

***HYDROCOTYLE SIBTHORPIOIDES* AND *H. BATRACHIUM* (ARALIACEAE)  
NEW FOR NEW YORK STATE**

**DANIEL ATHA**

Center for Conservation Strategy  
New York Botanical Garden  
Bronx, New York 10458  
datha@nybg.org

**ABSTRACT**

Spontaneous populations of *Hydrocotyle sibthorpioides* (lawn marsh pennywort) and *H. batrachium* (Araliaceae) are documented for New York state for the first time. *Hydrocotyle batrachium* is also new to North America. *Hydrocotyle sibthorpioides* was first found in 2013 in Queens county; *H. batrachium* was first found in 2016 in Westchester county. Both species are native to eastern Asia and show potential to be aggressive invaders in southeastern New York, particularly in wetlands. A key to the species of *Hydrocotyle* in New York State is provided.

Prior to this report four species of *Hydrocotyle* were known from New York state, all of them native and all but one state-listed rarities: *H. umbellata* – Rare; *H. verticillata* var. *verticillata* – Endangered; and *H. ranunculoides* – Endangered (Young 2010). Among the native New York species, only *H. americana* occurs in abundance in the state. It is the only species historically reported for New York City and has not been documented for New York City since 1901.

The present report documents two additional species for the New York flora, both native to Asia and naturalized in southeastern New York. Fertile herbarium specimens and DNA samples were obtained for all cited specimens and are available for analysis.

***Hydrocotyle sibthorpioides* Lam.**

Spontaneous populations of *Hydrocotyle sibthorpioides* in New York were first detected and identified in Queens County by Nick Wagerik in the summer of 2013. The plants were found on 34th and 35th avenue between 82nd and 81st Streets but not collected. Eve Levine subsequently found spontaneous populations on West 70th St in New York County (Manhattan). In 2014, Levine, the author, Richard Lieberman and Regina Alvarez documented the West 70th Street plants with herbarium specimens and DNA samples. Later that year, the author found *Hydrocotyle sibthorpioides* in Kings County (Brooklyn) and Eve Levine found additional populations in New York County.

The New York plants are glabrous perennial herbs, prostrate and matted; stems slender, rooting at the nodes; leaves usually 2 per node, unequal, the blades basifixed, orbicular or reniform, weakly 7-lobed to merely crenate margined, 0.6–1(-2) cm broad, the basal sinus narrow, < 1/4 circumference of the blade, the main veins 7; umbels solitary, with 8–10 flowers, the peduncles about as long as the petioles; fruit 1.5 mm long. Figure 1.

**New York. New York Co.:** New York City, Upper West Side, 205 W 70th St, between 69th and 70th Streets, 40.778210, -73.986567 (WGS84, ±25 m), ca 18 m elev, 16 Sep 2014, *Atha, Alvarez, Levine and Lieberman 14919* (NY); 40.778172, -73.985990 (WGS84, 25m), ca 18 m elev, 16 Sep 2014, *Atha, Alvarez, Levine and Lieberman 14921* (NY); 40 9th Ave, between 59 and 60th Streets, 40.769374, -73.984448 (WGS84, ±25m), ca 24 m elev, 17 Sep 2015, *Atha 15288* (NY). **Kings Co.:** New York City, Brooklyn, Eastern Parkway and Washington Avenue, 40.671531, -73.962694 (WGS84, ±25m), 47 m elev, 14 Oct 2014, *Atha 14936* (NY). **Westchester Co.:** Tuckahoe, Bronxville Lake on the Bronx River, E shore,

W of Kensington Road and N of Avon Road, 40.947572, -73.832933 (WGS84,  $\pm 25$ m), ca 30 m elev, 24 Sep 2016, *Atha*, *Nolan and Andruk 15814* (NY).

