Twelve New Records of Bees (Hymenoptera: Apoidea: Anthophila) for York County, Pennsylvania, USA: A Progress Report[1]

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There is biology during the coldest months of the year when "everything is pretty much like a winter wonderland"!

Abstract: During an ongoing study (March 2020 to the present) of bee biodiversity in two localities separated only by 17 km in York County, Pennsylvania (USA), we have found 81 species of which 12 are new county records, increasing the total number of bees reported for the county to 160. One of them, *Andrena neonana*, is also a new record for the state of Pennsylvania. Thus far, we have found 68 species of bees in the more rural site, Nixon Park, and 49 species in the more suburban site, Springettsbury and Spring Garden Townships. Only 47% of the species of bees appear to in common.

Key Words: New county records, Apoidea, bees, York County, Andrenidae, *Andrena neonana*, new state record, *Andrena* (*Andrena*) *cornelli*, *Andrena* (*Andrena*) *mandibularis*, *Andrena cf.* (*Gonandrena*) *persimulata*, *Andrena* (*Melandrena*) *vicina*, *Andrena* (*Plastandrena*) *crataegi*, Halictidae, *Augochloropsis* (*Paraugochloropsis*) *metallica*, *Lasioglossum* (*Dialictus*) *abanci*, *Lasioglossum* (*Hemihalictus*) *birkmanni*, *Lasioglossum* (*Dialictus*) *cattellae*, *Lasioglossum* (*Evylaeus*) *cinctipes*, *Lasioglossum* (*Hemihalictus*) *birkmanni*, Colletidae, *Colletes thoracicus*, *Hylaeus* (*Metziella*) *sparsus*, Apidae, *Nomada illinoensis*, *Nomada sayi*, new York County records of bees, Nixon Park, Springettsbury Township, Spring Garden Township, Pennsylvania, USA

Introduction

According to Kilpatrick et al. (2020), 148 species of bees (Hymenoptera: Apoidea: Anthophila) have been reported for York County, located in south central Pennsylvania; for the state of Pennsylvania, 437. Kirkpatrick et al. (2020, Figure 2 of their paper) also state that in the nearby states of New York, Maryland, and Michigan, as well as in the province of Ontario (Canada), bee biodiversity is in the 400's species. There are approximately 4,000 species of bees reported for the USA (Droege 2017) and 5,227 species of bees reported for North America (Kilpatrick et al. 2020).

During ongoing research on eastern North America redbuds, *Cercis canadensis* Linnaeus, 1753 (Fabaceae) (see Posthumus et al. 2022, p. 83 of this issue, and https://www.usanpn.org/nn/redbud), which began amidst a snowy day in December 2018 and has continued up to the present, we decided to compare the bees of a suburban

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neighborhood with those in a secondary county forest (Frey 2021), both located in York County (Pennsylvania, USA). As a result of this ongoing bee study, which has serendipitously coincided with the Covid-19 pandemic in the USA (March 2020 to the present), herein we report 12 new records of bees for York County, of which one, *Andrena neonana* Viereck, 1917, is a new record for the state of Pennsylvania.

Methods

Study sites. The bee study is taken place in two contrasting "localities": one, a more "rural" secondary forest; the other, a suburban neighborhood (Figure 1).

