewick Man. Likewise, dental wear by itself may not be a completely reliable
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1 indicator of age, because it will vary depending upon the amount of grit in the diet, the
2 specific foods eaten, and how these foods were processed. It is hoped that information about
3 these matters can be obtained from the stable isotope and phytolith studies that have been
4 requested and possibly from other techniques such as scanning electron microscopy of casts
5 taken from the surface of the skeleton's teeth (which may disclose the existence of diagnostic
6 microwear patterns). Such studies, however cannot answer all of the unknowns. For these
7 reasons, bone histology is necessary since it will provide an independent method for
8 determining Kennewick Man's age at time of death.

9
10 19. Histology involves cross-sectioning a leg bone. The cross section is then examined
11 under a high-power optical microscope to evaluate the structural features in the bone cortex
12 (e.g., primary osteons, secondary osteons, and osteon fragments). Age at death is determined
13 by measuring the degree of age-related remodelling and resorption that has occurred within
14 the cortex and interior of the bone. The resulting estimation of age at time of death will be
15 among the most accurate possible.

16 20. This procedure should be performed by a qualified expert and at an appropriately
17 equipped facility. Dr. Douglas Ubelaker, a forensic anthropologist, has offered to study the
18 bone cross-section. He is an expert in these matters and has published scientific articles on
19 the subject. A report of his findings can be provided within approximately three months after
20 he receives the bone sample.

21 21. This procedure will require the removal of a small cross-section (approximately
22 one-half inch or less) from one of the leg bones. After this cross-section has been removed,
23 the leg bone can be rejoined and secured with a high-strength bonding compound. I will
24 personally deliver the extracted bone specimen to Dr. Ubelaker.
25
26

OTHER POINTS

1
2 22. The procedures described above will be performed in a respectful manner. My
3 colleagues and I view skeletal remains as the tangible relics of individuals who should be
4 treated with dignity and honor. We honor them by learning what they have to teach.

5 23. Approximately four to five days will be needed to complete the on-site portions
6 of our examination of the skeleton, and the other procedures described above. To avoid
7 excessive cost and travel time, they should all be scheduled for the same visit.

8 24. My interest in examining the skeleton is to accurately determine its true
9 characteristics, including its biological affinities. I have no preconceptions regarding the
10 results of the proposed examination that would prevent me from being objective in gathering
11 or processing the data to be collected. I have nothing to gain from an erroneous or inaccurate
12 determination regarding the biological affinities of the skeleton.

13
14 25. Use of morphometric measurements and dental characteristics to determine race
15 and other biological affinities is a well established, accepted practice. These techniques are
16 used not only for scientific purposes, but are also employed in MIA and criminal
17 investigations. The studies to be conducted by Dr. Jantz and myself, and by Drs. Brace, Gill,
18 Powell, Steele and Turner, employ some of the most sophisticated techniques and most
19 comprehensive comparative databases in the world. The combination of these studies,
20 together with Dr. Bonnichsen's DNA analysis, will allow a very accurate and reliable
21 assessment to be made of the Kennewick Man's relationship (if any) to modern Native
22 American peoples.

23
24 26. As an experienced forensic anthropologist, I can state unequivocally that the
25 Kennewick Man skeleton cannot be identified without thorough scientific study. It cannot
26 be assumed a priori that this individual is related to modern Native American peoples.

1 Whether such a relationship does (or does not) exist can only be determined by careful
2 collection and assessment of all lines of potential evidence. Study of this skeleton is also
3 important for the information it can provide for other repatriation cases. Our ability to
4 identify (or affiliate) prehistoric skeletal remains depends upon a steady accumulation of
5 knowledge of all kinds. Data that may appear unimportant now may become critical in later
6 cases as new concepts or techniques are developed. And what is learned about one time
7 period can have important implications for later time periods. At present, there are hundreds
8 of Early and Middle Archaic skeletal remains that have yet to be securely affiliated because
9 of insufficient information about their ancestry and descent lineages. Kennewick Man can
10 help to fill in some of these gaps.
11

12 27. An example of the importance of careful examination of human remains using all
13 available scientific techniques is provided by a NAGPRA review I am currently conducting
14 for the National Park Service. This review involves a collection of 17th century skeletal
15 remains from the Jamestown settlement in Virginia. Included in this collection are several
16 skeletons that were originally identified as Native American when they were excavated in the
17 1940's. However, our reanalysis of the skeletons has determined that they are not Native
18 Americans, but instead represent some of the first Africans in Colonial America. The original
19 assessment gave heavy weight to the presence of shovel shaped incisors, a trait which is
20 common (but not unique) to Native Americans. However, no single trait or measurement by
21 itself is definitive for determining biological affiliation. All factors must be considered in
22 order to reach a reliable assessment. If these skeletons had not been reexamined using
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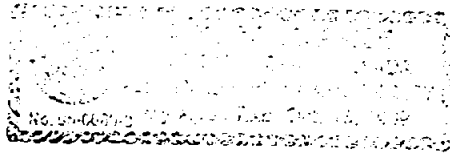
1 appropriate modern techniques, they would have been subject to repatriation under NAGPRA
2 and African-Americans would have lost an important part of their history.

3
4 Douglas W Owsley
5 Douglas W. Owsley

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7 SUBSCRIBED and SWORN to before me this 4 day of March, 1997.

8 Alan M. F. Siew
9 Notary Public for: Casson City
10 My Commission Expires: 10-15-99

11 C:\richland.man\owsley.aff



STATE OF OREGON)
) ss
County of Multnomah)

I, Tamara L. Thorud, being duly sworn, depose and say: (1) I am a competent person over the age of 18 years and am not a party nor an attorney in the proceeding entitled Bonnichsen, etc. v. United States of America, et al. in the United States District Court for the District of Oregon and bearing docket number CV 96 1481 JE in said court; (2) I am a person regularly employed by Lane Powell Spears Lubersky, with offices at 520 SW Yamhill Street, Suite 800, Portland, Oregon 97204-1383, who are attorneys for plaintiffs in said proceeding; (3) On March 11, 1997 I served the foregoing document upon defendants in said proceeding by mailing a copy thereof to the attorneys for defendants at their last known address:

Timothy W. Simmons
U.S. Attorney for the District of Oregon
888 SW 5th Avenue, Ste. 1000
Portland, OR 97204

Daria J. Zane
General Litigation Section
Environment and Natural Resources Division
U.S. Department of Justice
P.O. Box 663
Washington D.C. 20044-0663

Tamara L. Thorud

Signed and sworn before me this 11th day of March, 1997.

Julie R. Dod

Notary Public for Oregon
My commission expires: 3/14/97

