

Free-living *Cucurbita pepo* in Maryland

Ohad J. Paris

Department of Environmental Studies, Goucher College, Baltimore, MD, USA

Harry S. Paris

Cucurbits Section, A. R. O. Neve Ya'ar Research Center, Ramat Yishay 3009500, Israel (Retired, Present Address: P. O. Box 6114, Yoqne'am 2065626, Israel). Email: hsparis@outlook.co.il

Cucurbita pepo L. is native to North America. It is widely cultivated on that continent for production of its relatively large, edible fruits, referred to as pumpkins if they are round and squash if they are not round. Some *C. pepo* bear small, inedible, often bitter fruits, and these are referred to as gourds. Pumpkins and gourds are also grown and marketed for decorative purposes. Most squash are used for culinary purposes when the fruits are young and tender, several days past anthesis.

Two subspecies of *Cucurbita pepo* are widely cultivated. One of them, subsp. *pepo*, is thought to have originated in central or southern Mexico and was domesticated approximately 10,000 years ago. However, no wild-growing plants of this subspecies have been documented. The other, subsp. *ovifera* (L.) D.S. Decker, is native to the woodlands of the eastern half of the United States and was domesticated approximately 5,000 years ago. Indeed, there have been numerous sightings of plants of subsp. *ovifera* growing wild in the southern and central states (Smith, 2006; Kistler et al., 2015; Khoury et al., 2020).

We document and describe herein the occurrence of a small but phenotypically highly diverse free-living population of *Cucurbita pepo* in Howard County, Maryland, that we sighted in the early autumn of 2024. This population was on an islet in the Middle Patuxent River. We did not wish to access this population physically so as not to trample or disturb it in any way, so we observed it from the opposite riverbank and shallow water. Moreover, this population was surrounded by a deep accumulation of detritus, flotsam, and heavy logs piled in water of uncertain depth, which would have made closer physical access hazardous (Figure 1). The Middle Patuxent River (<https://mapcarta.com/W964155444/Map>) is situated in the Maryland Fall line, where the Piedmont Plateau flattens into the Atlantic Coastal Plain, and is a tributary of the Patuxent River (Maryland Department of the Environment, 2010). The river traverses forested, agricultural, urban and suburban landscapes. Runoff has eroded the riverbanks, increased sediment levels, and introduced nutrients and pollutants to the river water and nearby soils, which are sandy clay loam or fine sandy loam. Intense, short-duration rainfall events can lead to dramatic increases in the river water levels,

depositing plant debris along the river (Maryland Department of the Environment, 2010; Paul and Meyer, 2008).

We observed this free-living population of *Cucurbita pepo* plants on the north-facing, upstream end of a small islet (~0.25 ha) in the river (Figure 1). Numerous dead tree trunks and thick branches accumulated at this location following an intense rain event in December 2023. The islet and adjacent riparian habitat featured a community of eastern deciduous forest hardwood species as well as numerous invasive plant species. While some individual plants were rooted in alluvial soils of the islet, others appeared to have rooted in the fine detritus found between the logs that constituted the north end of the islet. The plants were partially intertwined with those of a native cucurbit, oneseed bur cucumber (*Sicyos angulatus* L.), and the invasive orange jewelweed (*Impatiens capensis* Meerb., Balsaminaceae), and experienced light conditions of partial shade.

The number of plants comprising the population of *Cucurbita pepo* is uncertain, but the minimum would be four, based on the observed fruit phenotypes. Fruits were observed over much of the site, with some hanging off the deadwood above the water (Figure 2). Perhaps the most prominent of the fruits in this population was a pumpkin (subsp. *pepo*) about the size of the pie pumpkins that are widely sold in autumn in the United States (Figure 3). This pumpkin, though, differed from those typically found at marketplaces by having a light orange exterior instead of the typical dark, intense orange. The light color suggests that it may have been derived from crossing. Its large stylar scar confirmed its taxonomic identity as subsp. *pepo*. Several bicolor and striped, more-or-less pyriform gourds at different stages of development were also observed (Figure 4). These may have derived from the same plant. The shape, striping, and bicolor pattern suggest that the ornamental gourd 'Bicolor Pear' (subsp. *ovifera*) was in the parentage. Another bicolor fruit appeared to have been rounder and had less amount of yellow-orange on the bicolor fruit surface, perhaps it was from a different plant (Figure 4). Two young, round, light green fruits, one with a short, dark green peduncle and the other with a long, light green peduncle were observed (Figure 5). The starkly differing peduncles indicate that these two fruits must have been borne by

different plants but perhaps one of them was derived from the same plant as the large, nearly mature light orange pumpkin (Figure 3). Another fruit was larger, warted, and dark green, but only partially visible to us through the foliage and fallen leaves, and it was in the close vicinity of the maturing light orange pumpkin (Figure 5).