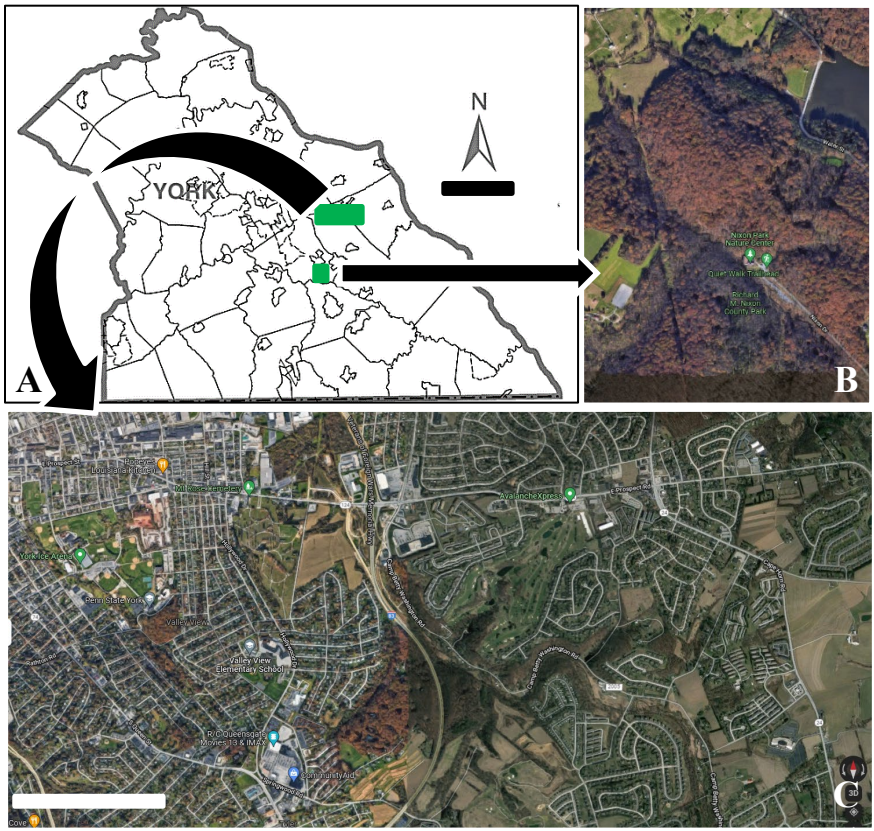

Figure 1. Study sites. A. York County. B. Rural site: Richard M. Nixon Park. C. Area where suburban trees are located. The specific location of the ten households is not given to protect the owners' privacy. Nine out of the ten household are located in Springettsbury Township. The tenth household is located in Spring Garden Township. Map in panel A comes from https://commons.wikimedia.org/wiki/File:Map_of_York_County,_Pennsylvania_No_Text.png ; maps on panels B and C come from Google Maps. Pins from Google Maps have bene removed and key landmarks have bene added. Scale bars: A. 10 km, B. 200 m, and C. 1 km.

The "rural" site is located at the Richard M. Nixon Park, which forms part of the York County Parks in the US state of Pennsylvania (Frey 2021). Nixon Park was selected because there is a secondary forest with many *C. canadensis* trees, most of which are part of the redbud study. At that specific locality within Nixon Park, the redbuds are in the understory of a deciduous broadleaf forest dominated by black walnuts, *Juglans nigra* Linnaeus, 1753 (Juglandaceae), conveniently located immediately behind (and northwest) of the Nature Center (latitude 39.8855074°N, longitude 76.7324753°W). In contrast, the suburban locality, which we colloquially call "the neighborhood", consists of selected homes mostly in Springettsbury Township, York County (one is in Spring Garden Township, also York County). The neighborhood is represented by 13 redbud trees located in ten different households whose owners' author JASB know, hence, obtaining an oral permit to collect in those private properties was almost effortless. To protect the privacy of the owners, we are not providing the coordinates of the households. The centroid coordinates for Springettsbury Township are, as follows: latitude 39.9950°N, longitude 76.6759°W. The centroid coordinates for Spring Garden Township are, as follows: latitude 39.9354°N, longitude 76.7279°W.

Importantly, in no moment do we assert or imply that any of the bees collected are pollinators of, or in any other way, biologically associated to *C. canadensis*. To establish a host-plant pollination interaction, the organisms must be collected visiting the flowers of the putative host plants and the pollen present on their bodies examined. The following references, are useful examples for anyone interested in topic (Bernhardt 2005; Bernhardt et al. 2014; Bougler 2014; Edens-Meier et al. 2011; Fowler and Droege 2020; Kearns and Inouye1993; Mola et al. 2021; Orr et al. 2022; Schlindwein et al. 2009; Tao et al. 2018; Tasei 1972, 1973; Williams 2022). Correct species identification is essential. For eastern North America bees, Mitchell (1960, 1962) and the web site *Discover Life* (https://www.discoverlife.org/ , Schuh et al. 2010) are extremely useful.

