Bovid Mortality Patterns at Elandsfontein, Western Cape Province, South Africa, and Implications for the Hunting Capability of Acheulean-Age Hominins

By Henry T. Bunn, UW-Madison

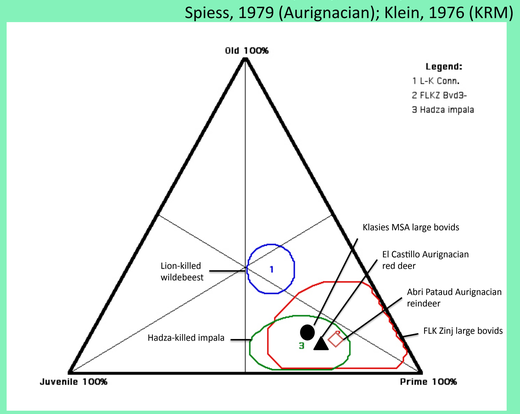
Introduction

Elandsfontein (EFT) was a Middle Pleistocene marsh preserving a rich fossil fauna and Acheulean artifacts. By the 1960s, ~ 13,000 fossil specimens had been collected, including a partial cranium of *H. heidelbergensis*, along with ~ 160 Acheulean bifaces and thousands of stone flakes. Along with many specialists' reports, curation and analysis of the fossils by Richard Klein and colleagues summarized the collection and made it available to other researchers. Prior research (e.g., Klein, 1982; Klein et al., 2007) used mortality profiles based largely on the number of selected teeth, rather than on actual minimum number of individuals (MNI), to characterize the site fauna as carnivore-generated and to generalize from that finding that "Acheulean-age hominins obtained few large mammals, whether by hunting or scavenging." Klein et al. (2007) reported a catastrophic profile for equids as a "departure" from the attritional "aggregate", which is illustrated by *Pelorovis* without reference to the abundant bovid taxa smaller than *Pelorovis.* From that perspective, the evolution of hominin hunting capability and related humanness all occurred within the past 100,000 years or less. According to Jared Diamond (1992), all hominins prior to the European Upper Paleolithic were "... just another large mammal." Providing (1) MNI-based analysis of mortality profiles at EFT, and (2) more in-depth investigation of the Pleistocene evolution of hominin hunting, inspires the current reanalysis of EFT and other sites.

Reconstructing Hunting & Humanness in the Pleistocene:
Evidence of hunting in the Early and Late Pleistocene predicts hunting in the Middle Pleistocene

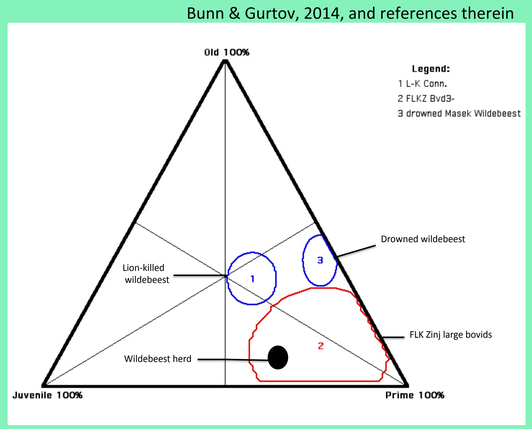
~ 130,000 years ago – modern Hadza hunting

Bunn & Gurtov, 2014, and references therein:
Schaller, 1972 (lions); Pike-Tay et al., 1999, and Spiess, 1979 (Aurignacian); Klein, 1976 (KRM)



~ 1.8 Ma Living-structure pattern at FLK is indistinguishable from Late Pleistocene and modern hunting

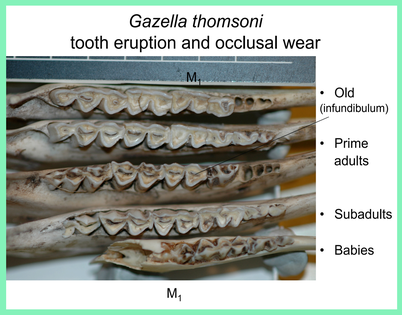
Bunn & Gurtov, 2014, and references therein



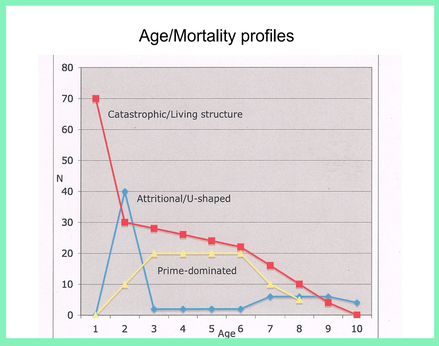
Method

To determine comprehensive MNI & age at death for EFT and Olduvai sites, teeth of each species were arrayed and compared using anatomical position, size, morphology, and eruption/wear state. The percentages of individuals grouped into three age-at-death classes yield a mortality profile by species or pooled species, plotted on triangular graphs using software from Weaver et al. (2011). Cited literature provided raw data for other sites.

