

Supplemental 3: Ontology competency questions, user domains or groups, and example use cases

This document is supplemental information for Stucky et al. (2019) _____.

Table S1. Ontology competency questions and relevant ontology concept areas for each question. Key to concept area numbers: **1)** observations and observing processes; **2)** relationships and interactions; **3)** single-organism behaviors; **4)** ontogeny; **5)** organism products and traces; **6)** habitat, locality, and substrates; **7)** positional and spatial information; **8)** weather and climate; **9)** collecting methods; **10)** curation. For more information about these concept areas, see Table 1 in the main article.

Competency question	Concept area(s)
1. What all is known about the natural history of species <i>X</i> ?	2-8
2. What natural history observations do we have for species <i>X</i> in North America?	2-8
3. What are the positive, negative, and neutral biotic interactions observed for species of the genus <i>X</i> ?	2
4. Toward which species is species <i>X</i> antagonistic?	2
5. Given a list of species from some community, how do these species interact with each other?	2
6. If species <i>X</i> were to become locally extinct, what other species might be impacted?	2
7. Which insect species might be conserved if a piece of forest with tree species <i>X</i> , <i>Y</i> , and <i>Z</i> is preserved?	2
8. Which species visit flowers of the genus <i>X</i> ?	2
9. Which insect species of the family <i>X</i> are associated with trees?	2
10. Which species of the genus <i>X</i> have not been found on flowers?	2
11. Near which tree species does species <i>X</i> engage in courtship behaviors?	2, 3, 6, 7
12. Are all occurrences of species <i>X</i> associated with plant species <i>Y</i> ?	2
13. Which species of the order <i>X</i> have been observed laying eggs on a plant species on which they have not been observed feeding?	2
14. What predator/prey interactions have been observed in state park <i>X</i> ?	1, 2
15. What specimens are associated with observations of predation by species <i>X</i> , and where are they located?	1, 2, 10
16. From which host life stages has parasitoid species <i>X</i> emerged?	2, 4
17. Which species of the genus <i>X</i> are parasitized by the species <i>Y</i> ?	2
18. From which species have species of the genus <i>X</i> emerged?	2
19. Which host associations for the parasitoid species <i>X</i> are supported by at least 3 different observers?	1, 2
20. Are there parasitoids of hyperparasitoids?	2
21. What species of insects have been found in two or more hosts from different taxonomic orders?	2
22. On eggs of which species has parasitoid species <i>X</i> been found?	2
23. What does species <i>X</i> eat?	2

Competency question	Concept area(s)
24. What are all the food sources for lab rearing of species X?	2, 4
25. What predators eat species X?	2
26. Does species X eat carrion?	2
27. Do insects ever eat hummingbirds?	2
28. Which species farm fungus X?	2
29. Where does species X lay its eggs?	2, 6, 7
30. When does species X lay its eggs?	1, 8
31. Which insects are found on insects that are found on carrion?	2, 6, 7
32. Which species of the family X have larvae associated with species of the family Y?	2
33. On which parts of the human body have bot flies been found?	2, 6, 7
34. Which ant species are known to sting humans?	2
35. What are the northern-most records of insects feeding on humans?	1, 2
36. Which species of the order X have been collected in houses in Florida?	6, 7
37. Which insect species have been found on human remains?	2
38. What are potential natural controls of potential pests of crop X?	2
39. What are the potential vectors of crop disease X?	2
40. Which species of the order X parasitize mammals in Africa?	1, 2
41. Does species X make a cocoon?	4, 5
42. What do we know about the development of species X?	4
43. Is there developmental information about species X from lab rearings?	4
44. What is known about the development time of species X?	4
45. Which species of genus X are found in tropical lowland forests?	6
46. Which insect genera are found in both forests and deserts?	6
47. Which species are found in biome X?	6
48. Under what temperature regimes do fireflies signal?	3, 8
49. Which species in family X are nocturnal?	1, 9
50. Has species X been collected at lights?	9
51. Which non-target species are collected in pheromone traps for species X?	9
52. If I want to observe/collect species X, what methods should I use?	2, 6-9

Table S2. Ontology user domains or groups, example use cases, and the most relevant competency questions for each use case. Competency question numbers correspond with the question numbers in Table S1.

User domain/group	Example use cases	Relevant competency questions
Entomology	Developmental studies	1, 41-44, 52
	Forensic entomology	23, 26, 37, 42
	Insect collecting and rearing	1, 2, 8-13, 16-19, 22, 24, 26, 29-32, 40, 42-45, 47, 49-52
	Medical and veterinary entomology	18, 33-36, 40
	Natural history studies	1, 2, 4, 5, 8-13, 15-32, 40-50, 52
Taxonomy and systematics	Authoring field guides	1, 2, 8, 9, 12, 16, 18, 22, 23, 26, 29, 30, 40, 41, 45, 49
	Generating checklists/catalogues	1, 2, 9, 12, 16, 18, 22, 23, 26, 29, 30, 41, 45, 47, 49
	Systematic revisions	1, 2, 9, 12, 16, 18, 22, 23, 26, 29, 30, 41, 45, 49
Ecology and evolutionary biology	Community ecology	3-18, 20-23, 25, 26, 28-32, 40, 45, 47
	Comparative analyses	2, 8-12, 15-19, 21-23, 26, 28-32, 40, 41, 45-49
	Disease ecology	35, 39, 40
	Ecosystem ecology	3-5, 9, 10, 23, 25, 32, 45-47
	Evolutionary ecology	2, 8-12, 15-19, 21-23, 26, 28-32, 40, 41, 45-49
Conservation biology and natural resource management	Ecological restoration	1, 3, 5, 6, 12, 23, 29, 45-47
	Environmental monitoring	31, 45, 47-52
	Habitat preservation decisions	5-7, 9, 11, 12, 14, 23, 29, 45, 47
	Predicting trophic/extinction cascades	3-7, 12, 23, 25
Agriculture and forestry	Finding potential biological control agents	4, 15-19, 21-25, 32, 38
	Finding potential disease vectors	4, 18, 23, 24, 35, 36, 39, 40
	Finding potential pest insects	4, 12, 13, 18, 23, 24, 29, 35, 36, 38-40
Education	Classroom education	1-6, 8-12, 16-18, 20-27, 29-31, 33-37, 40-42, 45-49, 52
	Public outreach	1, 2, 6, 8-10, 12, 14, 17, 18, 22, 23, 27, 29, 30, 33-36, 38-40, 45, 47, 48, 52
General public	Finding potential garden pests and control agents	4, 8, 12, 16-19, 22-24, 29, 32, 38, 39
	Insect collecting and rearing	1, 2, 8-13, 16-19, 22, 24, 26, 29-32, 40, 42-45, 47, 49-52
	Natural history studies	1, 2, 4, 5, 8-13, 15-32, 40-50, 52