Deviant, or non-normative burials in the archaeological record include those who receive mortuary treatments that vary from the norm. The unusual treatment some individuals receive can provide insight into social customs, including beliefs of the time (Parker Pearson, 1999). Moreover, it reflects the deceased’s social identity (Aspöck, 2009). In post-medieval Poland (17th-18th century A.D.), belief in vampires or revenants was strongly held despite the prevalence of Catholicism (Machal, 1976; Perkowski, 1976). Vampires in this context were synonymous with evil spirits that caused harm to the living. As a result, careful mortuary rituals were conducted for those suspected of being at risk of becoming a vampire (i.e., the reanimation of their corpse). According to Polish folklore, there were a wide variety of reasons why a person might be at risk, including both cultural and biological factors (Barber, 1986; Perkowski, 1976).

Cultural risks included being born out of wedlock, lacking a proper baptism, being an outsider (both figurative and literal), or practicing witchcraft. Biological risk factors included being born with teeth (considered a sign of the “beast”), being the first to die in an epidemic, or having a deformity or disfigurement. While it is difficult to determine the exact reason why an individual was considered at risk for vampirism, some bioarchaeological analyses can test the validity of certain factors. For example, someone who migrated to the area may still be considered an outsider upon their deaths and, thus, require burial with apotropaics, or objects that prevent evil. To test this possibility, strontium isotopic analysis can be used to assess patterns of mobility and migration.

**Strontium Isotopes**

The analysis of strontium isotopes ($^{87}$Sr/$^{86}$Sr) from dental enamel is useful in assessing the geographic origins of those buried at Drawsko 1, including the deviant burials. $^{86}$Sr isotopes are stable, abundant, and constant over time in the geologic environment (Faure, 1986). $^{86}$Sr isotopes result from the decay of $^{88}$Rb (rubidium) in igneous rocks and, thus, increase over time (Faure, 1986). Strontium isotopes enter local environments when the bedrock is weathered, moving from soils and groundwater to the local flora and fauna (Price et al., 1994, 2002). When these are consumed, strontium is incorporated into the skeleton and teeth. The biogeochemical signatures in dental enamel, which forms during childhood, reflects the geographic origin of individuals (Bentley, 2006). Analyzing faunal $^{87}$Sr/$^{86}$Sr values provides evidence of the locally bioavailable strontium for humans residing in that particular region. By determining the mean ± 2 standard deviations, those who are non-local can be identified based on strontium values that are outside of the range for that particular locale (Bentley, 2006; Price et al., 2002).

The purpose of this study is to assess whether those buried with anti-vampiristic mortuary goods were targeted for such treatment due to their relatively recent migration to the community.

**Materials and Methods**

At the cemetery site of Drawsko 1, in northwestern Poland, more than 285 skeletons were recovered between 2008 and 2012, including six deviant burials interred with sickness and/or stones. Most of the sicknesses were placed across the throat to decapitate the corpse should it become reanimated (Figure 1). The stones were placed on the throat to prevent biting or to block the throat, making the individual unable to feed (Figure 2).

The $^{87}$Sr/$^{86}$Sr values of modern local faunal bone samples were assessed to determine the bioavailability of strontium at Drawsko. Enamel from 60 human remains, including five of the six deviant burials (one was edentulous) was sampled and strontium isotopic values measured. The sample included 29 adult females (2 deviants), 29 adult males (1 deviant), and 2 subadults (2 deviants).

Surface enamel of each tooth was mechanically removed using a Dremel tool. Sample preparation followed protocol outlined by Perry et al. (2008). Samples of enamel were dissolved in nitric acid ($\text{HNO}_3$) and underwent column extraction using Eichrom Sr-Spec resin. The extracts were treated with phosphoric acid ($\text{H}_3\text{PO}_4$), and the liquid samples were dried, re-dissolved in tantalum chloride ($\text{TaCl}_5$), and placed on rhenium filaments on which they were dried with electrical current. Strontium isotopic ratios were analyzed on a VG Micromass Sector 54 thermal ionization mass spectrometer (TIMS).

Non-parametric statistical tests (Mann-Whitney U, Kruskal Wallis) were conducted to compare the individual isotope signatures to the local isotopic values. The mean faunal $^{86}$Sr/$^{87}$Sr value was 0.7101±0.0012 (2σ), which provided the local baseline range of 0.7082 to 0.7121.

Human dental enamel had an overall ratio of 0.7112±0.0006 (1σ). Males (0.7112±0.0007, 1σ) and females (0.7111±0.0004, 1σ) did not differ significantly from one another ($p=0.26$, Mann-Whitney U). Subadults (0.711±0.004, 1σ) shared a similar mean to adults (0.7112±0.0006, 1σ), but statistical analysis could not be conducted. Those suspected of vampirism had a mean $^{87}$Sr/$^{86}$Sr value of 0.7112±0.0004 (1σ) and were not statistically different from males or females from the normative burials ($p=0.54$, Kruskal Wallis).

**Discussion**

The deviant burials include individuals who were local to the Drawsko region. Based on these results, the hypothesis that these individuals were non-local and thus targeted for anti-vampiristic burial is rejected.

Why were these individuals buried with anti-vampiristic apotropaics? There are many alternative factors, both cultural and biological, that may play a role. There is no reason to assume that the cause behind one individual’s deviant mortuary treatment is the same for the other individuals. Unfortunately, many of the alternatives, especially those cultural in nature, have no archaeological correlate that can be analyzed. Some of the biological factors have already been explored and refuted, including evidence of disease, trauma, or birth defect (Betsinger and Scott, 2012). Other biological risks, including being born with teeth or being the first to die in an epidemic do not leave skeletal markers. For example, while cholera outbreaks were known to occur in the region during this time period (Wynwa, 2004), the fast-acting nature of the disease does not leave any diagnosable changes that would enable this factor to be assessed in the Drawsko 1 population (Roberts and Manchester, 2005).

**Conclusions**

The “vampire” burials from Drawsko, Poland are not individuals who moved to the region and were then treated as outsiders. Their local $^{87}$Sr/$^{86}$Sr values indicate these individuals were born in the general vicinity of the community.

Various alternate explanations may account for why six individuals were targeted for anti-vampiristic mortuary treatment, but most cannot be tested bioarchaeologically.

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