FEAST ON FACTS

FROM ACADEMY AWARD® NOMINEE **SCOTT HAMILTON KENNEDY**

FOOD EVOLUTION

EDUCATIONAL
RESOURCE GUIDE

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HOW TO USE THIS GUIDE

BRINGING FOOD EVOLUTION INTO THE CLASSROOM

This Educational Resource Guide was created with educators in mind and can be used in a variety of ways in the classroom, as well as in more informal educational settings like community screenings, farmers markets, workshops, after-school programs, community education programs, or training sessions.

The history, implications, problems, and potential solutions surrounding food sustainability, agricultural technology, organic farming, corporate greed, climate change and the environment, the international economy, and global hunger are complex and nuanced and have been studied, written about, and explored by many academics, policy makers, and experts alike. This guide does NOT endeavor to do the same; rather, we hope to shed a new light on how these issues affect individuals and communities by learning about them through the lens of critical thinking and the everyday application of the scientific method. Because the stories and themes explored in the film cannot be fully understood without context, some abridged background information is included—but more comprehensive background information can be found by exploring the organizations and websites listed in the Additional Resources section of this guide.

Additionally, the Screening Guidelines section provides activities that can be performed in a group or individually before watching the film, while watching it, and afterwards, to provide an opportunity for analysis and making connections. The subsequent lesson plan provides teachers with specific procedures that drill down into some of the important themes and topics that the film presents, making connections to national curriculum standards in a variety of courses, formatted for classroom use. And because one of the main messages of the film is the importance of activism, there is a comprehensive section of social action project prompts that provide educators and students opportunities to deepen their exploration of the topics that the film and this guide raise and turn their understanding into action—both locally and nationally.

By learning more about the issues raised in this film, and perhaps more importantly, the significance of critical thinking, analyzing information as we consume it, and the application of the scientific method in everyday life, we hope to foster productive dialogues around the country that can lead to real and sustainable change.

"FOOD EVOLUTION makes some fascinating points about human behavior ... about how we don't make decisions based on facts as often as we think we do. This documentary may not change your mind, but it will make you consider what caused you to decide in the first place."

—Kenneth Turan,
Los Angeles Times

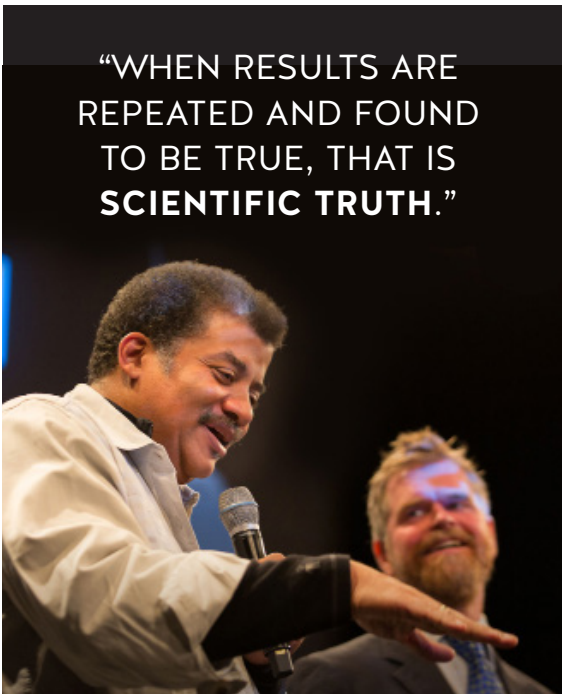
DIRECTOR'S STATEMENT

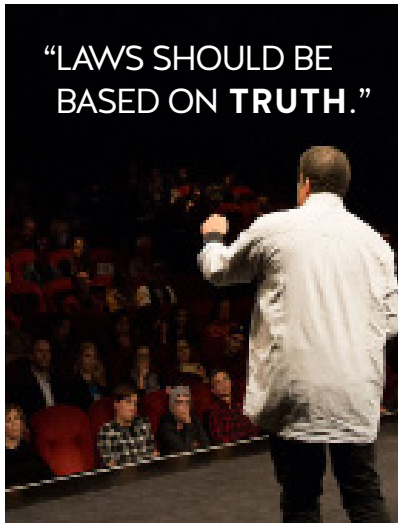
FROM SCOTT HAMILTON KENNEDY

IS FOOD EVOLUTION "PRO-GMO" OR "PRO-SCIENCE"?

