The world-famous geologist Paul Martin (1928-2010), born in Allentown, PA, did a fascinating project at Great Marsh while a post-doctoral fellow at Yale University in the late 1950s. The Moore family even has photos of him digging in the marsh mud. Martin recognized the significance of a periglacial (cold climate) legacy at the Marshlands, a vast wetland complex about 40 km south of the last glacial maximum ice margin. Noting the rarity of pristine tussock sedge wet meadows in the region, Martin thought Great Marsh might be a late Pleistocene *refugium*, a place where some plants dating to the last full glacial episode had managed to survive despite warmer conditions today. Now we know that Great Marsh is actually a Holocene refugium, a place where a pre-Colonial marshland is preserved within an Anthropocene landscape.

Join Professors Dorothy Merritts and Robert Walter of Franklin and Marshall College to learn more about their research that builds upon Paul's amazing discoveries, examine cores of sediment from the marsh that are filled with wetland plant seeds dating back 16,000 years, and look at paleo-seeds with microscopes set up in the Nature Center.

More detail:

In one of the earliest uses of radiocarbon dating, Martin (1958) reported radiocarbon ages of ~13,500 to 13,600 years Before Present (BP) for organic soil samples from depths of ∼1–1.6 m that he collected by digging and coring at Great Marsh. Jim Moore and his brother—both boys then--met Paul at the time and have photos of Paul doing his field work. When calibrated with modern techniques, Martin's radiocarbon ages are 16,400 to 16,500 years BP, respectively. Indeed, they date to the last glacial maximum, making this a very special place. Paul Martin also identified pollen from this depth as indicative of taiga-tundra vegetation, much like is found today in places such as Siberia where continuous permafrost exists (permanently frozen ground). Observing that adjacent slopes are marked by relict periglacial boulder fields (you can see them on Moore Road), Martin inferred that the landscape during this earlier time would have been characterized by "scattered trees in valleys surrounded by bare solifluction [mass movement] slopes" (Martin 1958, p. 470). The boulders were formed by frost-shattering during cold times with permafrost, and then moved downslope during times of permafrost thaw. Martin also discovered that some of the younger (higher) sediments in his cores contained pollen that indicated a shift to tussock sedge wet meadow vegetation during the modern warm period, known as the Holocene Epoch. We will show similar cores during our presentation.

It turns out that Martin was partly right, but he didn’t know another piece of the story. The rarity of such wetlands today, as Walter & Merritts (2008) have shown, is not because they are late Pleistocene refugia. Rather, most Holocene valley bottom wetlands have been concealed by sediment trapped upstream of tens of thousands of historic (late seventeenth to early twentieth century) milldams in the mid-Atlantic region. Surprisingly, Great Marsh is one of the few locations with no milldams in the region! In a sense, it is a Holocene refugia surrounded by Anthropocene landscapes. Great Marsh is a relict Holocene wetland landscape watered by springs flowing from adjacent slopes that are mantled with frost-shattered bedrock and Pleistocene colluvium. Such is the legacy of formerly periglacial landscapes after permafrost thaw.