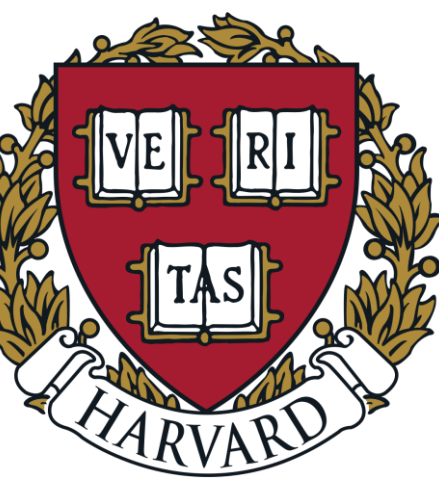




TRACKING AN ECTOPARASITIC FUNGUS OF *HARMONIA AXYRIDIS* IN NORTH AMERICA USING LITERATURE RECORDS AND CITIZEN SCIENCE DATA

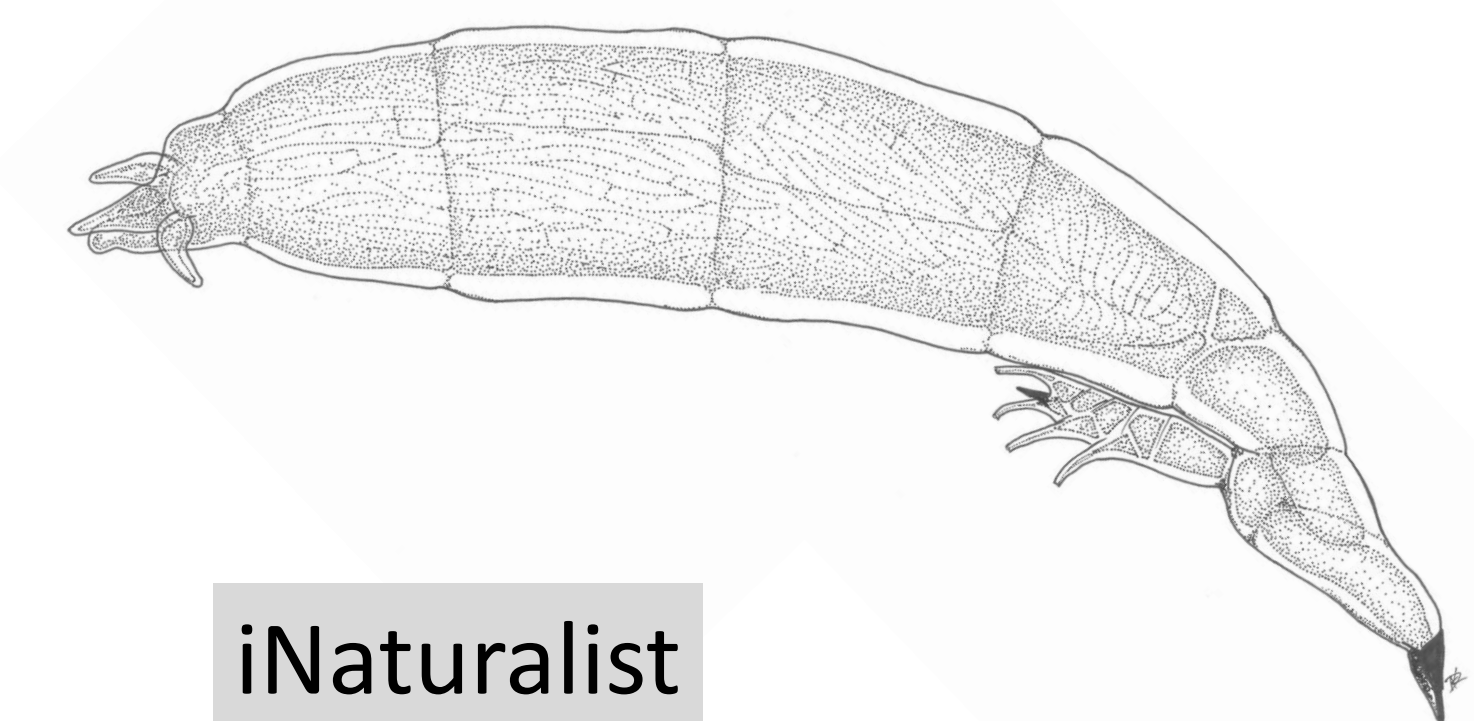


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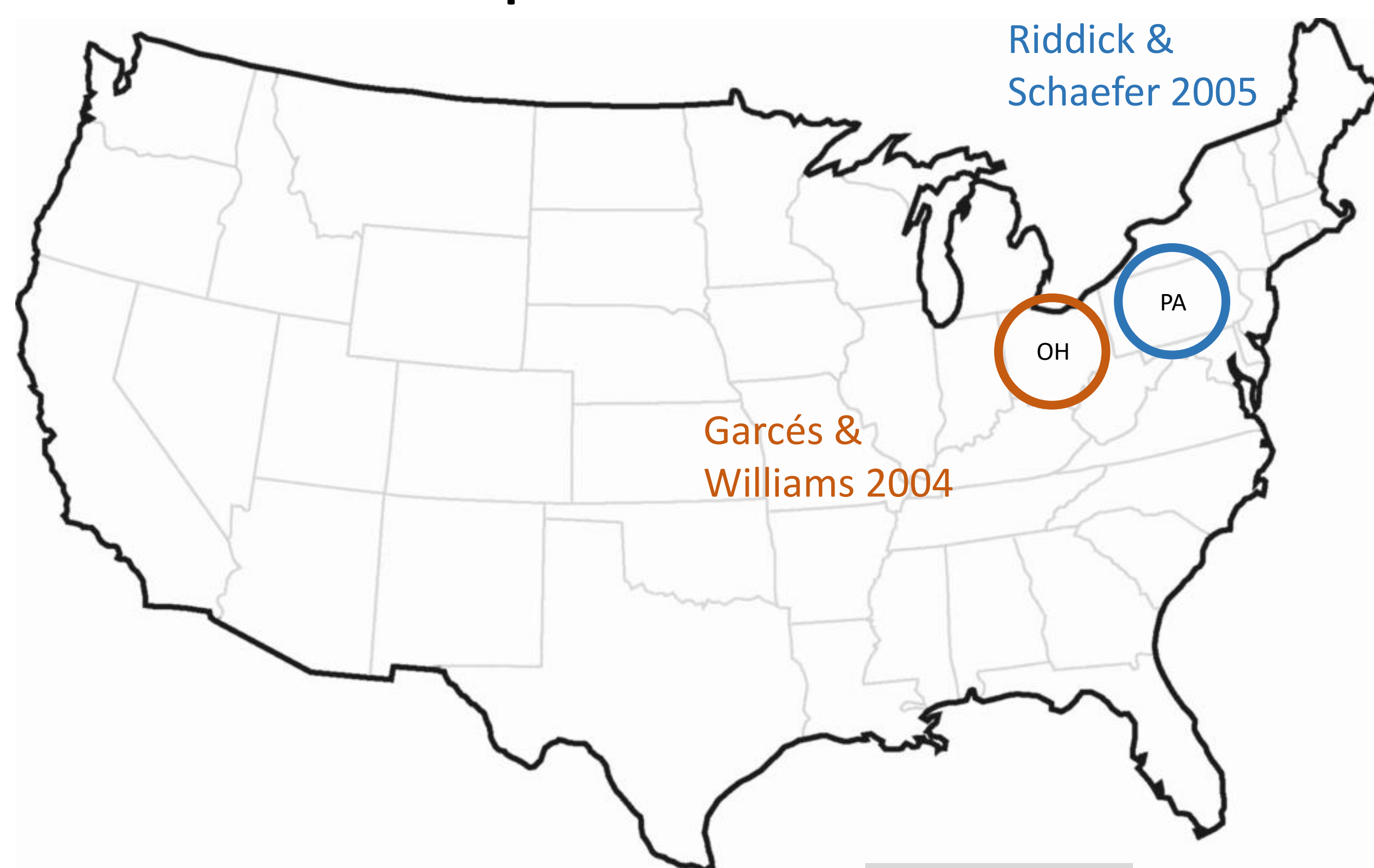
Hesperomyces virescens is a fungal ectoparasite (Laboulbeniales) that infects adult ladybirds. We recently discovered that *H. virescens* is a complex consisting of at least seven species, each specialized to different host species. One of these, *H. harmoniae* nom. prov., is only known from *Harmonia axyridis* from many countries around the world. We do not know the place this fungus originated. Was it imported into North America with *Ha. axyridis* upon introduction of the latter? Or did a host shift occur from a North American native ladybird to *Ha. axyridis*, after which the fungus became more successful on the invader? From studies in the Netherlands and the USA, we know there is a significant gap between establishment of *Ha. axyridis* in the wild and the first observations of the fungus on this ladybird. Supposedly, the ladybird acquired the fungus after a certain time lag, providing some support for the hypothesis that *H. harmoniae* is a North American native fungus. We launched an initiative to create a dataset encompassing all available reports of the *Ha. axyridis*–*H. harmoniae* association in North America. Reports have been collected from the literature and online citizen science platforms Bugguide.com and iNaturalist. Using the records gathered through this initiative, available at beetlehangers.org, we constructed a map showing all occurrences, each with location information, collection date, collector(s) and source. The map will be searchable by date so we will be able to determine where in North America the association originated and track its distributional expansion over the years.



