

# Preliminary Report on Human Material Excavated at Kaman-Kalehöyük 1989, 1991, 2004 and in August 2005

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## INTRODUCTION

In November 2004 the first Preliminary Report on human remains excavated at Kaman-Kalehöyük was submitted for publication. This report concentrated on material from 1986-1990 with some initial observations on individuals excavated in 2004 (Hunt 2005). For the background to the reports and analysis I would refer the reader to this paper.

The following is a report on the new individuals analysed in August 2005.

1989 - 2 individuals

1991 - 2 individuals

1994 - 9 individuals (including one multiple assemblage of 8 individuals)

1996 - 1 individual

2004 - 4 individuals

2005 - 7 individuals (including one multiple assemblage of 6 individuals)

## METHODOLOGY

Analysis of human remains will always be influenced by the high degree of variation that exists between individuals. The main factors in such variation are sexual dimorphism, individual development and the influence of environmental factors such as nutrition, and of pathology. An individual is a product of all these, and each influences both overall development and that of more localised areas of the skeleton.

The skeleton is our primary source of information at most excavations. Because of the variation discussed above it is unlikely that we will be able to pinpoint a specific age for an individual based solely on his or her

mortal remains. Likelihood of arriving at a narrow age span decreases with the amount of material available for analysis. This is also true if the state of preservation is poor, and if the individual being assessed is likely to be a mature adult. Given the relatively fragmented and often friable condition of much of the remains, the results of this primary analysis should be seen as provisional only. In many cases a more detailed analysis would be necessary to achieve a higher degree of certainty.

The following methodology was used for the primary analysis:

### Number of Individuals

Main indicators used (each indicator applies to entire bones and teeth as well as to fragments):

- difference in levels of maturity between different bones or teeth that would normally exhibit the same degree of development if belonging to the same individual;
- morphological and/or size differences between antimeres (bones or teeth), taking into account the possible influence of pathology;
- presence of "extra" bones or teeth;
- acceptable/unacceptable levels of articulation between adjacent bones in joints;
- presence/absence of occlusion between upper and lower dentition;
- presence/absence of observed anomalies in fragments of the same element;
- state of closure/obliteration of cranial sutures;
- differences in secondary sexual traits;
- levels of dental wear;
- differences in preservation/colour.

It should be noted that differences in preservation/colour may not always be a reliable indicator. In some excavated material, even a single bone may show different colours in different areas (e.g. in a cranium which had been partly buried, partly exposed to open air). Two fragments of the same bone may also show different colour if they were separated *post mortem* and subject to different taphonomic pressures. This indicator was therefore always used in conjunction with others.

### Level of Maturity

#### 1) Adult or juvenile

This report defines the term “adult” as an individual in whom

- the basi-occipital synchondrosis is complete (Warwick and Williams 1973);
- the 2nd molars are fully erupted and in occlusion, with the apex of the roots closed, and (where these exist) eruption of the 3rd molars is either complete or in progress (Buikstra and Ubelaker 1994);
- the epiphyseal union in paired long-bones other than the clavicle is advanced or completed (Brothwell 1981).

In most populations these events will have taken place in the late teens - early twenties.

“Juvenile” indicates an individual where one or more of these developmental stages has not been reached. If no assessment could be made, the report uses “?adult” or “?juvenile”, depending on which was deemed to be more likely.

#### 2) Age

Following an assessment of maturity, the following indicators/traits were used to determine a likely age span at death:

##### A) adults

- dental development (Hillson 1996; Brown 1985)
- epiphyseal union (Warwick and Williams 1973; Brothwell 1981)
- age related changes in the auricular surface (Lovejoy *et al.* 1985)
- age related changes in the costo-condrial junction of the 4th rib (Angel *et al.* 1986)
- change in the pubic symphysis (Brooks and Suchey

1990)

- fusion in cranial sutures (Buikstra and Ubelaker 1994)
- osteophytosis of the spine (Bass 1995)

##### B) juveniles

- dental development (Hillson 1996; Brown 1985)
- basi-occipital synchondrosis (Warwick and Williams 1973)
- epiphyseal union or lack thereof (Warwick and Williams 1973; Brothwell 1981)
- development of epiphyses (Warwick and Williams 1973; Bass 1995)
- union of the ilium, ischium and pubis (Warwick and Williams 1973; Brothwell 1981)
- length of long-bones without epiphyses (Bass 1995, after Trotter and Gleser 1952)