While on first glance I can see why some people might call FOOD EVOLUTION a "pro-GMO" film, if you look a bit deeper, the GMO controversy is a metaphor for the importance of using the scientific method to make informed decisions.

Or as our esteemed narrator Dr. Neil deGrasse Tyson put it at our world premiere in New York City:





PHOTOS: MARGARITA CORPORAN, BLACK VALLEY FILMS

THE RESPONSE TO THE FILM HAS BEEN AMAZING.

Following FOOD EVOLUTION's theatrical release in the summer of 2017, the critical response has been incredible, including receiving and maintaining 100% on Rotten Tomatoes. And at hundreds of screenings around the world, we have seen the film's power to change minds from cautious or fearful about GMOs to, thanks to the science and data presented in the film, informed not only about GMOs, but about how to use the scientific method to make decisions in all aspects of our lives.

"I am happy to see the huge interest in today's showing of FOOD EVOLUTION. It shows that the topic of biotechnology is an important one, and we are promoting a constructive dialogue on this topic in the European Parliament.

When it comes to the GMO debate, problems arise when value systems are confused with facts and political decisions are dressed up as science based when they are not. Questioning the safety of GMOs is like denying climate change. If policy makers rely more on alternative facts than science, it makes our mission even more challenging."

—Jens Gieseke, Member of the European Parliament from Germany

"I applaud the makers of this film for taking the time to examine the multiple arguments within this debate. This is a good film, an extraordinary film, and I'm proud that it's being shown right here in our nation's capital."

—SENATOR PAT ROBERTS, Chairman of the U.S. Senate Committee on Agriculture, Nutrition and Forestry, Capitol Hill screening

Director Scott Hamilton Kennedy presenting FOOD EVOLUTION to the FAO in Rome. PHOTO: ALISON VAN EENENNAAM

THE RESPONSE FROM SCIENTISTS AND POLICYMAKERS HAS BEEN JUST AS STRONG.

We have had the honor of screening FOOD EVOLUTION at the National Academy of Sciences, Capitol Hill, the European Parliament in Belgium, the U.S. Mission to the United Nations Food and Agriculture Organization in Rome, and many more prestigious settings.

And we are happy to say that the impact of FOOD EVOLUTION is growing as we reach more communities around the world. We are especially excited about the educational front, connecting the film with students from 6th grade through to college and university postgraduates. We invite you to participate in this important conversation.

FOOD EVOLUTION
EDUCATIONAL OUTREACH COALITION

GALVANIZING THE COMMUNITY AROUND FOOD EVOLUTION

In today's "post-truth" society, it is more crucial than ever that each of us become informed consumers of information. If each of us—from parents to politicians—fails to use science and data to help us curb our biases and get outside of our bubbles, then, to quote Mark Lynas from the film, all public dialogue will become simply "an amorphous blob of competing world views." The most effective way to interrupt this disintegration of public discourse is to enable educators and students to rethink the way they approach questions and the way they search for answers. Since its theatrical release in June 2017, FOOD EVOLUTION has been shifting hearts and minds across the globe.

The FOOD EVOLUTION Educational Outreach Coalition strives to inspire middle-school, high-school, and college students—and communities at large—to use the scientific method to guide their decision-making. This guide, which serves as the curricular cornerstone of the Educational Outreach Coalition, is meant to mobilize stakeholders in the educational community and in communities at large to think differently about how they consume information, how they interact with evidence, and how these processes feed into how we look to solve the problems that face us as a global community—such as climate change, food sustainability, and the management of public discourse. To meet these objectives, we are organizing screenings, professional development opportunities, and other programs for communities and schools around the country.

