



@Maya Evenden

# Launch of the Massive Open Online Course: Bugs 101, Insect-Human Interactions

Maya Evenden & Ilan Domnich



## Introduction:

Entomologists at the University of Alberta created a 12-module Massive Open Online Course (MOOC) (Fig. 1) to provide free content that engages learners and teaches about the importance of insects and related arthropods to human society. Bugs 101 launched on the Coursera platform on June 28, 2019. A for-credit version of the course (Ent 101) was offered for the first time at the University of Alberta in September 2019.

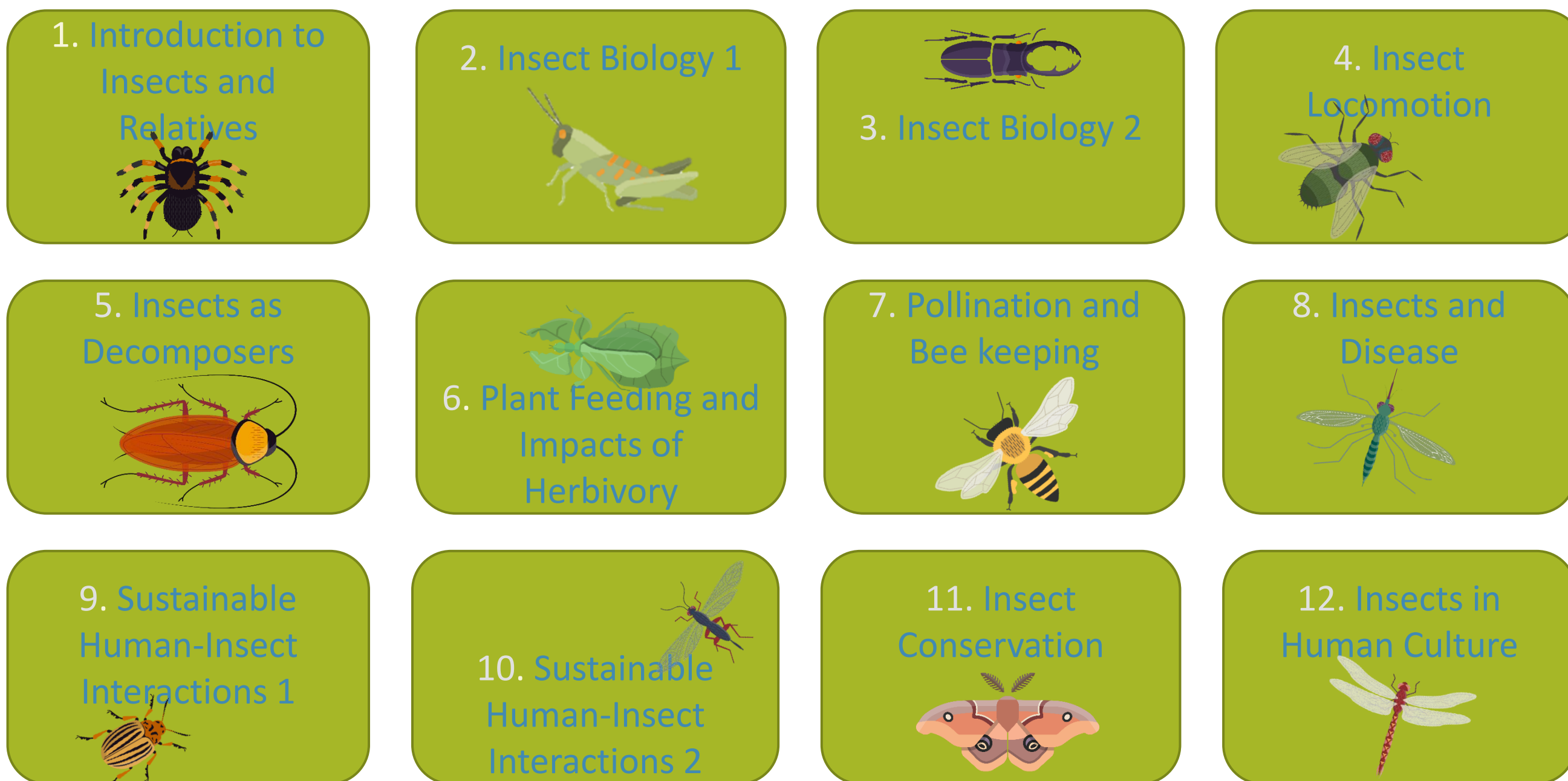


Figure 1. Course map of topics covered in the 12 modules of Bugs 101

## Methods:

We followed an instructional design method (Fig. 2) to create the content and utilized Bloom's Taxonomy to create learning objectives that help guide course content and assessments (Hussey and Smith, 2003). The course features diagrams, photos and videos that visualize content for the learner (Fig. 3). Student learning is enhanced through use of animations, interviews with experts (Fig. 4) and interaction with the course material through "Interactive Learning Objects" (ILOs) (Fig. 5). The high production quality of the course videos helps support student engagement (Guo et al., 2013).