In addition, in foetal material or that of very young infants:

- measurements of individual bones (Fazekas and Costa 1978)
- presence/absence of open cranial fontanelles (Warwick and Williams 1973)
- fusion of the tympanic ring (Warwick and Williams 1973)
- fusion of other bones (Warwick and Williams 1973)

### Determination of Sex

This cannot always be done with certainty, as the remains may not include an adequate number of the relevant parts of the skeleton, or the skeleton may not show sufficiently marked secondary sexual traits. These latter only develop from puberty onwards, and it is therefore rarely possible to determine the sex of juveniles with any degree of accuracy from the dry skeleton only. This report therefore uses “male”, “female”, “?male”, “?female” and “undetermined”, as appropriate.

The following traits were used in determining sex:

the pelvis: ischio-pubic ramus, sub-pubic concavity, ventral arc, sub-pubic angle, morphology of the sciatic notch, sacro-iliac articulation, presence/absence of pre-auricular sulcus, overall pelvic morphology (Phenice 1969; Washburn 1948; Bass 1995; Brothwell 1981)

the cranium: prominence of brow-ridge, development

of the nuchal lines, occipital protuberance and external occipital crest, development of the mastoid process and the zygomatic arch, angle and shape of the orbits, degree of incline in the frontal bone, relative size of the dentition (Brothwell 1881; Bass 1995; Scott and Turner 2000)

the mandible: development of the gonial area, angle of the ascending ramus relative to the body of the mandible; development of the chin, the relative size of the dentition (references as for cranium);

general: development of muscular insertion points, overall robusticity, metric measurements e.g. length of long-bones, diameter of the femoral head (Bass 1995, using Trotter and Gleser 1952).

Except in individuals with marked dimorphic traits in the pelvic area or the cranium, assessment is often based on relative size and development. Dimorphism can vary between populations as well as between individuals. As with indicators of maturity and age, therefore, as many of the sexual traits as possible were used in the analysis.

## RESULTS OF PRIMARY ANALYSIS

A new, formalised method for numbering all human remains, regardless of completeness, was adopted at Kaman in 2004. Work is currently in progress to create a separate electronic database for the human material, in which each individual will be allocated his/her individual number. Since not all individuals have yet been allocated such a number the system adopted in last year's report (Hunt, *op. cit.*) will be continued, with each individual being allocated an alphabetic "working label". Where the new number is known, this will be reported immediately following the string of co-ordinates.

As in the previous report, the abbreviated forms L and R are used for "left" and "right". Likewise, in view of the frequently incomplete and fragmented state of the bones, and in order to avoid tedious repetition of the phrase "fragment(s) of", only the name of the relevant

bone or portion has been given, except where the use of this phrase was considered necessary for clarification.

The "two-digit" system of the Fédération Dentaire Internationale has been used throughout to refer to individual teeth.

Individuals A-L were described in Hunt (2005). The following individuals were inspected in August 2005.

### Individual M

**Co-ordinates:** KL 890817 North-III XLI-54G, Provisional Layer (PL) ④ HS 89-01  
Juvenile, ?male.

Upper half of the skeleton only (skull, arms, axial to the level of the superior innominate ridge on both sides).

**Skeletal elements present:** Cranium and mandible, upper and lower dentition (complete except 25; 8s incomplete and unerupted), hyoid, L and R clavicle, L and R scapula, L and R ribs, cervical, thoracic and lumbar vertebrae, sternum (manubrium and fragment of body), L and R humerus, L and R radius, L and R ulna, L and R hand bones (all carpal bones except R pisiform, all metacarpals and epiphyses except the distal epiphysis for the 5th L metatarsal, 17 phalangeal epiphyses and shafts).

**Observations:** The 2nd R metacarpal shows a healed fracture.

There is a small root socket anterior to the (fully erupted) 13. There may have been a retained 53 or a small supernumerary tooth.

Copper oxide stains can be seen on the R temporal bone (close to the auditory meatus), the R side of the atlas and of the 3rd cervical vertebra. There is a similar stain on the L mastoid process.

The cranial remains were too fragmented to enable an assessment of possible trauma.