Preparation of the Traps and Collecting. Two hundred and seventy plastic cups (also known as "party cups") were tri-perforated with a flame heated screwdriver (Figure 2A). The plastic cups, which were set on March 2020, are secured in between branches, or loosely hanged from the redbud trees (circa 10 – 400 cm above ground level) with metal shower curtain hooks. The cups, which contain propylene glycol that is replenished as needed, are cleaned, adjusted, and replaced as the circumstances impose. Weather depending, collections generally take place in April, May, June, September, and December of 2020 and 2021. For example, a bee collected in March could have landed in the cup anywhere from the previous collection day, in December of the prefvious year. Bees are picked up with forceps and the smaller contents of the cups, often including tiny bees (e.g., *Lasioglossum*) are suctioned using a turkey baster and placed in 15 mL tubes

made from high-clarity polypropylene (also known as Falcon tubes) containing 70% or higher-grade ethanol. After the contents of the cups are collected, the cups are refilled with propylene glycol. Up to the moment of this writing, 12 collections have been made and the contents placed into circa 3,000 Falcon tubes. Thus far, 1,411 bees belonging to 81 species (species count does not include bees that could be identified only to genus, fewer than 5%), have been processed (i.e., vigorously alcohol cleaned, dried up, pinned, labeled, sexed, and identified).

Nomenclature, Images, and Repository. Bee nomenclature follows Kirkpatrick et al. (2020). Following the style of Kirkpatrick et al. (2020), we report the months of collection and add comments, where we deem it appropriate. Gorgeous images of most new records as well as species overviews can be found in *Discover Life* (Schuh et al. 2010, https://www.discoverlife.org/). All specimens remain in the possession of the first author (JASB) and will be donated/lent to a collection of his choice and at a time of his choice.

Figure 2. A. Preparing the collecting cups. A. Perforating the cups. This allows ziptieing the cups and facilitates the flow of excess precipitation as propylene glycol is denser. B. Blue, white, and yellow plastic cups (nine per tree, only six cups shown) on branches of *Cercis canadensis* (tree number 21) at Nixon Park, Pennsylvania. The cups, which are 2.6 cm (shorter radius) x 4.05 cm (larger radius) x 7.0 cm (height) (247 cm^3 capacity) have propylene glycol that adequately preserve bees and most contents for the purposes of this study. Twenty-seven ranslucent cups (not shown), one per tree, were added as sampling devices more recently. To avoid mammals, including people, from accidentally kicking the cups, we placed only ten cups on the ground, all at author's JASB household. Also, for logistic and safety reasons, we did not place cups more than four meters above ground.

When this study concludes, we intend to include detailed collection data and ecological analyses, which are currently in progress.

Systematic Entomology

Below, we list each new record of bee for York County, Pennsylvania. For some of the species, additional comments are included. Table 1 lists the 165 species thus far recorded for York County.

One New State Record of Bee for Pennsylvania

Andrenidae

Andrena (*Scrapter*) *neonana* Viereck, 1917

One specimen collected in May 2020 at the neighborhood.

Eleven Additional New Records of Bees for York County, Pennsylvania

Andrenidae

Andrena (*Andrena*) *cornelli* Viereck, 1907

One specimen collected in April 2021 at Nixon Park, behind the Nature Center.

Andrena (*Andrena*) *mandibularis* Robertson, 1892

Twenty-one specimens collected in April and May 2020 as well as March 2021, April 2021, and May 2021. Three specimens total collected at Nixon Park (May 2020, April 2021), behind the Nature Center, and 18 others at the neighborhood (April 2020, March 2021, May 2021).

Andrena (*Melandrena*) *vicina* Smith, 1853

One specimen collected in May 2021 at Nixon Park, behind the Nature Center.

Andrena (*Plastandrena*) *crataegi* Robertson, 1893 (*crataegi* group)

Two specimens collected in June 2020 at Nixon Park, behind the Nature Center.

Halictidae

Augochloropsis (*Paraugochloropsis*) *metallica* (Fabricius, 1793) *fulgida* (Smith, 1853)

Four specimens total collected in June 2020, September 2020, June 2021, September 2021 at Nixon Park, behind the Nature Center.

Lasioglossum (*Dialictus*) *abanci* (Crawford, 1932) (*viridatum* group)

Two specimens collected collected in May 2021 at Nixon Park, behind the Nature Center.

Lasioglossum (*Dialictus*) *cattellae* (Ellis, 1913)

Five specimens collected in April and May 2020 as well as in January 2021 at Nixon Park, behind the Nature Center.

Lasioglossum (*Evylaeus*) *cinctipes* (Provancher, 1888)

Collected in July 2020 and March 2021. Two specimens collected in the neighborhood.