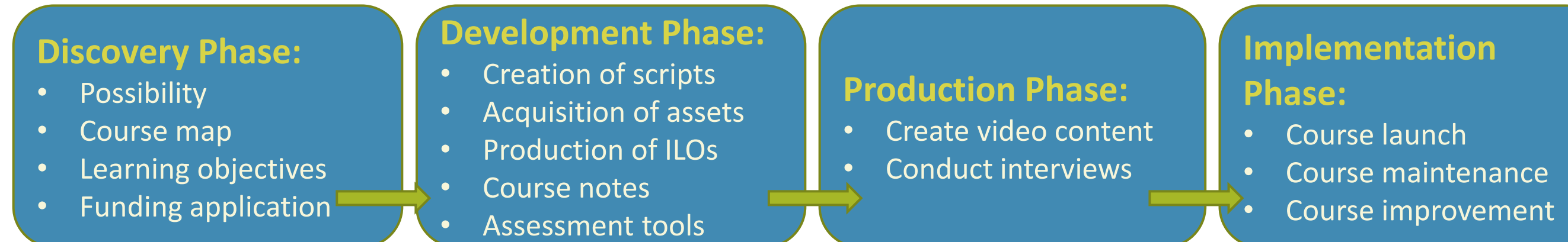


Figure 2. Instructional design method used to create Bugs 101

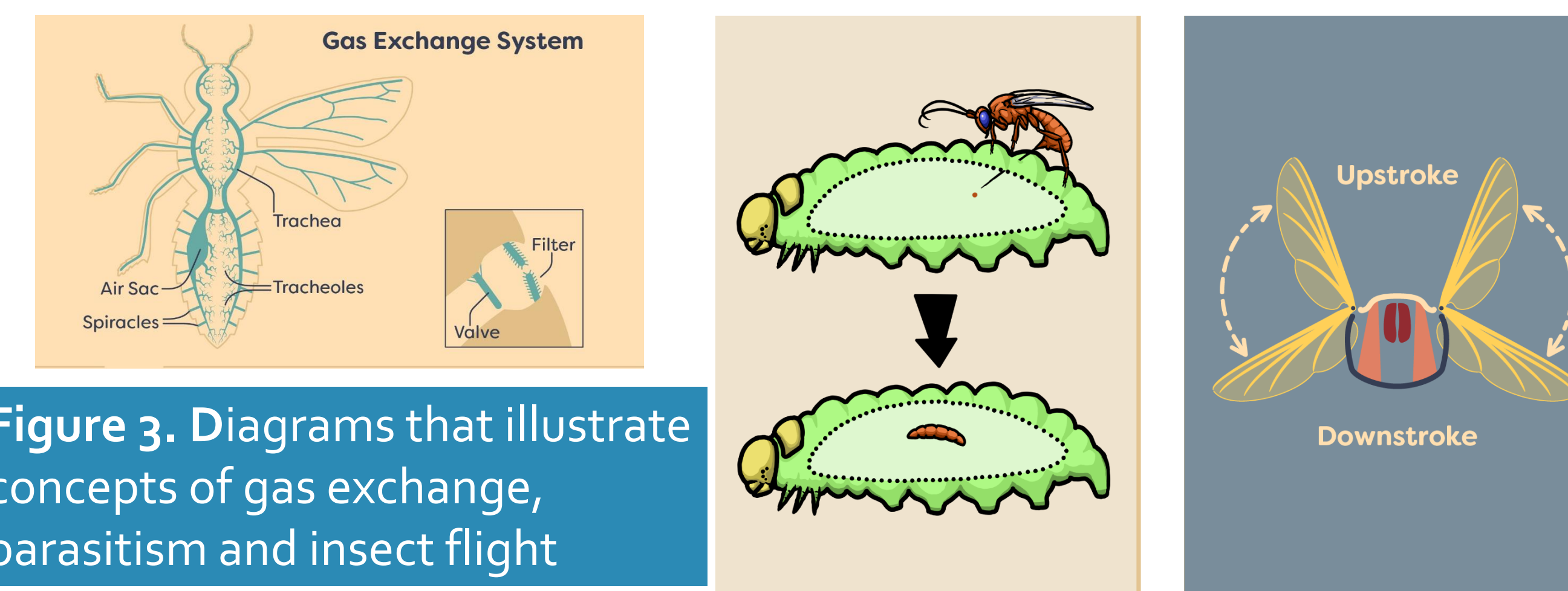


Figure 3. Diagrams that illustrate concepts of gas exchange, parasitism and insect flight