### Individual N

**Co-ordinates:** KL 890817 North-III XLI - 54G, PL④  
Probably adult, age undetermined  
Found together with Individual M.

**Skeletal elements present:** Cranium (<10 small fragments), cervical vertebra (fragment of C3, R side), small longbone fragments (<10 in number, unidentified elements), fragment of a sciatic notch, fragment of L 5th

metatarsal.

**Observations:** The preservation of the fragments, their density and the presence of fragments already noted in Individual M indicate this to be a separate individual. No further observations were possible.

#### Individual O

**Co-ordinates:** KL 910809 North-IX XXIX–55G, P554 HS 91-05

Skeleton no. 5 from this set of co-ordinates. One of a multiple-individual assemblage.

Adult female, 18-23 years old

Very fragmented. The elements listed below should be considered as represented rather than fully present.

**Skeletal elements present:** Cranium (frontal bone, R temporal bone, occipital bone, maxilla), mandible (L ascending ramus and fragment of L side of body), upper and lower dentition (11-13, 15-18, 21-28, 31-33, 35, 43-44 and 46-48; damaged roots), hyoid, R clavicle (distal and proximal ends only); fragments of undetermined number of cervical and thoracic vertebrae and ribs (medial fragments only).

**Observations:** Due to the paucity of osseous remains observations about this individual has had to be limited to the visible parts of the teeth and roots. Calculus and dirt under a layer of consolidant cover a number of teeth to approximately half-way up the crown, rendering observations about dental health difficult. Linear enamel hypoplasia is, however, discernible close to the cemento-enamel junction in 27, 28, 47 and 48.

There are three distinct roots in tooth 47. The antimere is missing.

#### Individual P

**Co-ordinates:** KL 910820 North-IX XXIX–55G, P554 HS 91-12

Skeleton no. 12 from this set of co-ordinates. One of a multiple-individual assemblage.

Juvenile female, c. 13-16 years old.

Due to the inconsistent presence of epiphyses in the two relatively intact longbones uncovered, it was not possible to assess the stature of this individual.

**Skeletal elements present:** cranium (fragment of a petrous bone only); L clavicle (medial fragment only), L scapula (fragment of acromion and glenoid

only), cervical and thoracic vertebrae (<10 very small fragments), sacrum, R innominate (epiphyses missing), L ulna, L hand bones (L 1st and 2nd proximal metacarpals), L femur (including epiphyses); L patella, L tibia (distal epiphysis missing), L fibula (distal half, including epiphysis, L calcaneus (including epiphysis), L talus.

**Observations:** No observations of osseous pathology or abnormality were made.

A number of elements, whole or fragmented, from much younger individuals were found with Individual P and had been grouped under skeleton number 12. These were:

the shaft of a femur (from a small child or infant)

the shaft of a tibia (from an infant)

a fragment of a tarsal bone (still largely unformed, probably from an infant)

a fragment of a ?tibial epiphysis (from a small child or infant)

the body of a cervical vertebra (from a small child or infant)

one other fragment (unidentified).

These remains may be from one individual, or possibly two. A further inspection of this material will be carried out during a later season and will be reported on then.

Two teeth and a frontal bone fragment of non-human origin were included with the human bones.

#### Individual Q

**Co-ordinates:** KL 940810 North-XII XLIX–55G, PL<sup>14</sup> R151

Sex undetermined, age undetermined

**Skeletal elements present:** Mandible (fragment of central body; anterior surface missing), lower dentition (one root fragment only in position in the bone fragment), rib fragments (from 2 L ribs, 1 R rib and 4 unsided).

**Observations:** The mandibular fragment is burnt. There is no obvious fit between the unsided rib fragments or between these fragments and the sided ones. All rib fragments are medial.

Two pieces of charcoal and bone of a non-human origin were included with this specimen.

**Individual R****Co-ordinates:** KL 940719 North-O XLVI-54G, PL<sup>18</sup>

Adult, sex undetermined, age undetermined.

**Skeletal elements present:** Body of a thoracic vertebra, probably a C4 or C5. The vertebral disc is completely fused and well worn.**Observations:** There is a small amount of lipping at the anterior edges, slightly more at the inferior rim than the superior.**Individuals S - Z**

A total of 8 individuals – 4 adults and 4 juveniles – were found at the same co-ordinates.