The minimum number of plants comprising this population would have been four, two pumpkins and at least two gourds. None of the fruits closely resembled those of a distinct cultivar. It is difficult to account for the strange, mixed assemblage constituting this small, free-living population. Both pie pumpkins and ornamental gourds are frequently sold at markets during the autumn. Growers and consumers can simply discard these fruits when they have outlived their usefulness or save seeds from them and plant them the following spring in their gardens. Clearly, not all of the variants in this spontaneous population could have been derived from a single pumpkin plant and a single plant of 'Bicolor Pear'. The pumpkin, with its plain dull coloration and large stylar scar, could not have been derived from a first-generation cross between a typical pie pumpkin and a 'Bicolor Pear' gourd. If the variants were derived from the same field or garden or household, then a minimum of one other parental plant, besides a pumpkin and 'Bicolor Pear', would have been necessary to account for the fruit variation seen in this population. In this regard, it should be mentioned that the nearest houses are approximately 250 m away and the riverbank is part of the Middle Patuxent River Trail. So, it is possible that this population is derived from the nearby residences or the users of the trail. Or that this population is downstream from other possible seed sources, leading to two other scenarios that could perhaps better explain its constitution. One would be that the population did not have a single origin, but rather had two or more derivations and indeed, rotting logs, flotsam, and detritus were observed to have accumulated at this site. Another distinct possibility would be that this was at least a second-generation population, implying that it had been derived from at least one previous spontaneous generation reproducing itself in an uncultivated habitat. Or, more specifically, that this population has reproduced itself at this same or nearby site at least once.

We did not find *Cucurbita pepo* at this location or in the immediate vicinity in 2025. Only time will tell if the population

we have described here was merely ephemeral. However, the natural distribution of *C. pepo* subsp. *ovifera* may have been considerably wider in the past, extending beyond the central and southern states into the northeastern states, but was contracted by human activities in the distant and recent past (Kistler et al., 2015; Khoury et al., 2020; Reamer, 2024). On the other hand, if, ironically, *C. pepo* does reappear here, it would be a propagule derived from modern human activities leading to the restoration of this species in what may have been a part of its former natural range.

Literature Cited

- Khoury, C.K., D. Carver, H.R. Kates, H.A. Achicanoy, M. van Zonneveld, E. Thomas, C. Heinitz, R. Jarret, J.A. Labate, K. Reitsma, G.P. Nabhan, and S.L. Greene. 2020. Distributions, conservation status, and abiotic stress tolerance of wild cucurbits (*Cucurbita* L.). *Plants People Planet* 2: 269–283.
- Kistler, L., L.A. Newsom, T.M. Ryan, A.C. Clarke, B.D. Smith, and G.H. Perry. 2015. Gourds and squashes (*Cucurbita* spp.) adapted to megafaunal extinction and ecological anachronism through domestication. *Proc. Natl. Acad. Sci. U.S.A.* 112: 15107–15112.
- Maryland Department of the Environment. 2010. Water quality analysis of sediment in the Middle Patuxent River watershed, Howard County, Maryland. Retrieved January 6, 2025, from https://mde.maryland.gov/programs/Water/TMDL/DocLib_MPaxR_02131106/MidPatx_Sed_WQA_091010_final.pdf
- Paul, M.J. and J.L. Meyer. 2008. Streams in the urban landscape. *Ann. Rev. Ecol. Evol. Syst.* 32: 333–365. <https://doi.org/10.1146/annurev.ecolsys.32.081501.114040>
- Reamer, J.M. 2024. Evidence for the eastern agricultural complex crops in the Upper Delaware Valley: Botanical analysis from the Manna site (36Pi4). *Am. Antiq.* 89: 512–526.
- Smith, B.D. 2006. Seed size as a marker of domestication in squash. *In:* (M.A. Zeder, D.G. Bradley, E. Emshwiller, and B.D. Smith, eds.) *Documenting domestication, new genetic and archaeological paradigms*, pp. 25–31. University of California Press, Berkeley.



Figure 1. View looking southwest to the free-living population of *Cucurbita pepo* on an islet in the Middle Patuxent River in Howard County, Maryland. Plants were growing on top of a large mass of dead plant matter accumulated at the location during an intense rain event in late 2023. Photographed 14 September 2024.



Figure 2. Fruits of *Cucurbita pepo* hanging off deadwood above the water, on an islet in the Middle Patuxent River, Howard County, Maryland. Notice the young, light green pumpkin and fully grown, quadricolor (striped and bicolor) gourd. Photographed 28 September 2024.



Figure 3. Light orange pumpkin growing in the spontaneous population of *Cucurbita pepo*. Photographed 28 September 2024.



Figure 4. Bicolor striped, more-or-less pyriform gourds. Top left: large, maturing fruit. Top right: fruit approximately two weeks past anthesis. Bottom left: young fruit day after flowering. These three may have been borne by the same plant. Bottom right: bicolored, shape of fruit not clear, may or may not have been borne by the same plant as the other three fruits. Top photographs from 28 September 2024. Bottom photographs from 14 September 2024.



Figure 5. Top: young pumpkin fruits. Left, with short, dark green peduncle and right, with long, light green peduncle. The differing peduncles indicate that these two fruits could not have been derived from the same plant. Bottom: Partial view of warty, dark green gourd (left foreground) and a maturing light orange pumpkin (right background). Photographs from 28 September 2024.