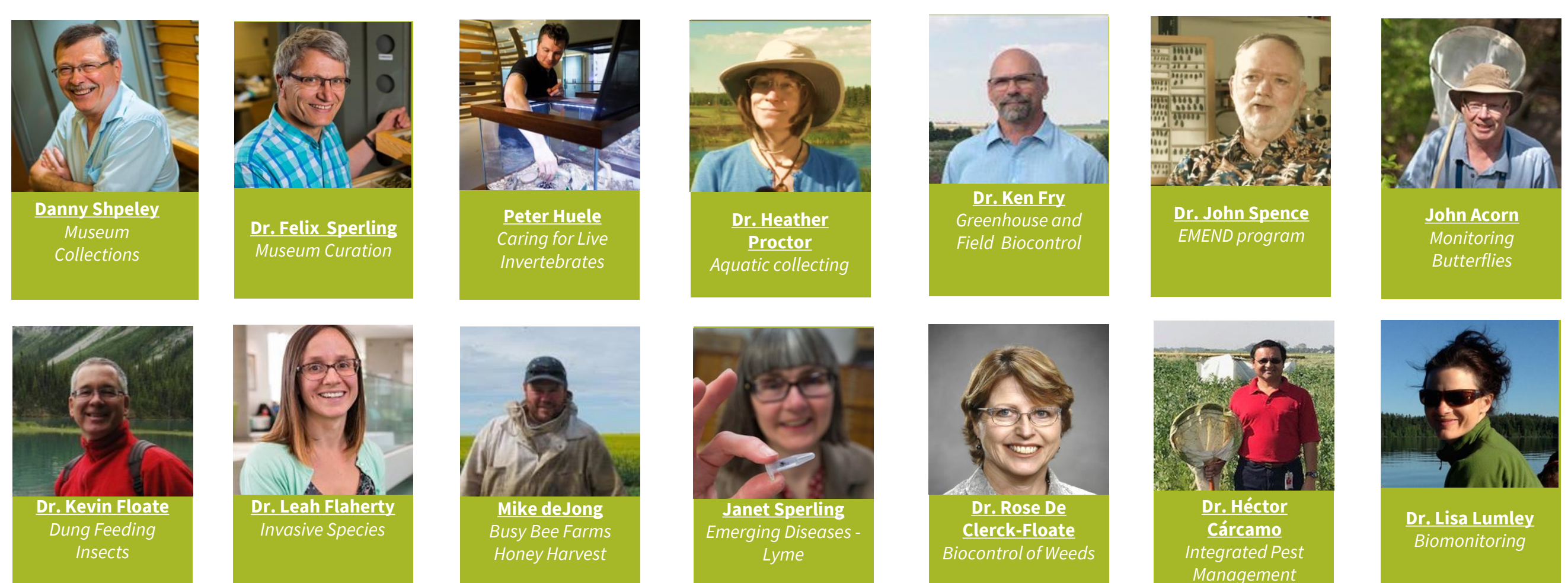


Figure 4. Fourteen of 26 experts interviewed in the making of Bugs 101.

## Interactive Learning Objects (ILOs):

Student interaction with course content is associated with information retention and student enjoyment (Miyazoe and Anderson, 2013). Interactive web apps, or ILOs, are among the highest rated items in previous UAlberta MOOCs. They add an **active learning** component to the course and encourage higher levels of learner **engagement**. ILOs are a simple way to integrate **gamification** into an online course. They are useful tools to teach concepts best understood through **action** and **exploration** (Yu et al., 2019). Bugs 101 incorporates **13** different ILOs including a unique capstone ILO on orchard integrated pest management that allows students to synthesize, and critically evaluate content from multiple modules (Fig.5).