**Co-ordinates:** KL 940720 North-XII XLIX-55G, PL<sup>14</sup> R151**Individual S:** Juvenile, sex undetermined, age undetermined**Skeletal elements present:** cranium (L and R petrous bone), mandible (R body).**Individual T:** Juvenile, sex undetermined, age c. 3-5 years**Skeletal elements present:** Fragment of R neural arch, not fused to the vertebral body.**Individual U:** Juvenile, sex undetermined, age undetermined, but older than individual T.**Skeletal elements present:** proximal diaphysis of a humerus, diaphyses of two other longbones (undetermined), three cervical vertebrae, one unfused vertebral disc, one small fragment of an unfused epiphysis.**Individual V:** Juvenile, sex undetermined, c. 10-12 years.**Skeletal elements present:** Upper and lower dentition: 21 (fully erupted, light wear), 24 (erupting), 28 (unerupted, crown not fully formed), 33 (erupting), 37 (erupting, roots partly formed and 38 (unerupted, crown not fully formed); distal/lateral clavicle.**Individuals W-Z:** All adults, MNIP 4.**Observations (S-Z):** All remains from these

co-ordinates, with the exception of a fragment of a distal femur and some small rib fragments, are burnt, with the colouration ranging from white through black to pale brown. The bone is highly fragmented and many of the smaller fragments could not be identified with certainty. A further study will be attempted made of these individuals at a later date.

**Individual AA****Co-ordinates:** KL 960625 North-XXI XLVI-56G, PL<sup>28</sup> R208

Adult, sex undetermined, age undetermined.

**Skeletal elements present:** Lower dentition (a 34), one cervical vertebra (probably a C6 or C7), 3rd L metacarpal, metaphysis of tibia (united).**Observations:** Not enough material was present from this individual to make any more detailed comments.

Two fragments of non-human, mammal bone were also found with this assemblage.

**Individual AB****Co-ordinates:** KL 04 (no specific date given) North-XXVII XLVI-53G, PL<sup>79</sup> HS 0407 no. 1

Adult, sex undetermined, probably older than 25 years.

**Skeletal elements present:** Cranium (vault, basi-occipital fragment), upper dentition (16, 17 18, 27, 28), one thoracic vertebra (probably T10), three sacral vertebrae (S1-S3), L innominate, L and R femur.**Observations:** Very fragmented material. Found together with Individual AC (please see below).**Individual AC****Co-ordinates:** KL 04 (no specific date given) North-XXVII XLVI-53G, PL<sup>79</sup> HS 0407 no. 2

Adult, possibly male, c. 20-25 years old.

**Skeletal elements present:** Cranium (fragment of occipital bone, including occipital protuberance), L innominate (superior iliac crest and inferior part of the acetabulum).**Observations:** Found together with Individual AB (please see above).**Individual AD**

(Initial observations on this individual were published in Hunt (1995).)

**Co-ordinates:** KL 040826 North-XXXII XLII-51G, PL<sup>24</sup> P2772 HS 0401

Adult male, probably older than 35 years.

**Skeletal elements present:** Cranium (facial structure and nasal sinuses shattered), mandible (part of R gonial region missing), upper and lower dentition (full set of 32 teeth), L and R clavicle, L and R scapula, sternum (anterior surface only), L and R ribs (including most costo-condrial and dorsal ends), ossified thyroid, hyoid cervical, thoracic and lumbar vertebrae, sacrum, coccyx, L and R innominate, L and R humerus, L and R radius (distal end of L missing), L and R ulna, L and R carpals (all) L and R metacarpals (all) L and R phalanges (*manus*), L and R femur (distal ends missing), L and R patella, L and R tibia, L and R fibula (proximal end of L missing), L and R calcaneous, L and R talus, L and R 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> cuneiform, L and R cuboid, L and R metatarsals (all), L and R phalanges (*pes*), a sesamoid bone.

**Observations:** Based on measurements on R tibia, R fibula and L femur, and taking the mean of the three figures calculated using formulae set out in Bass (1995), this individual will have been approximately 167 cm tall.



