ANTHROPOLOGY

Comment on "Evidence of prehistoric human activity in the Falkland Islands"

T. J. Clark[1]*, Jason Newton[2], Ewan D. Wakefield[3]

Stable isotopes from archaic Falkland Islands wolves (*Dusicyon australis*) indicate a high trophic, marine diet. Hamley *et al.* argue that this is consistent with mutualism with Yaghan people. However, most *D. australis* had similar isotopic signatures in the European era, despite human persecution. These data therefore neither support nor refute human-mediated introduction of *D. australis* to the Falklands.

Before their extirpation by European settlers ~1876, *Dusicyon australis* was the Falkland's only endemic land mammal. It remains unclear how it populated the Falklands, the two main theories being that it crossed from continental South America during the Last Glacial Maximum, when the sea level was lower and seasonal ice was more extensive (*1*), or that it arrived from the continent with humans, with whom it had a mutualistic relationship (*2*). (We note that these two hypotheses are not necessarily mutually exclusive.) Hamley *et al.* (*3*) provide valuable new evidence of pre-European bone deposits, the discovery of a stone projectile of apparently local manufacture, and sedimentary charcoal accumulation in the Falklands. Together with previously reported lithics (*4*) and charcoal accumulation (*5*), these data are consistent with the hypothesis that people indigenous to continental South America were present in the archipelago before European colonization.

Hamley *et al.* (*3*) additionally report stable isotope ratios in subfossil *D. australis* collagen, citing these in support of the pre-European occupation hypothesis. Their reasoning is as follows: Stable isotope ratios in the tissues of consumers predictably reflect those in their diet (*6*). High *D. australis* $\delta^{13}C$ and $\delta^{15}N$ values indicate a relatively marine, high trophic level diet consistent with mutualism with humans such as the Yaghan (Yámana) people, who hunted and gathered marine organisms, including seals, penguins, and shellfish. Although they acknowledge that the observed *D. australis* isotopic signatures could also arise from scavenging such prey, the weight of their argument is in favor of the former hypothesis. For example, they state that "The $\delta^{15}N$ values reported here reflect a marine diet at higher trophic levels, including seals, which the small canid was unlikely to have hunted" (*3*). However, *D. australis* was a medium-sized canid, with body mass of 12 to 14 kg, body length without tail of ~77 cm, height at shoulder of 48 cm (*7*), and smaller or similarly sized canids routinely predating pinniped pups [e.g., (*8*, *9*)]. They then say that "Future studies of warrah [*D. australis*] remains collected during the European period, when abundant terrestrial food sources (e.g., sheep, cattle, horses, rabbits, pigs, rats, and mice) had been introduced to the islands, may provide further insight into the warrah's dietary preferences and potential interaction with humans" (*3*).

Here, Hamley *et al.* (*3*) omit an important piece of evidence that detracts from their argument. Previously, we analyzed stable isotope ratios in 19th century *D. australis* hair tissues from eight museum specimens (*7*). This showed that despite being persecuted by humans, eventually to extinction, the majority of *D. australis* in the European period also had a high $\delta^{13}C$, high $\delta^{15}N$ diet. Furthermore, with their consent, we included collagen isotope data from Hamley *et al.* (*3*) before the submission of their paper and found that their stable isotope data were within or near the probable isotopic niche of 19th century *D. australis* (*7*). By implication, the most parsimonious explanation of the currently available stable isotope data is that it does not imply mutualism with humans and therefore has little bearing on the question of how *D. australis* first arrived in the Falklands. Other evidence supports the supposition that *D. australis* were able to obtain higher trophic marine prey for themselves. This includes not only morphological analysis, which indicates adaptation to efficient consumption of large prey (*10*), but also direct contemporary accounts of *D. australis* consuming penguins and sea lions (*11*, *12*).

In conclusion, while we applaud continued investigations of the human and ecological history of the Falkland Islands, we caution that it is unparsimonious to conclude from current stable isotope data that *D. australis* had a mutualistic relationship with humans and therefore arrived in the islands by human agency. Equally, we acknowledge that both hypotheses remain open and deserving of testing further.

[1]Center for Ecosystem Sentinels, Department of Biology, University of Washington, Seattle, WA 98195, USA. [2]National Environmental Isotope Facility, Scottish Universities Environmental Research Centre, Rankine Avenue, East Kilbride G75 0QF, UK. [3]Department of Geography, Durham University, Lower Mountjoy, South Road, Durham DH1 3LE, UK.
*Corresponding author. Email: tjclark1873@gmail.com

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