Three Age Classes include: (1) JUVENILES, representing first 20% of potential lifespan, identified by deciduous teeth or erupting, unworn permanent teeth, and divided into Young Juveniles from 0-10% with erupting M_1 or M_2, and Subadult Juveniles from 10-20% with erupting M_3 and P_{3-4}; (2) PRIME ADULTS, representing 20-75% of lifespan, identified by all permanent teeth with light to moderate wear, & divided into Early (20-50%) and Late (50-75% of lifespan) subclasses; (3) OLD ADULTS, representing ~75-100% of lifespan, & beginning with loss of mesial M_1 infundibulum on Size 3 bovids (or loss of M_2 infundibula on smaller, Size 1-2 bovids).



Conventional graphing (or histograms, instead) identifies several idealized mortality profiles using similar age-at-death data grouped here into 10% increments of lifespan; however, triangular graphs facilitate statistical comparisons of multiple samples using density contours that are sensitive to sample size and approximate 95% confidence intervals.



Results

MNI-based Mortality Data

Site	Taxon	Juvenile	Prime	Old	MNI
EFT	Bovid3	41	74	10	125
EFT	Bovid3 SA	8	74	10	92
EFT	Eland	14	11	12	37
KRM	Bovid3	69	43	12	124
KRM	Bovid3 SA	21	43	12	76
KRM	Eland	51	38	4	93
BK	Alcel. 3	6	22	4	32
FLK	Bovid3	3	12	2	17

EFT Bovid 3 MNIs

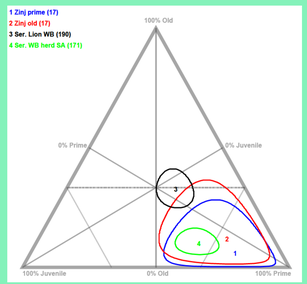
Taxon	Juv.	Prime	Old	MNI
H. leucophaeus	2	8	0	10
O. gazella	5	13	0	18
H. gigas	2	12	1	15
T. strepsiceros	8	6	3	17
Connochaetes	8	12	1	21
Rabaticeras	16	23	5	44

Discussion

New mortality profiles for six species of large (Size Group 3) bovids from EFT (MNI=125 in original collection) and for three species of Size 3 bovids from BK, a 1.3 Ma site in Bed II, Olduvai, (MNI=32), reveal strong, catastrophic, living-structure patterns dominated by prime adults. They are statistically indistinguishable from mortality patterns at older (FLK Zinj, Olduvai) sites probably involving ambush hunting, AND from younger, Late Pleistocene (MSA Klasies & European Aurignacian) and modern (Hadza ethnography) sites where spear and bow hunting, respectively, are not in doubt. At EFT, living-structure profiles are the "aggregate" pattern for Size 3 ungulate prey, not "departures" from it. In contrast, the mortality profile for very large (Size 4) eland from EFT is a strong, attritional pattern consistent with predation by lions.

These results encourage further consideration of a working hypothesis that meat foraging by *H. heidelbergensis* at EFT involved efficient hunting of large bovids in a natural ecosystem favoring fossil preservation from many sources, and that hominin prey may have been selectively transported for further butchery to destinations beyond the landscape area sampled. More broadly, the evolution of hunting large ungulates by *Homo* probably spanned the past 2 Ma and contributed significantly to an early adaptation of humanness in our genus.

Evolving software (to Weaver et al. 2011) & data presentation

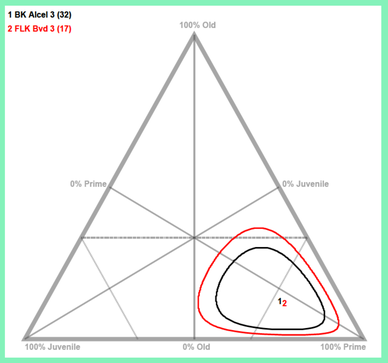


Acknowledgements

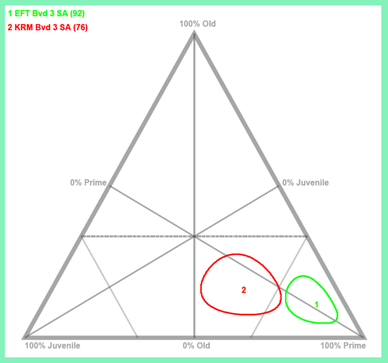
For research access, sincere thanks to the Iziko South African Museum and Dr. Romala Govender, Quaternary Collections Curator, and to the Tanzanian government (COSTECH, National Museum, Dr. A. Mabulla, Director General). Research is supported by the African Studies Program and the Graduate School of the UW-Madison, and by the Wisconsin Alumni Research Foundation (WARF).

EFT & Hunting by "Acheulean-Age" Hominins

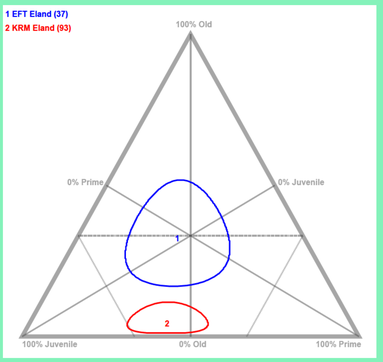
BK 1.3 Ma (Acheulean/D. Oldowan) Large Size 3 Bovids. Living-structure profile dominated by prime adults indicates efficient hunting, not scavenging or endurance running



EFT & Klasies (KRM) Large Size 3 Bovids. Living-structure profiles dominated by prime adults indicate hunting by hominins at both sites



EFT & Klasies (KRM) Eland. Attritional profile at EFT with many old adults is consistent with predation by lions



EFT Old Eland