Fig. 1 Individual AD. Lesion in R parietal bone

Three instances of traumatic injury can be seen in the skeleton. One is a lesion in the R parietal bone, immediately superior to the temporal line, approximately circular in outline and approximately 4 cm across at its widest (Fig.1). The lesion is deeper along the edge closest to the temporal line, and appears to have been made by a blow from a heavy object. The wound healed during the life-time of the individual and was therefore not directly the cause of death. It is possible that the blow did not fully penetrate the bone. There is a thickening of the bone on the inside of the vault in the same position as the lesion, but X-ray investigation would be needed to ascertain if there was an initial break.

A second injury is a fracture of the shaft of the L tibia, located about a third of the way from the proximal end. The fracture has healed in a poorly aligned position, resulting in the L tibia becoming approximately 1.5 cm shorter than the R, which will have given the individual a slight limp. The proximal third of the tibial shaft shows profuse osteophytic growth, the result of altered musculo-skeletal interaction due to the fracture. No corresponding fracture in the L fibula can be seen; the proximal fibular end is missing and it cannot readily be ascertained how the two bones interacted following the fracture. The distal ends of both tibia and fibula appear normal.

A third instance of trauma is a fracture in the distal end of the shaft of the R 5th metacarpal. The fracture healed during the individual's life-time and resulted in a foreshortened finger.

A possible fourth instance of trauma can be seen when comparing the L and R first metacarpals. The R one is 0.8 cm shorter than the left and has a much more worn appearance than its antimeres. There is no obvious indication of a fracture; an X-ray of the element might provide more information. There is no corresponding difference in length in the 1st toes.

There is evidence of osteoarthritis at several points in the skeleton. Eburnation can be seen in the odontoid peg (posterior surface, with corresponding eburnation in the Atlas), the R humeral head, the L and R distal radius and ulna, the metacarpo-phalangeal and inter-phalangeal joints in the R thumb, the inter-phalangeal joint in the L thumb, the joint between R pisiform and triquetral,

the lateral side of the inter-vertebral joint between L1 and L2, the R femoral head, and the 3rd L toe (1st inter-phalangeal joint).

There is ankylosis evident in the joint between the 5th and 6th cervical vertebrae and in the 2nd inter-phalangeal joint in the 4th L toe.

Evidence of osteophytosis can be seen in most cervical inter-vertebral joints, at the lateral end of the L coracoid, at the R sterno-clavicular joint, in the inferior surface of the R clavicle, the R sacro-iliac joint.

The inferior and facial structures were badly damaged during the excavation process and observations can therefore no longer be made about other parts of the cranium than the vault. The posterior part of the sagittal suture is obliterated. There are a total of six ossa incae, two to the L, one at lambda and three to the R, with the ones to the R being markedly smaller than the others.

This individual has a full set of permanent dentition. Shovelling can be seen in upper central and lateral incisors. The grade of this shovelling cannot be assessed since the surface had been smoothed down.

There is markedly heavier wear in the right dentition than in the left, evident from tooth 4 to tooth 7. Evidence of "work wear" can be seen between 27 and 28, close to the alveolar margin and forming a rounded hollow, possibly by the repeated insertion of a thin round object (Fig.2). It is possible that this action eventually wore through the enamel and into the dentine, allowing bacteria to settle and causing the caries that has destroyed the disto-lingual corner of 27. Corresponding, rounded wear can be seen at the same level in 28. There is the beginning of formation of secondary dentine at the



Fig. 2 Individual AD. Work wear in tooth 27

apex of the root of 27.

There is a suggestion of a similar type of work wear on the other side of the maxilla, but only in its very early stages. No sign of work wear can be found in the mandible.

All teeth except 13 and 22 have remains of calculus.

A small number of fragments of non-human bone was excavated from the immediate surrounds of the skeleton. Species not determined.

#### Individual AE

**Co-ordinates:** KL 040916 North-XXXII XLII-51G, PL<sup>26</sup> P2803 HS 0406

Adult female, age undetermined

**Skeletal elements present:** Cranium (including R incus and L malleus), mandible, upper and lower dentition (24 and 34 lost post-mortem, 38 impacted or agenesis), L and R clavicle, L and R scapula, sternum, L and R ribs, hyoid, cervical, thoracic and lumbar vertebrae, sacrum, L and R innominate, L and R humerus, L and R radius, L and R ulna, L and R hand (both complete), L and R femur, R patella, L and R tibia, L and R fibula, L and R calcaneus, L and R talus, L and R metatarsals (all), phalanges (*pes*), sesamoid bones.