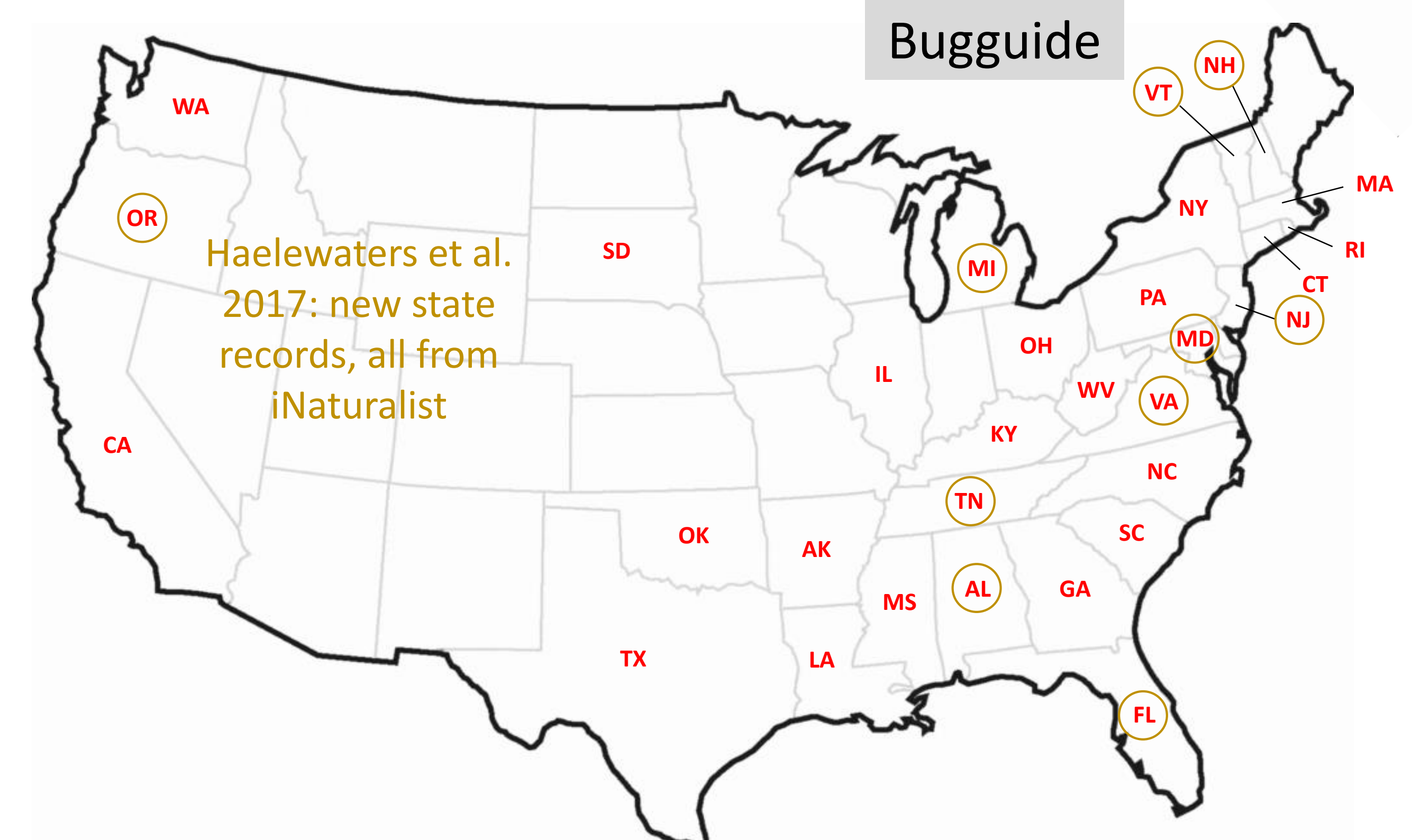
Photo: Gilles San Martin / Drawing: André De Kesel



