

## Evaluating Scientific Content: Misinformation about Insects in a Popular Children's Movie



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### ABSTRACT

An evaluation of the scientific content in a popular children's movie about bees provides an opportunity for discussion about the sources and consequences of scientific misconceptions.

**Key Words:** *Insects; bees; misconceptions; popular media; movies; media literacy.*

Most students love watching and critiquing popular movies; this lesson allows students to do both while encouraging them to think deeper about the consequences of scientific misinformation in popular media sources such as the movies or television, especially those aimed at children. During a review on insects, we engaged high school biology students in a content analysis of *Bee Movie* (2007, DreamWorks). Our investigation uncovered multiple factual errors related to insect anatomy, life cycles, and behaviors and led to some great discussions about the necessity of science-related media-literacy skills. Ideas for assessment and extension are included.

### ○ Rationale

Today's children obtain many of their scientific ideas from popular media sources; however, these sources often present incorrect information in the name of entertainment. Additionally, many children lack the personal experiences with nature that might counteract misinformation that is picked up from the media (Louv, 2008). Research indicates that erroneous ideas or misconceptions can be very tenacious and often interfere with subsequent learning in science (Driver et al., 1994). A systematic investigation of the scientific content of a movie helps students learn to ask questions, develop critical-viewing skills, and analyze and evaluate media messages. As science teachers, we need to ensure that students leave our classrooms with the abilities necessary to critique scientific information in whatever format it enters their lives (MacKenzie, 2007).

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### ○ Objectives

- Students will review basic information about insects, including how they fit into the animal kingdom (classification), their anatomy, life cycles, and behaviors.
- Students will think critically about the scientific content of a popular children's movie, identifying factual errors, attitudes, and other messages about insects.
- Students will discuss possible misconceptions that might be promoted by this (and other) media, the consequences of these, and possible solutions to these issues.
- Students will work in groups to communicate what they've learned to the rest of the class.

### ○ Lesson Preparation

- Follow your school's guidelines to obtain permission to show *Bee Movie* to your students. If time doesn't allow showing the entire movie, preview it and decide which scenes best fit your classroom's objectives. Please note: under the Fair Use provision of copyright law, teachers are allowed to use copyrighted material without permission if their purpose is to teach students how to critique and analyze it (<http://www.centerforsocialmedia.org/fair-use>).

- Decide how to handle the insect/bees review. Students can do their own research about bees in the library or on the Internet; however, we suggest providing some

initial resources to ensure that they have the necessary background knowledge for their evaluation of the movie. Our favorite resources included the books *Plan Bee: Everything You Ever Wanted to Know about the Hardest Working Creatures on the Planet* (Brackney, 2010) and *Honey Bees: Letters from the Hive* (Buchmann, 2011), chapters 1 and 2, as well as the film *Bees: Tales from the Hive* (2007, NOVA). Other resources might be found in your school or public library. If time is not an issue, ask around to see whether there is an experienced local beekeeper,

**Table 1. Misinformation found in *Bee Movie*.**

Misrepresentations in Anatomy	Misrepresentations in Life Cycle	Misrepresentations in Behaviors
<ul style="list-style-type: none"> <li>• Insects with only 4 legs</li> <li>• Insects with human-like hairdos, noses, eyes, eyebrows, eyelashes, hands, etc.</li> <li>• No compound eyes</li> <li>• Hind legs appear to originate from the abdomen, not the thorax</li> <li>• Insects with human-like facial expressions</li> <li>• Male bees with stingers (the stinger is a modified ovipositor – a female structure)</li> <li>• Insects with teeth</li> </ul>	<ul style="list-style-type: none"> <li>• Male workers/soldiers in colony (in nature, all workers/soldiers are female)</li> <li>• Workers forced to choose one job per life (in nature, bees often cycle through a series of jobs; e.g., younger bees usually tend to larvae and older bees leave the hive for pollen)</li> <li>• A worker bee stings a human but does not die</li> <li>• Insects with interspecies “romances”</li> <li>• Insects with longer-than-normal life spans</li> <li>• Insects living in small family units (dad, mom, child)</li> <li>• Extended parental care (past larval stage)</li> </ul>	<ul style="list-style-type: none"> <li>• Lots of anthropomorphism (attribution of human characteristics to other species)</li> <li>• Insects walking upright on two legs</li> <li>• Insects expressing emotion</li> <li>• Insects expressing goals/plans/ambitions rather than acting on instinct</li> <li>• Insects living in human-like homes</li> <li>• Insects “falling in love”</li> <li>• Insects talking with each other and with humans</li> <li>• Insects using tools in their work, especially to make honey</li> <li>• Insects thinking creatively to solve their problems</li> </ul>

a university extension group, or a conservation agent who is willing to come in as a guest speaker or even as a participant in the movie review.

- Divide your students into teams, assigning each a topic on which to focus their review. We used the topics Bee Anatomy, Life Cycle, Bee Behaviors, and Making Honey for our groups. If the class is large, other topics could be assigned or these topics could be used for more than one group. We preselected material from the above sources for each group to review. Although each group was free to critique in any topic area, asking the students to specialize cut down on the amount of time spent in preparation and helped the students to focus during the movie.