Lasioglossum (*Hemihalictus*) *birkmanni* (Crawford, 1906)

Two specimens total collected in June 2021 and September 2021 at Nixon Park, behind the Nature Center.

Colletidae

Colletes thoracicus Smith, 1853 (*thoracicus* group)

Collected in June 2020 as well as in May and June 2021. Two specimens collected at the neighborhood and the other at Nixon Park, behind the Nature Center.

Hylaeus (*Metziella*) *sparsus* (Cresson, 1869)

One specimen collected in May 2020 at Nixon Park, behind the Nature Center.

Additional Species of Apoidea Found in This Study but Not Counted as New Records for York County, Pennsylvania

Apidae

Nomada illinoensis Robertson, 1900 or *Nomada sayi* Robertson, 1893

Three specimens collected in May 2021 at Nixon Park, behind the Nature Center. Comments: These two species cannot be easily separated morphologically. In either case, the taxon(-a) is(are) new records for York County, Pennsylvania. However, they are not included in our tally of new records because the bees have not been identified to a single species.

Andrenidae

Andrena cf. (*Gonandrena*) *persimulata* Viereck, 1917

One specimen collected in May 2021 at Nixon Park, behind the Nature Center. Comments: *Andrena persimulata* has been reported for more northern latitudes in northeastern USA. It is somewhat surprising to have found *A.*

persimulata in southern Pennsylvania. Currently, we are studying our material to compare it with other identified conspecifics.

Table 1. Updated checklist of the 160 species placed in 28 genera of bees reported from York County, Pennsylvania, USA. Based on Kirkpatrick et al. (2020), with the new records of species herein reported boldfaced and in slightly larger font.

Apidae: 41 species placed in 12 genera

Anthophora (*Clisodon*) *terminalis* Cresson, 1869
Habropoda laboriosa (Fabricius, 1804)
Apis (*Apis*) *mellifera mellifera* Linnaeus, 1758
Bombus (*Bombus*) *affinis* Cresson, 1863
Bombus (*Psithyrus*) *citrinus* (Smith, 1854) (*citrinus* group)
Bombus (*Pyrobombus*) *bimaculatus* Cresson, 1863 (*lapponicus* group)
Bombus (*Pyrobombus*) *impatiens* Cresson, 1863 (*lapponicus* group)
Bombus (*Pyrobombus*) *perplexus* Cresson, 1863 (*hypnorum* group)
Bombus (*Pyrobombus*) *vagans vagans* Smith, 1854 (*vagans* group)
Bombus (*Thoracobombus*) *fervidus* (Fabricius, 1798) (*pensylvanicus* group)
Bombus (*Thoracobombus*) *pensylvanicus* (DeGeer, 1773) (*pensylvanicus* group)
Ptilothrix bombiformis (Cresson, 1878)
Eucera (*Peponapis*) *pruinosa* (Say, 1837)
Eucera (*Synhalonia*) *atriventris* (Smith, 1854)
Eucera (*Synhalonia*) *hamata* (Bradley, 1942)
Melissodes (*Eumelissodes*) *denticulatus* Smith, 1854
Melissodes (*Eumelissodes*) *dentiventris* Smith, 1854
Melissodes (*Eumelissodes*) *trinodis* Robertson, 1901
Melissodes (*Heliomelissodes*) *desponsus* Smith, 1854
Melissodes (*Melissodes*) *bimaculatus bimaculatus* (Lepeletier, 1825)
Holcopasites calliopsidis calliopsidis (Linsley, 1943)
Triepeolus lunatus (Say, 1824)
Triepeolus pectoralis (Robertson, 1897)
Triepeolus remigatus (Fabricius, 1804)
Triepeolus simplex Robertson, 1903
Nomada ceanothi Cockerell, 1907 (*ruficornis* group)
Nomada composita Mitchell, 1962 (*ruficornis* group)
Nomada cressonii Robertson, 1893 (*ruficornis* group)
Nomada cuneata (Robertson, 1903) (*ruficornis* group: bidentate mandible)
Nomada denticulata Robertson, 1902 (*ruficornis* group)
Nomada imbricata Smith, 1854 (*ruficornis* group)
Nomada luteola Olivier, 1812 (*ruficornis* group)
Nomada luteoloides Robertson, 1895 (*ruficornis* group)
Nomada maculata Cresson, 1863 (*ruficornis* group: bidentate mandible)
Nomada obliterata Cresson, 1863 (*ruficornis* group)
Nomada pygmaea Cresson, 1863 (*ruficornis* group)