The New York County collection, *Atha et al. 14919*, was growing in the cracks of a concrete patio and in the adjacent concrete planter with cultivated *Rosa*, *Spirea*, *Buddleja*, *Syringa*, *Hydrangea*, and the weedy species *Potentilla indica* and *Acalypha australis*. The plants were in partial shade and rather sparse, probably due to the frequent trampling and maintenance of the ornaments. The other collection from nearby at the same address (*Atha et al. 14921*) was growing in partial shade in a flat, well-maintained, irrigated lawn planted with *Crataegus* and *Malus*. The plants were very dense and formed nearly a complete covering, competing only with *Potentilla indica*. Less than one mile away, also in Manhattan, the species was found growing in a mostly bare foundation planter at ground level planted with a small *Picea* tree (*Atha 15288*). The site received ample irrigation and partial sun. In a fenced area around the corner, on West 60th St (not vouchered), there was a complete carpet of *Hydrocotyle sibthorpioides* in an irrigated street-level bed about 50 meters square in mostly shade.

The Kings County plants (*Atha 14936*) were growing in a recently installed, well-irrigated lawn contained in architectural boxes at street level in partial sun.

The Westchester County plants (*Atha et al. 15814* and Figure 1) were growing on the floodplain of the Bronx River in wet, silty soil maintained as lawn and used for recreation and visited frequently by Canada geese (*Branta canadensis*).

*Hydrocotyle sibthorpioides* is native to eastern Asia in wet valleys, grassy areas, and stream banks (She et al. 2005). In North America it is reported from mostly isolated counties from Louisiana and Arkansas northeast to New Jersey and disjunct in California (USDA NRCS 2017). *Hydrocotyle sibthorpioides* has been in North America at least since about 1900 (Britton & Brown 1913). The northernmost North American populations previously known were Hunterdon and Mercer counties in New Jersey (USDA NRCS 2017). In North America it has been found in greenhouses, nurseries, lawns, sidewalks, and shorelines of brackish and fresh water. *Hydrocotyle sibthorpioides* is used as an ornamental ground cover and is sold for the aquarium and terrarium trade (Planted Aquariums Central 2016).

### **Hydrocotyle batrachium** Hance

In October of 2014, the author observed an extensive and well-established population of an unrecognized small-leaved *Hydrocotyle* in a garden bed in suburban Westchester County that upon examination and comparison with herbarium material and floristic treatments, was determined to be *H. batrachium*. In 2016, the same taxon was found and collected on the floodplain of the Bronx River while surveying for the invasive *Corydalis incisa* with Suzanne Nolan and Christina Andruk. *Hydrocotyle sibthorpioides* was also found growing a few meters away in the same floodplain.

The New York plants are glabrous perennial herbs, prostrate and matted; stems rooting at the nodes; leaves usually 2 per node, unequal, the blades basifixed, depressed orbicular, strongly 5-lobed,  $0.5\text{--}0.8 \times 0.6\text{--}1.1$  cm, the basal sinus wide,  $> 1/4$  circumference of the blade, the main veins 5, sinuses of the lobes reaching about to the middle of the blade; umbels solitary, with 3–4 flowers, the peduncles about as long as the petioles; fruit 2 mm long. Figure 2.

**USA. New York. Westchester Co.:** New Rochelle, Wood Hollow Lane, 40.942913, -73775002 (WGS84,  $\pm 25$ m), ca 44 m elev, 1 Oct 2014, *Atha*, *Schuler and DelTorto 14932* (NY); Tuckahoe, Bronxville Lake on the Bronx River, E shore, W of Kensington Road and S of Avon Road, 40.945733, -73.834539 (WGS84,  $\pm 25$ m), ca 30 m elev, 24 Sep 2016, *Atha 15821* (NY).

The Wood Hollow Lane plants (*Atha et al. 14932*) were growing in a well-irrigated ground-level planter in partial sun from which a dense patch of *Pachysandra terminalis* had recently been removed. The gardener reported never having seen the *Hydrocotyle* until the *Pachysandra* was removed. The Bronx River population (*Atha 15821* and Figure 2) was found on the floodplain of the Bronx River in wet, black silty soil in filtered shade of *Alnus glutinosa*, frequented by *Branta canadensis* (Canada goose).

*Hydrocotyle batrachium* is native to eastern Asia, ranging from northern Vietnam, central and southern China, Taiwan and the Ryukyu Islands, in open wet areas and grasslands (She et al. 2005; Flora of Taiwan Editorial Committee 1993). *Hydrocotyle batrachium* is reported as *H. sibthorpioides* Lam. var. *batrachium* (Hance) Hand.-Mazz. ex R.H. Shanas in the Flora of China (She et al. 2005). The taxon is treated at the species level as *H. batrachium* in the flora of Taiwan (Flora of Taiwan Editorial Committee 1993) and Eichler's comprehensive review of the genus (Eichler 1987a).