## ○ Lesson Plan

- We started this lesson by asking students, “Where do people get ideas about science?” On whiteboards, in small groups, students listed all the places they had learned “science.” Answers included TV/movies, books (fiction and nonfiction), parents/friends, school, textbooks, news reports, and personal experiences.
- We asked students to rank (on their whiteboards) these sources of scientific information in order of likelihood of accuracy; that is, which source was most likely to present accurate information, and so on, down to the source most likely to contain inaccurate information. Answers varied, of course, and the discussion was interesting. There was no right or wrong answer that we were looking for with this task. The point was to stimulate the idea that misinformation abounds, even being found in science classrooms and textbooks.
- Next, we switched gears to a quick review of “What is an insect?” Students were given actual specimens of insects (4 pinned insects per table). We asked them to list similarities among the specimens, hoping they would remember the characteristics of insects in the process. If pinned insects are not available, pictures of insects would also work. Answers included 6 legs, 3-part bodies, antennae, exoskeletons, wings, jointed appendages, etc. Afterward, we reviewed the classification of insects (how they fit into the animal kingdom) on the board.

- We gave students a brief overview of the rest of the assignment: (1) review a bee-related topic in a small group; (2) watch *Bee Movie* with the objective of identifying inaccuracies in fact or in attitude (i.e., where does the movie make obvious factual errors, and does it portray underlying stereotypes or negative messages about bees/insects and beekeepers?); (3) present findings to class; and (4) discuss implications of the findings. Students were assigned to their groups and given resources to review. Individual notes were required and assessed for both the review session and the movie, allowing students to practice their note-taking skills in their science class. Presentations were given via whiteboard. Our students used individual whiteboards measuring approximately 1.5 feet by 2 feet in size; however, presentations could also be given via the classroom whiteboard, through a computer/projector system, or in a poster session. Students discussed both what was wrong and what was right about the movie. Some of their answers are included in Table 1.

- Finally, we wrapped up the lesson with a discussion about scientific misconceptions (sources and consequences), media literacy skills, and a “Why everyone should learn some science” discussion. Students contributed numerous examples of “bad science” from the movies to the discussion.

## ○ Discussion

Some of the misinformation in the movie is listed in Table 1. Students thought it most likely that insect anatomy was altered by the movie’s creators to make the insect characters more appealing to children, whereas life-cycle and behavior discrepancies might be attributed to plot.

## ○ Assessment

Students were formatively assessed throughout the project. We read their notes, listened to their small-group discussions, watched their presentations, and charted their participation in the large-group discussions. As a final assessment, students were given an exit slip and

**Table 2. Final assessment for *Bee Movie* analysis.**

Exit Paper: Please respond to 3 of the following 4 scenarios. Your responses should be in paragraph form and include a <i>minimum</i> of 5 sentences each.	
1	Scenario: A family friend, who teaches 3rd grade, is thinking about showing the movie <i>A Bug's Life</i> (Disney cartoon) to her class for science next week. She really wants your feedback on this idea. What input can you give her (even if you have never seen the movie)?
2	Scenario: A new action movie is released that depicts the aftermath of a huge disease outbreak that kills 1 of every 2 people. Before you start panicking, what can you do to relieve your anxiety about such a possibility?
3	Scenario: All your friends are complaining about needing 3 credits of science to be able to graduate from high school. "We don't want to be scientists or doctors," they complain. What support can you list for the idea that ALL students need to learn science, no matter what their future plans are (whether you agree with this idea or not)?
4	Scenario: A relative of yours insists on killing every insect he finds, especially bees and wasps. He is on a mission to rid the world of insect "pests." You think this is maybe a bad idea – Why?

asked to respond to three out of four scenarios. The scenarios are included in Table 2.

## ○ Extension Ideas

- Assign students in groups to analyze the scientific content in another children's movie and present their findings to the class. Movies with insect themes include *Antz* (1999, DreamWorks), *A Bug's Life* (1998, Disney), and *James and the Giant Peach* (1996, Disney).
- Assign students to analyze and present on the scientific content of a children's picture book that covers an insect-related topic. Assess each student's work via peer review (Sampson & Gleim, 2009) or give small groups of students three picture books on the same topic to assess and ask them to determine which of the three they would use in their own classroom (and why). An elementary-school or public library might be used to obtain books for these assignments.
- Connect the lesson to current news reports. Bees are often in the news (declining populations, swarming incidents, allergic reactions, etc.). How are the bees portrayed? Are the articles scientifically accurate? Are they biased?
- Ask students to interview younger children about their ideas about bees. In groups, have students prepare 5–10 interview questions, administer the interviews, and report back on misconceptions that are found. One of the questions should ask the children where/how they learned what they know about bees.

### Media Literacy IS...

- Asking: Who created this, and why?
- Asking: Who benefits from this media and who (if anyone) is harmed?
- Identifying embedded values and points-of-view (both overt and implied)
- Realizing that different people (e.g., younger children, those with differing levels of education) might be affected by the same message in different ways
- Reflecting on one's own biases on the topic (e.g., Do you hate or love insects? How does that affect your critique of the movie?)
- Thinking critically about what you are seeing, hearing, or reading
- Connecting what you've learned in science to what you see in the media

For a handout of "Key Questions to Ask When Analyzing Media Messages," visit the National Association for Media Literacy Education (2010) at <http://www.ithaca.edu/looksharp/?action=medialithandouts>.

### Media Literacy IS NOT...

- Media "bashing"
- Identifying errors, bias, agendas, etc. without questioning/discussing possible impacts of these
- Saying "don't watch television or movies"

## Resources

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