Ceratina (*Zadontomerus*) *calcarata* Robertson, 1900
Ceratina (*Zadontomerus*) *dupla* Say, 1837
Ceratina (*Zadontomerus*) *mikmaqi* Rehan and Sheffield, 2011
Ceratina (*Zadontomerus*) *strenua* Smith, 1879
Xylocopa (*Xylocopoides*) *virginica virginica* (Linnaeus, 1771)

Megachilidae: 26 species placed in five genera genera
Anthidium (*Anthidium*) *manicatum manicatum* (Linnaeus, 1758)
Anthidium (*Proanthidium*) *oblongatum oblongatum* (Illiger, 1806)
Coelioxys (*Allocoelioxys*) *coturnix* Pérez, 1884
Coelioxys (*Boreocoelioxys*) *rufitarsis* Smith, 1854
Coelioxys (*Boreocoelioxys*) *sayi* Robertson, 1897
Megachile (*Eutricharaea*) *apicalis* Spinola, 1808
Megachile (*Eutricharaea*) *rotundata* (Fabricius, 1787)
Megachile (*Litomegachile*) *brevis* Say, 1837
Megachile (*Litomegachile*) *mendica* Cresson, 1878
Megachile (*Megachile*) *centuncularis* (Linnaeus, 1758)
Hoplitis (*Alcidamea*) *pilosifrons* (Cresson, 1864) (*producta* group)
Hoplitis (*Alcidamea*) *producta producta* (Cresson, 1864) (*producta* group)
Hoplitis (*Alcidamea*) *truncata truncata* (Cresson, 1878) (*truncata* group)
Hoplitis (*Robertsonella*) *simplex* (Cresson, 1864)
Osmia (*Helicosmia*) *georgica* Cresson, 1878
Osmia (*Melanosmia*) *albiventris* Cresson, 1864
Osmia (*Melanosmia*) *atriventris* Cresson, 1864
Osmia (*Melanosmia*) *bucephala* Cresson, 1864
Osmia (*Melanosmia*) *collinsiae* Robertson, 1905
Osmia (*Melanosmia*) *distincta* Cresson, 1864
Osmia (*Melanosmia*) *proxima* Cresson, 1864
Osmia (*Melanosmia*) *pumila* Cresson, 1864
Osmia (*Melanosmia*) *virga* Sandhouse, 1939
Osmia (*Osmia*) *cornifrons* (Radoszkowski, 1887)
Osmia (*Osmia*) *lignaria lignaria* Say, 1837
Osmia (*Osmia*) *taurus* Smith, 1873

Andrenidae: 38 species placed in two genera
***Andrena* (*Andrena*) *cornelli* Viereck, 1907**
Andrena (*Andrena*) *frigida* Smith, 1853
***Andrena* (*Andrena*) *mandibularis* Robertson, 1892**
Andrena (*Andrena*) *rufosignata* Cockerell, 1902
Andrena (*Andrena*) *tridens* Robertson, 1902
Andrena (*Callandrena* s. l.) *simplex* Smith, 1853 (*simplex* group)
Andrena (*Derandrena*) *ziziaeformis* Cockerell, 1908
Andrena (*Gonandrena*) *fragilis* Smith, 1853
Andrena (*Holandrena*) *cressonii cressonii* Robertson, 1891
Andrena (*Iomelissa*) *violae* Robertson, 1891

Andrena (*Larandrena*) *miserabilis* Cresson, 1872
Andrena (*Melandrena*) *barbara* Bouseman and LaBerge, 1979
Andrena (*Melandrena*) *carlini* Cockerell, 1901
Andrena (*Melandrena*) *commoda* Smith, 1879
Andrena (*Melandrena*) *dunningi* Cockerell, 1898
Andrena (*Melandrena*) *pruni* Robertson, 1891

***Andrena* (*Melandrena*) *vicina* Smith, 1853**

Andrena (*Micrandrena*) *melanochroa* Cockerell, 1898 (*piperi* group)
Andrena (*Micrandrena*) *nigrae* Robertson, 1905 (*illinoiensis* group)
Andrena (*Micrandrena*) *personata* Robertson, 1897 (*piperi* group)