### Key to *Hydrocotyle* species in New York State

1. Leaves peltate.
  2. Inflorescences umbellate, the umbels solitary ..... **Hydrocotyle umbellata**
  2. Inflorescences verticillate, the verticels several, interrupted ..... **Hydrocotyle verticillata**
1. Leaves basifixed (not peltate).
  3. Leaves (1-)2–7 cm broad; umbels sessile or the peduncles < 1/2 length of petioles.
    4. Umbels sessile or subsessile ..... **Hydrocotyle americana**
    4. Umbels pedunculate ..... **Hydrocotyle ranunculoides**
  3. Leaves 0.6–1.5(-2) cm broad; umbels pedunculate, the peduncles > 1/2 length of petioles.
    5. Leaves nearly orbicular with 7 principal veins and usually 7 principal lobes, the basal sinus narrow, < 1/4 circumference of the blade; umbels with 3–4 flowers; fruit 2 mm long  
..... **Hydrocotyle batrachium**
    5. Leaves compressed oblong with 5 principal veins and 5 principal lobes, the basal sinus broad, > 1/4 circumference of the blade; umbels with 8–10 flowers; fruit 1.5 mm long  
..... **Hydrocotyle sibthorpioides**

Examination of both species in the field and from the many herbarium specimens preserved in the NY and BKL herbaria shows that *Hydrocotyle sibthorpioides* and *H. batrachium* are each consistent morphologically as described here and are consistently distinct from one another (see key above). Both taxa were found growing together in the same habitat in Westchester county and no intermediates were found.

### Background

*Hydrocotyle* is a nearly cosmopolitan genus provisionally placed in the Araliaceae (Plunkett et al. 2004; Yi et al. 2004; Plunkett & Nicolas 2009, but see Konstantinova & Yembaturova 2010). In 1820, Achille Richard published the first and only worldwide monograph of the genus (Mathias 1936). In 1987, Hansjorg Eichler published a nomenclatural and bibliographic survey of the genus (Eichler 1987a, b, c) providing the only global treatment of the genus since the monograph of Richard. Since Eichler's review, only regional revisions and floristic treatments have been published and the genus is greatly in need of revision (Konstantin & Yembaturova 2010). There are approximately 100 currently accepted species (Pimenov & Leonov 1993; She et al. 2005; Du & Ren 2010; The Plant List 2017).

Prior to the present work, nine species of *Hydrocotyle* were known from North America, six native and three non-native: *H. americana* L., *H. bonariensis* Comm. ex Lam., *H. bowlesioides* Mathias & Constance – non-native, *H. moschata* G. Forst.– non-native, *H. prolifera* Kellog, *H. ranunculoides* L. f., *H. sibthorpioides* Lam.– non-native, *H. umbellata* L., and *H. verticillata* Thunb. (USDA NCRS 2017). The Central American species *H. bowlesioides* was added to the North American flora in 1983 (Anderson 1983).

#### ACKNOWLEDGEMENTS

I thank Richard Lieberman, Regina Alvarez, Jessica Arcate-Schuler, Bob DelTorto, Suzanne Nolan, Christina Andruk, and Eve Levine for their assistance in the field. I am especially grateful to Eve Levine for first bringing *Hydrocotyle sibthorpioides* in New York to my attention and for her helpful discussion regarding morphology and distribution of the species. I thank John Baker, Director of Conservation, Westchester County Department of Parks, Recreation, and Conservation for permission to document new and potentially invasive plants on the Bronx River and the New York City Department of Parks and Recreation for permission to document emerging invasives in the City. I am grateful to Meryl Rubin for databasing, labeling, and distributing the specimens and to the imaging staff at NYBG, especially Charles Zimmerman. I thank Guy Nesom, Regina Alvarez, and Meryl Rubin for their helpful comments and suggestions on the manuscript.