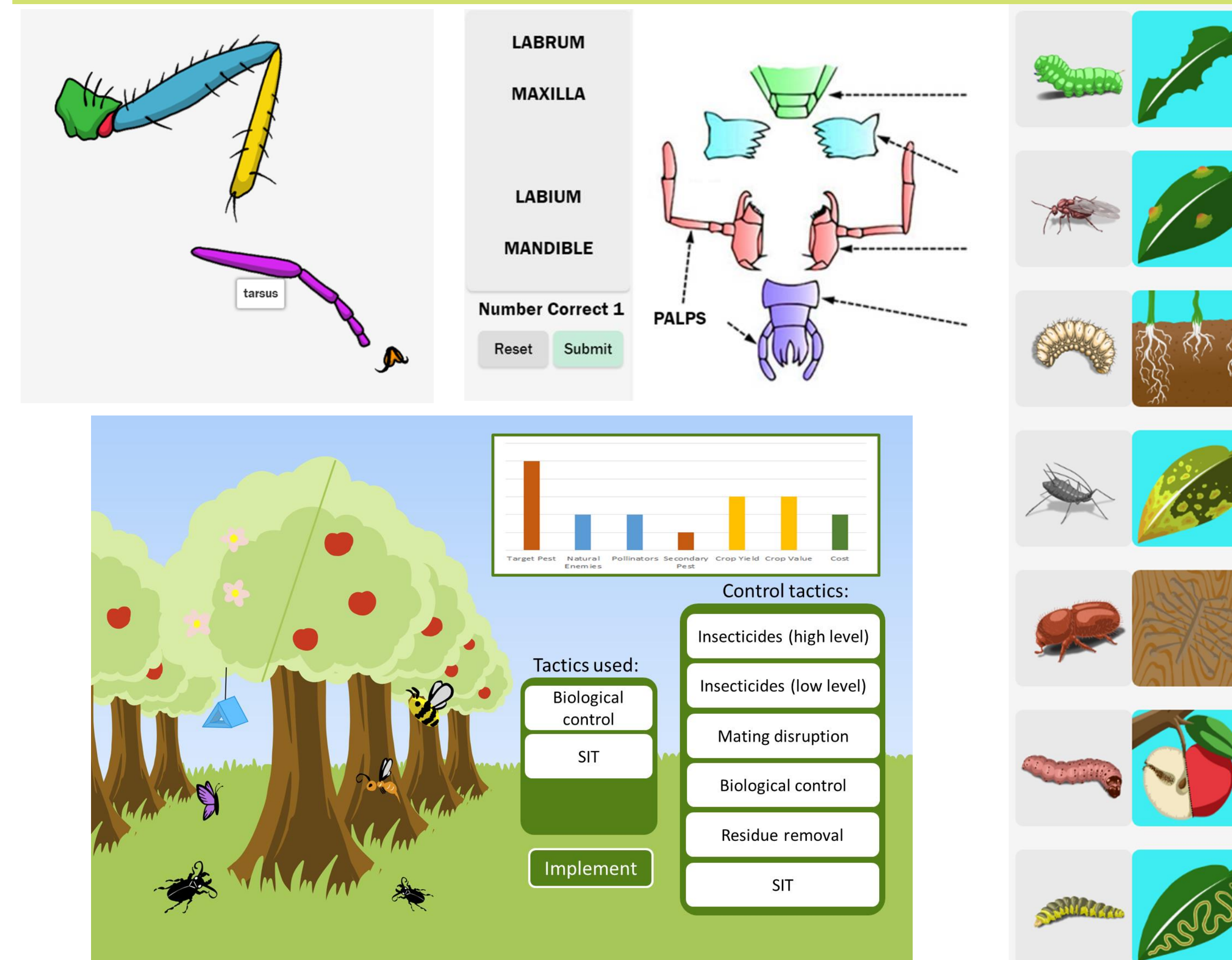


Figure 5. Example Interactive Learning Objects in Bugs 101. Gamification through puzzles, drag and drop labelling, and matching promotes student interaction with content through active learning. In the orchard integrated pest management ILO, students discover how management decisions influence pests, non-target insects and the economics of apple production.

## Results:

We present metrics collected from [www.coursera.org](http://www.coursera.org) 2 and 4 months after the course launch. Two months post launch the course had **5688** learners enrolled which increased to **6844** at 4 months. There were **52** and **298** learners who had completed the course 2 and 4 months post course launch, respectively. The initial uptake from the course was greatest in North America (Table 1), but learners from **122** and **132** different countries were enrolled in the course at 2 and 4 months post launch, respectively. One year after course launch, over **21,000** learners were enrolled, surpassing older UAlberta science MOOCs. The course has maintained a rating of **4.9/5** stars.