***Andrena* (*Plastandrena*) *crataegi* Robertson, 1893 (*crataegi* group)**

Andrena (*Ptilandrena*) *erigeniae* Robertson, 1891
Andrena (*Rhacandrena*) *robertsonii* Dalla Torre, 1896
Andrena (*Scrapteropsis*) *imitatrix* Cresson, 1872 (*imitatrix* group)
Andrena (*Scrapteropsis*) *morrisonella* Viereck, 1917 (*imitatrix* group)

***Andrena* (*Scrapter*) *neonana* Viereck, 1917**

Andrena (*Simandrena*) *nasonii* Robertson, 1895
Andrena (*Taeniandrena*) *wilkella* (Kirby, 1802)
Andrena (*Thysandrena*) *w-scripta* Viereck, 1904
Andrena (*Trachandrena*) *forbesii* Robertson, 1891
Andrena (*Trachandrena*) *heraclei* Robertson, 1897
Andrena (*Trachandrena*) *hippotes* Robertson, 1897
Andrena (*Trachandrena*) *miranda* Smith, 1879
Andrena (*Trachandrena*) *nuda* Robertson, 1891
Andrena (*Trachandrena*) *rugosa* Robertson, 1891
Andrena (*Trachandrena*) *spiraeana* Robertson, 1895
Andrena (*Tylandrena*) *perplexa* Smith, 1853
Calliopsis (*Calliopsis*) *andreniformis* Smith, 1853

Halictidae: 46 species placed in seven genera

Augochlora (*Augochlora*) *pura pura* (Say, 1837)
Augochlorella aurata (Smith, 1853) (*aurata* group)
Augochloropsis (*Paraugochloropsis*) *metallica* sensu lato (Fabricius, 1793)

***Augochloropsis* (*Paraugochloropsis*) *metallica* (Fabricius, 1793) *fulgida* (Smith, 1853)**

Agapostemon (*Agapostemon*) *sericeus* (Förster, 1771) (*sericeus* group)
Agapostemon (*Agapostemon*) *texanus* Cresson, 1872 (*splendens* group)
Agapostemon (*Agapostemon*) *virescens* (Fabricius, 1775) (*splendens* group
Halictus (*Odontalictus*) *ligatus* Say, 1837
Halictus (*Protohalictus*) *rubicundus* (Christ, 1791)
Halictus (*Seladonia*) *confusus confusus* Smith, 1853

***Lasioglossum* (*Dialictus*) *abanci* (Crawford, 1932) (*viridatum* group)**

Lasioglossum (*Dialictus*) *admirandum* (Sandhouse, 1924) (*viridatum* group)
Lasioglossum (*Dialictus*) *bruneri* (Crawford, 1902)

***Lasioglossum* (*Dialictus*) *cattellae* (Ellis, 1913)**
Lasioglossum (*Dialictus*) *coeruleum* (Robertson, 1893)
Lasioglossum (*Dialictus*) *cressonii* (Robertson, 1890)
Lasioglossum (*Dialictus*) *ephialtum* Gibbs, 2010 (*viridatum* group)
Lasioglossum (*Dialictus*) *georgeickworti* Gibbs, 2011 (*viridatum* group)
Lasioglossum (*Dialictus*) *gotham* Gibbs, 2011
Lasioglossum (*Dialictus*) *hitchensi* Gibbs, 2012
Lasioglossum (*Dialictus*) *illinoense* (Robertson, 1892)
Lasioglossum (*Dialictus*) *imitatum* (Smith, 1853)
Lasioglossum (*Dialictus*) *michiganense* (Mitchell, 1960) (*platyparium* group)
Lasioglossum (*Dialictus*) *obscurum* (Robertson, 1892) (*viridatum* group)
Lasioglossum (*Dialictus*) *oceanicum* (Cockerell, 1916)
Lasioglossum (*Dialictus*) *paradmirandum* (Knerer and Atwood, 1966) (*viridatum* group)
Lasioglossum (*Dialictus*) *pilosum* (Smith, 1853) (*pilosum* group)
Lasioglossum (*Dialictus*) *platyparium* (Robertson, 1895) (*platyparium* group)
Lasioglossum (*Dialictus*) *smilacinae* (Robertson, 1897)
Lasioglossum (*Dialictus*) *subviridatum* (Cockerell, 1938) (*viridatum* group)
Lasioglossum (*Dialictus*) *taylorae* Gibbs, 2010 (*viridatum* group)
Lasioglossum (*Dialictus*) *tegulare* (Robertson, 1890) (*tegulare* group)
Lasioglossum (*Dialictus*) *trigeminum* Gibbs, 2011
Lasioglossum (*Dialictus*) *versans* (Lovell, 1905) (*ruidosense* group)
Lasioglossum (*Dialictus*) *versatum* (Robertson, 1902)
Lasioglossum (*Dialictus*) *viridatum* (Lovell, 1905) (*viridatum* group)
Lasioglossum (*Dialictus*) *weemsi* (Mitchell, 1960)
Lasioglossum (*Dialictus*) *zephyrus* (Smith, 1853)