#### LITERATURE CITED

- Anderson, L.C. 1983. *Hydrocotyle bowlesioides* in Georgia – new to United States. *Castanea* 48: 317.
- Britton, N.L. and A. Brown. 1913. *Illustrated Flora of the Northern States and Canada*. Vol. 2: 650.
- Du, X. and Y. Ren. 2010. *Hydrocotyle changanensi* (Araliaceae), a new species from Shaanxi, China. *Ann. Bot. Fennici* 47: 403–407.
- Eichler, H. 1987a. Nomenclatural and bibliographical survey of *Hydrocotyle* L. (Apiaceae) Part I. *Feddes Repert* 98: 1–51.
- Eichler, H. 1987b. Nomenclatural and bibliographical survey of *Hydrocotyle* L. (Apiaceae) Part II. *Feddes Repert* 98: 145–196.
- Eichler, H. 1987c. Nomenclatural and bibliographical survey of *Hydrocotyle* L. (Apiaceae) Part III. *Feddes Repert* 98: 273–351.
- Flora of Taiwan Editorial Committee. 1993. *Hydrocotyle*. *Flora of Taiwan III*: 1024–1027, pl. 512.
- Konstantinova, A.I. and E.Y. Yembaturova. 2010. Structural traits of some species of *Hydrocotyle* (Araliaceae) and their significance for constructing the generic system. *Plant Divers. Evol.* 128: 329–346.
- Mathias, M.E. 1936. The genus *Hydrocotyle* in northern South America. *Brittonia* 2: 201–237.
- Perth NRM. 2016. Report for Hydrocotyle weed management plan for the Middle and Upper Canning River, 23/15602. Australian Government and National Landcare Programme. <http://www.perthnrm.com/wp-content/uploads/2016/09/Hydrocotyle-Weed-Mgt-Plan-2015-Final.pdf>.
- Pimenov, M.G. and M.V. Leonov. 1993. *Genera of the Umbelliferae*. Royal Botanic Gardens, Kew.
- Planted Aquariums Central. 2017. Dwarf Pennywort mat, *Hydrocotyle Sibthorpioides*. <[http://shop.plantedaquariumscentral.com/Dwarf-PennyWort-Mat-Hydrocotyle-sibthorpioides-3-x-5-inches\\_p\\_149.html](http://shop.plantedaquariumscentral.com/Dwarf-PennyWort-Mat-Hydrocotyle-sibthorpioides-3-x-5-inches_p_149.html)>
- Plunkett, G.M. and A.N. Nicolas. 2009. The demise of subfamily Hydrocotyloideae (Apiaceae) and the re-alignment of its genera across the entire order Apiales. *Molec. Phylogen. Evol.* 53: 134–151.
- Plunkett, G.M., J. Wen, and P.P. Lowry. 2004. Intrafamilial classifications and characters in Araliaceae: Insights from the phylogenetic analysis of nuclear (ITS) and plastid (trnL-trnF) sequence data. *Pl. Syst. Evol.* 245: 1–39.

- She, M., M.F. Watson, and J.F.M. Cannon. 2005. *Hydrocotyle*. In Z.Y. Wu, P.H. Raven, & D.Y. Hong (eds). Flora of China. Vol. 14 (Apiaceae through Ericaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis.
- The Plant List. 2017. *Hydrocotyle*. <<http://www.theplantlist.org/browse/A/Araliaceae/Hydrocotyle/>>
- USDA, NRCS. 2017. The PLANTS Database National Plant Data Team, Greensboro, North Carolina. <<http://plants.usda.gov>> Accessed 3 August 2017.
- Weldy, T., D. Werier, and A. Nelson. 2017. New York Flora Atlas. [S.M. Landry and K.N. Campbell (original application development), USF Water Institute. Univ. of South Florida]. New York Flora Association, Albany. <<http://newyork.plantatlas.usf.edu/>> Accessed 10 August 2017.
- Young, S. 2010. New York rare plants status lists June 2010. New York Natural Heritage Program, Albany.



Figure 1. *Hydrocotyle sibthorpioides* on floodplain of the Bronx River, Westchester County, New York (Atha *et al.* 15814). Note narrow sinuses of leaf blades and umbels with 8–10 flowers.



Figure 2. *Hydrocotyle batrachium* on floodplain of the Bronx River, Westchester County, New York (Atha 15821). Note open sinus of leaf blades and umbels with 3–4 flowers.