Table 1. Top 6 countries of 122 and 132 countries of origin of enrolled Bugs 101 learners, at 2 and 4 months post launch on 28 Aug and 29 Oct 2019, respectively.

Country	Number of Enrolled Learners	
	2 months post launch	4 months post launch
United States of America	2614	3004
Canada	1237	1545
United Kingdom	251	315
India	164	205
Australia	134	163
Mexico	74	103

## Results:

The demographic of learners enrolled in Bugs 101 is slightly different from that of learners enrolled in other courses on the Coursera platform. Bugs101 has more women enrolled than other MOOCs on Coursera (Fig. 6), and is comparatively more popular with older learners and less popular with younger learners (Fig. 7). The course average is ~68.5%, similar to other UAlberta science MOOCs. Monitoring course forums and feedback guides the addition of course content over time, such as supplementary readings, extra ILOs, and a virtual tour of the Royal Alberta Museum Bug Gallery. It also helps the team to identify errors, such as subtitle issues, and refine the online content available to students.

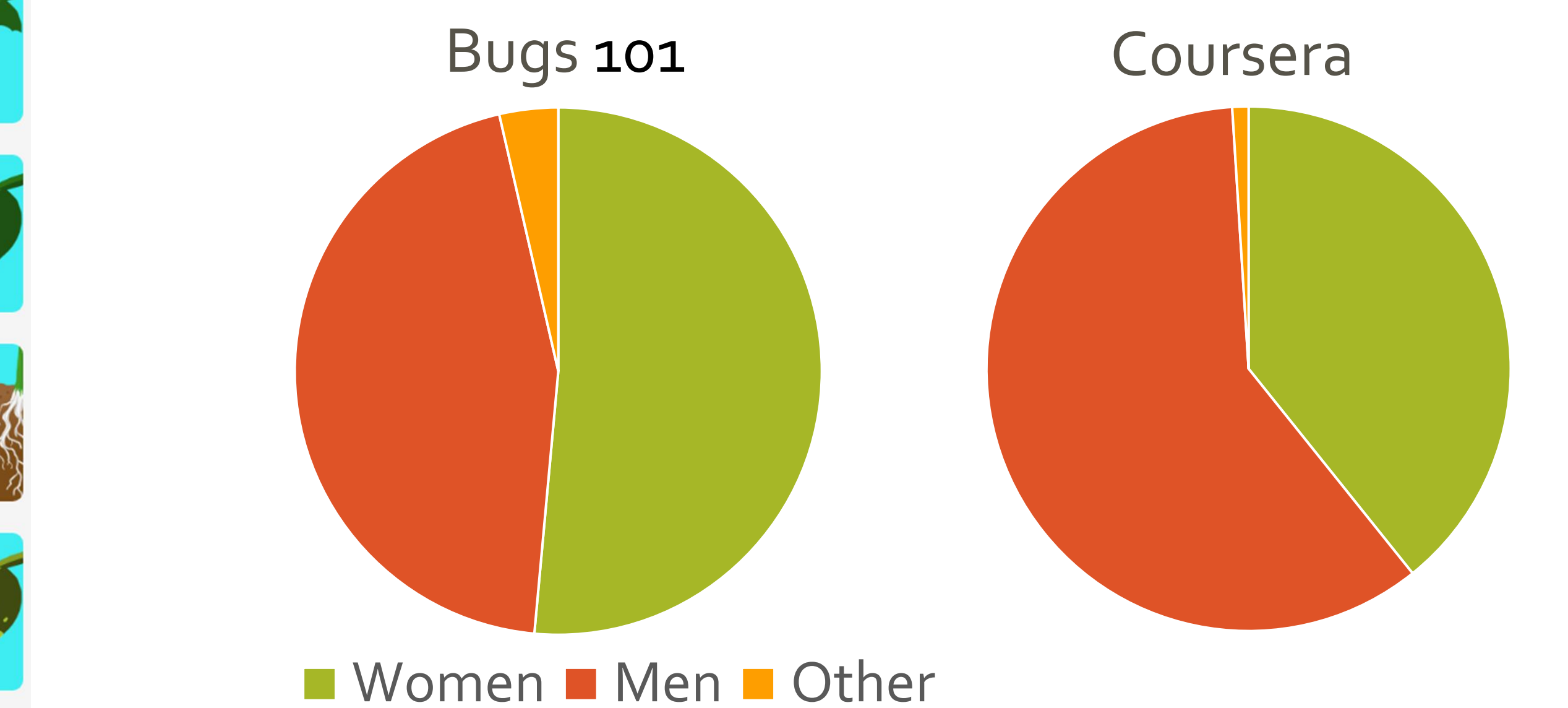


Figure 6. Distribution of learners by gender in Bugs 101 compared to other MOOCs on the Coursera platform, as of four months post launch.

