EVIDENCE OF SCURVY IN MEDIEVAL EASTERN EUROPE:
A possible case from Giecz, Poland

Amanda M Agnew1,2, Hedy M Justus1,2, Sam D Stout1

1The Ohio State University, 2The Slavia Foundation

INTRODUCTION
Vitamin C is obtained by humans only from dietary sources such as fresh fruits and vegetables. Vitamin C deficiency results in scurvy and its presence can aid in establishing dietary and socioeconomic patterns as well as reconstructing health in past populations.

Without necessary levels of vitamin C, collagen synthesis is impaired. Collagen is a major component of bone and other connective tissues. Osteoid formation is hindered and susceptibility to hemorrhage increases as a result of weak vessels devoid of collagen. A small amount of mechanical stress, even normal movement like chewing, can induce the rupture of capillaries and lead to bleeding into the skin and beneath the periosteum. Increased vascularity results in abnormal amounts of bone porosity, and allows for the movement and removal of accumulated blood from the site of inflammation. As Brickley and Ivess assert, it is the pattern of abnormal porosity that is most convincing in diagnosing scurvy in archaeological populations.

Giecz
Two hundred and thirty seven burials have been excavated to date from the medieval cemetery (XI-XII c.) in Giecz, Poland (Gz 4). The population at Giecz is important because it existed during the transitional period when the first Polish state was established. The village of Giecz was one of four major economic, political, and religious centres in Wielkopolska at the time. Only one of 85 subadult skeletons in the Giecz Collection exhibits bony changes consistent with scurvy.

RESULTS: Case study
Grave Gz 14/06 is the skeleton of a 5-6 year old child. The combination of skeletal lesions on this individual suggesting scurvy is present:

- Abnormal porosity is seen on the medial portion of both left and right coronoid processes of the mandible, insertion sites of the temporalis muscle, where the mechanical stress of chewing causes hemorrhage and associated porosity (Figure 1).
- Abnormal porous lesions are observed bilaterally, extending along the superior aspect of the external auditory meatus, anteriorly across the temporal bone, and covering the greater wing of the sphenoid. Involvement of the anterior portion of the parietals and frontal bone is also noted (Figure 2).
- Antemortem loss of the right and left first deciduous mandibular molars is observed with no plainly visible evidence of permanent tooth formation or eruption below. Associated alveolar resorption is also present (Figure 3).
- Porotic hyperostosis is present bilaterally as discrete circular patches (approximately 3 mm in diameter), on the posterior-lateral parietals extending onto the occipital. Minor cribra orbita is also observed as slight pitting along the anterior portions of the left and right orbital roofs. Porotic hyperostosis is a well-known non-specific indicator of infection, but observed within this context, contributes to a diagnosis of scurvy.
- The scapular spinous processes have an irregular woven appearance and possible periostitis. It extends the full length of the spine but not into the infraspinous or supraspinous fossa of either scapula. Woven bone formation is common in children with scurvy. The periosteum is not tightly attached to the bone and as swelling and bleeding increase, new bone formation is induced.
- However, there is no evidence of perimortem injury or abnormal porosity of the maxilla, zygomatic bones, or supraauricular fossae of the scapular, all typical sites for scorbutic lesions to manifest.

DISCUSSION
Assuming the sample excavated from Giecz is representative, finding only 1 skeleton exhibiting signs of scurvy, suggests that scurvy was not a significant problem in this medieval Polish population. It is important to consider that almost 50% of the population died before reaching maturity, and of those immature individuals 34% died before reaching 2 years of age. Although most individuals from this subadult sample exhibit no skeletal evidence of pathological lesions, scorbutic changes can take as long as 10 months to appear on the skeleton. It is also likely that acute conditions had a greater affect on immature individuals than chronic conditions, and that even if scurvy were present it may have been secondary to more serious conditions. Therefore, finding little evidence of scurvy in these skeletal remains does not imply near absence of the condition in the population. It is also possible that other nutritional deficiencies have inhibited the expression of scurvy, causing scorbutic lesions to appear with less severity. In addition, this child is beyond the age of rapid growth when hemorrhaging of weakly developed vessels would have been greatest, perhaps contributing to the seemingly mild expression of skeletal lesions.

Along with state formation in medieval Poland came increased sedentism, an increased reliance on agriculture, and an increase in population density at Giecz. These changes are likely to have had a significant impact on the general health of the population. For these reasons it is imperative that indicators of health from the Giecz Collection be described and compared to spatially and temporally similar and different populations in order to begin to understand the history of scurvy and factors contributing to health in medieval Eastern Europe. To our knowledge, no other reports on prevalence of scurvy in medieval Poland have been published. Future research will attempt to establish the prevalence of scurvy among the skeletal remains at Giecz and provide data for broader temporal and geographic comparisons.

ACKNOWLEDGEMENTS
The Slavia Foundation: Teresa Krysztofiak, Marek Polcyn

REFERENCES CITED

Figure 1. Abnormal porosity on medial right coronoid process of mandible

Figure 2. a) Right temporal region (above left). b) Detail of greater wing of right sphenoid (above right)

Figure 3. Antemortem mandibular tooth loss