***Lasioglossum* (*Evylaeus*) *cinctipes* (Provancher, 1888)**

***Lasioglossum* (*Hemihalictus*) *birkmanni* (Crawford, 1906)**
Lasioglossum (*Hemihalictus*) *foxii* (Robertson, 1895)
Lasioglossum (*Lasioglossum*) *coriaceum* (Smith, 1853)
Lasioglossum (*Lasioglossum*) *fuscipenne* (Smith, 1853)
Lasioglossum (*Sphecodogastra*) *quebecense* (Crawford, 1907) (*fulvicorne* group)
Sphecodes atlantis Mitchell, 1956 (*mandibularis* group)
Sphecodes minor Robertson, 1898 (*dichrous* group)

Colletidae: nine species placed in two genera
Colletes americanus Cresson, 1868 (*americanus* group)
Colletes inaequalis Say, 1837 (*inaequalis* group)

***Colletes thoracicus* Smith, 1853 (*thoracicus* group)**
Hylaeus (*Hylaeus*) *leptocephalus* (Morawitz, 1871)
Hylaeus (*Hylaeus*) *mesillae* (Cockerell, 1896) *cressoni* (Cockerell, 1907)

***Hylaeus* (*Metziella*) *sparsus* (Cresson, 1869)**
Hylaeus (*Prosopis*) *affinis* (Smith, 1853)
Hylaeus (*Prosopis*) *modestus modestus* Say, 1837
Hylaeus (*Spatulariella*) *hyalinatus* Smith, 1842

Discussion

Although our study is ongoing, we are surprised to have found 81 species of bees, including 70 species in the cups circumscribing a small area (circa 1,000 m^2) at Nixon Park. In the suburban area, we have found 49 species of bees. Thus far, no species of bee has been overwhelmingly dominant and most new records are represented by five or fewer specimens.

Table 2. Summary of bee biodiversity at the two collection sites (2020 to the present). Data as of December 2021. NP represents the collecting site at Nixon Park; an N the neigborhood.

	Total of both sites	NP (% of total)	N (% of total)	Shared between NP and N (% of total)	Unique to NP (% of total)	Unique to N (% of total)
Families	5	5 (100)	5 (100)	5 (100)	0 (0)	0 (0)
Genera	28	14 (50)	13 (46)	27 (93)	1 (4)	1 (4)
Species	81	68 (84)	49 (60)	42(52)	29(36)	10(12)

This study increases the total species of bees reported for York County from 148 to 160, or approximately 8% increase (Kirkpatrick et al. 2020). York is one of the counties with the highest reported bee biodiversity in Pennsylvania (Kirkpatrick et al. 2020, see Figure 3 on these authors paper).

Currently, we can only speculate about the bee biodiversity in these two study sites, let alone York County. Should we have also sampled more thoroughly by height within the vegetation (i.e., at and closer to ground level as well as over four meters above ground, including the canopy), by botanical as well as by ecological diversity (i.e., collecting on plants representing a fuller botanical diversity and habitats contexts), by type of disturbance (i.e., use of pesticides, use of mowing devices, etc.), as well as by collecting techniques (i.e., netting, vacuuming, Malaise trapping, etc.), we would expect to have found a greater bee diversity in our study sites.

Once, we used to refer to the bees of our more rural site as “the bees of Nixon Park”. Nowadays, we say that those organisms are “the bees of a small portion of Nixon Park”. The same is true about the bees of the more suburban site, “the neighborhood”. There is a lot more to be discovered among the bees of Pennsylvania.

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Beadwork by Ivana Shandor