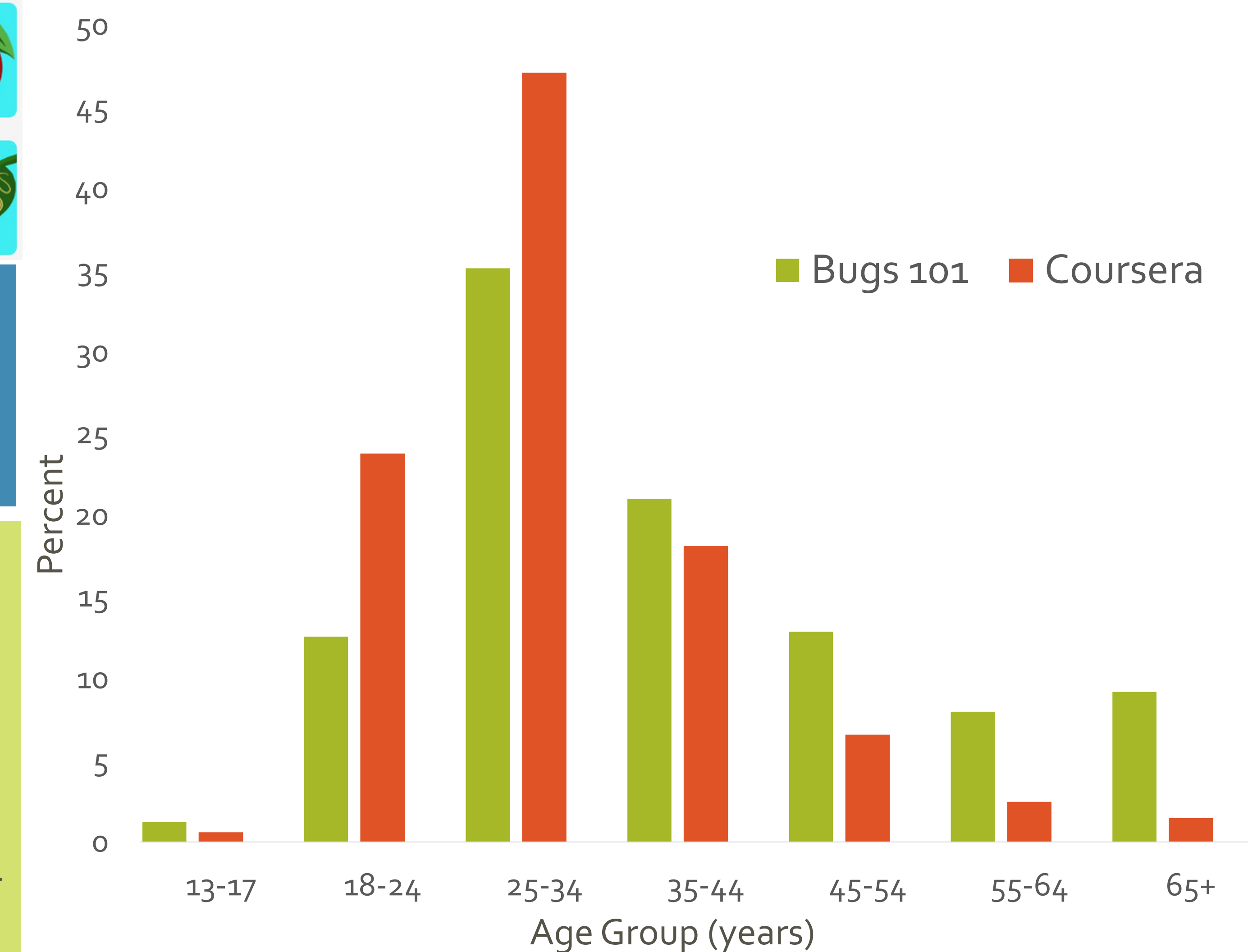


Figure 7. Distribution of learners by age in Bugs 101 compared to other MOOCs on the Coursera platform, as of four months post launch.

## References:

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