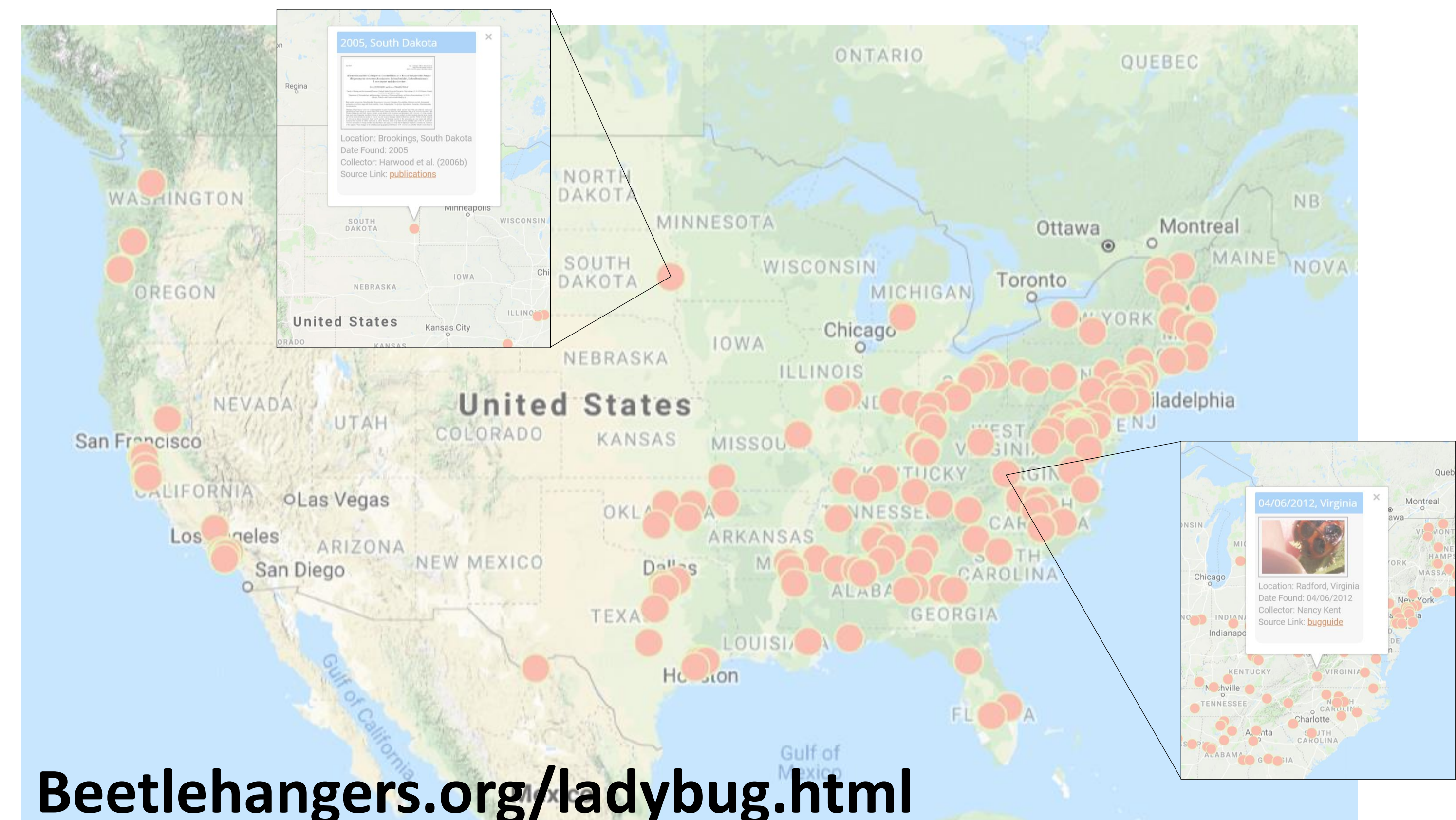
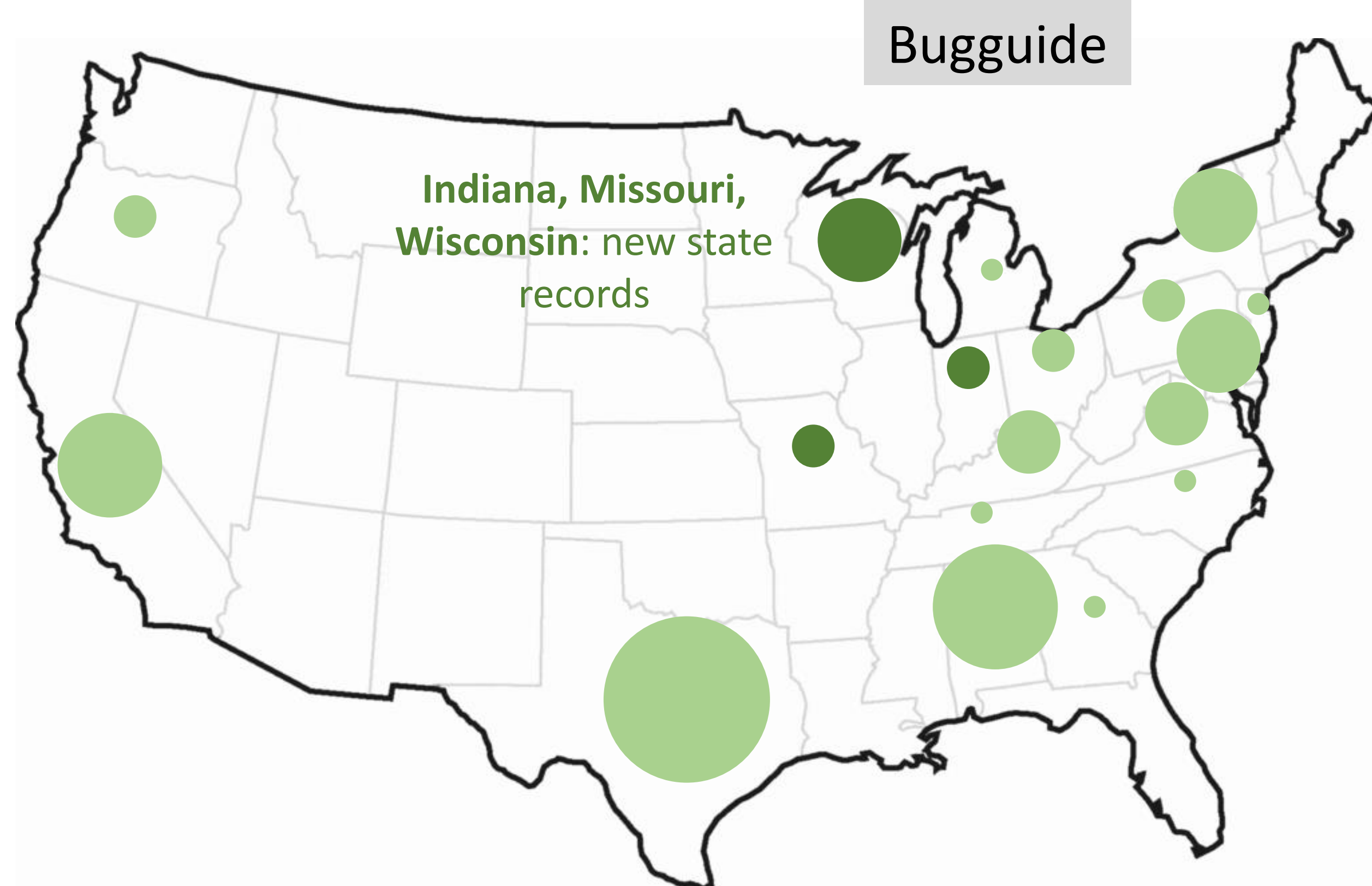
First literature reports