**Observations:** Although well represented, this skeleton is highly fragmented, with the cranium, the scapulae, the vertebrae, the innominates, the femora and the L and R proximal tibiae represented by fragments only. The remains are very dry and intact fragments continue to break. No detailed observations could therefore be made about most of the bone structure. Measurements of the arm bones and the L fibula could, however, be made. Based on the formulae published in Bass (1955), this individual will have been 148-156 cm tall.

There is ankylosis of the proximal and distal inter-phalangeal joints in both 5th toes.

*Spina bifida occulta* is present to the level of the 3rd sacral segment.

There is heavier dental wear on the R side than on the L, with the heaviest wear found in 15 and 16 where most of the lingual enamel is worn away and dentine exposed, and the mesio-lingual corner is worn almost to root level. The level of wear in the mandible is much lower and more evenly distributed. A further inspection

of this material will be undertaken during a later season, to ascertain whether the mandible belongs to this individual or must be regarded as “intrusive.”

#### Individuals AF - AK

**Co-ordinates:** KL 050817 or 050818 North-VIII XXXI–55G, PL<sup>88</sup>

HS number to be allocated

Individual AF: adult female, age undetermined

**Skeletal elements present:** L innominate

Individual AG: Adult male, older than 25 years

**Skeletal elements present:** Cranium, upper dentition

Individual AH: Adult male, age undetermined

**Skeletal elements present:** L fibula, one R rib

Unallocated adult material: L talus, a thoracic vertebra (dorsal process missing), a cervical vertebra (probably a C3).

Individual AI: Juvenile, unsexed, age 12-17 years

**Skeletal elements present:** Cranium (frontal bone, L and R zygomatic bones, L and R maxilla), upper dentition (deciduous and permanent), proximal epiphysis of humerus (unsided)

Individual AJ: Juvenile, peri-natal or neonate

**Skeletal elements present:** R ilium

Individual AK: Juvenile, aged 4 1/2 - 5 1/2 years

**Skeletal elements present:** one tooth (a 52 or 62)

**Observations (all individuals):** These skeletal elements were found in a context that dates from the Assyrian Trading Colony Period (Omura 2005, *pers. com.*). They were found intermingled or in close proximity and interspersed with a large amount of carbonised material, possibly small branches. Non-human, separate skeletal elements were also found, mostly from large herbivores, as were a large number of pot sherds of different types.

In contrast with other human bone excavated from this period (Omura 2005, *pers. com.*), none of this material was burnt.

A further inspection of this assemblage will be

made during a later season.

It may be that further excavation of the layer(s) below this assemblage may yield further human material.

#### Individual AL (provisional)

**Co-ordinates:** KL 05 (excavation begun in August), North-VIII XXX–55G, P2810

Adult, sex undetermined, age undetermined

**Skeletal material present:** Cranium (fragment of a maxilla), sternum (body only)

**Observations:** These two bone fragments were the first two to be uncovered at the above co-ordinates. Further fragments of bone were visible at the matrix surface level, but further investigation was still to come. It is therefore possible that more than one individual will have been found after I left the excavation. Any such material will be investigated together with the above fragments, in due course.

#### OTHER WORK

In addition to analysing the above specimens and assisting in excavation, preservation and lifting of the material from North-VIII (Individuals AF - AL), a start was made on re-organising and consolidating the material excavated in August 1991, from co-ordinates North-IX XXIX–55G P554, a multiple-individual deposit from the Iron Age. The preliminary results for one individual from this assemblage, Individual J, was published in the previous report (Hunt 2005). Two further individuals were analysed this season (Individuals O and P). It is as yet unclear precisely how many individuals were excavated from this location; it is likely that it will be higher than originally estimated. Further work on this material will be undertaken in forthcoming seasons.

#### CONCLUSION

The human material excavated at Kaman-Kalehöyük continues to offer potential for insights into a wide range of fields of study. This year's report



has covered adults and juveniles, represented by a varying amount of bone from one fragment or one tooth to a near-complete skeleton, single deposits to multiple burials. As the levels of information regarding individuals from specific time periods, it will also become possible to shed more light on the cultural activities and health/ill-health of these people. Further observations and analysis of data will be continued in coming seasons.

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