2003 – 2017



2018 alone



Methodology

- Data from Bugguide.net and iNaturalist
- iNaturalist.org, searched for “green beetle hanger”
- Bugguide.net, searched for “laboulbeniales fungus”
- Records were downloaded from citizen science sources
- QC (correct species ID assigned? fungus present? etc.)
- Programs written to extract metadata
- Bugguide records come without coordinates; we used geographic coordinates of city/county level
- Duplicate records were filtered out based on date, location, collector, and pictures
- All data sources were combined into one database, used as basis for the distribution map

Problems

- Patchiness of data; not enough available data between 2002 (first reports of the fungus on *Ha. axyridis*) and 2010 for conclusions about distributional spread

Number of records extracted from Bugguide & iNaturalist (post-QC)

Year	Bugguide	iNaturalist	Year	Bugguide	iNaturalist
2002			2010	13	
2003			2011	4	1
2004	2		2012	3	
2005	3		2013	6	4
2006	4		2014	5	5
2007	2		2015	2	7
2008	1		2016	3	19
2009	6		2017	3	22
			2018	2	46

What's next?

- Flickr.com, to be searched for “ladybugs fungus” ($n = 757$ prior to QC, $n = 35$ post-QC, June 2017)
- Data from personal collections and from museum studies of dried collections ($n = 131$)
- Transform this into citizen science project, through which users can submit sightings of *H. harmoniae* on *Ha. axyridis*