For more information on this coalition, including how to host a screening, go to

WWW.FOODEVOLUTIONMOVIE.COM/HOST-A-SCREENING/

OR

SCREENINGS@FOODEVOLUTIONMOVIE.COM

ABOUT THE **FILM**

"With a soft tone, respectful to opponents but insistent on the data, FOOD EVOLUTION posits an inconvenient truth for organic boosters to swallow: In a world desperate for safe, sustainable food, G.M.O.s may well be a force for good."

—Daniel Gold,
New York Times

FOOD EVOLUTION is set amidst a brutally polarized debate marked by fear, distrust, and confusion: the controversy surrounding GMOs. Academy Award® nominated director Scott Hamilton Kennedy travels from Hawaiian papaya groves to Ugandan banana farms to cornfields in Iowa, documenting how agricultural technology can be used in such varied crop settings.

FOOD EVOLUTION looks at one of the most critical questions facing the world today—that of food security—and demonstrates the desperate need for common sense, solid information, and calm logical deliberation. Using the often angry and emotional controversy over genetically modified foods as its entry point, the film shows how easily fear and misinformation can overwhelm objective, evidence-based analysis.

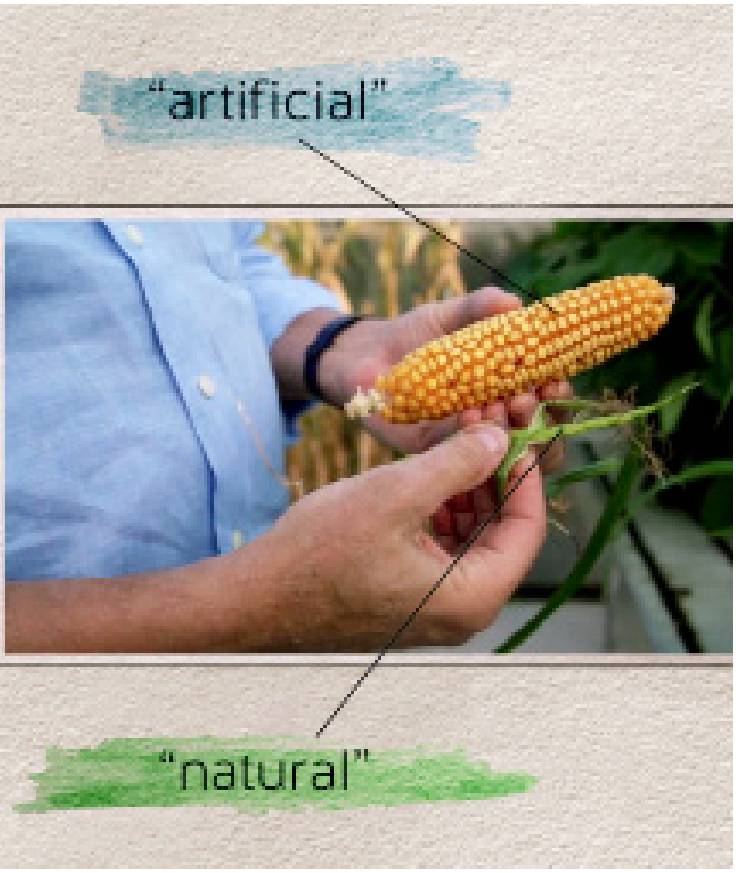
FOOD EVOLUTION takes the position that science and scientists hold the key to solving the food crisis. But whose science? In the GMO debate, both sides claim science is on their side. Who's right? How do we figure this out? What does this mean for the larger issues of food security, sustainability, and environmental well-being? FOOD EVOLUTION seeks to answer these critically important questions.

Narrated by Dr. Neil deGrasse Tyson, FOOD EVOLUTION presents an inside look at how misinformation travels with fear and the uphill battle to prove that what is accepted might not always be true.

FOOD FOR THOUGHT

AN OVERVIEW OF KEY THEMES IN FOOD EVOLUTION

UNPACKING THE PUBLIC DISCOURSE AROUND ADVANCES IN FOOD AND AGRICULTURE



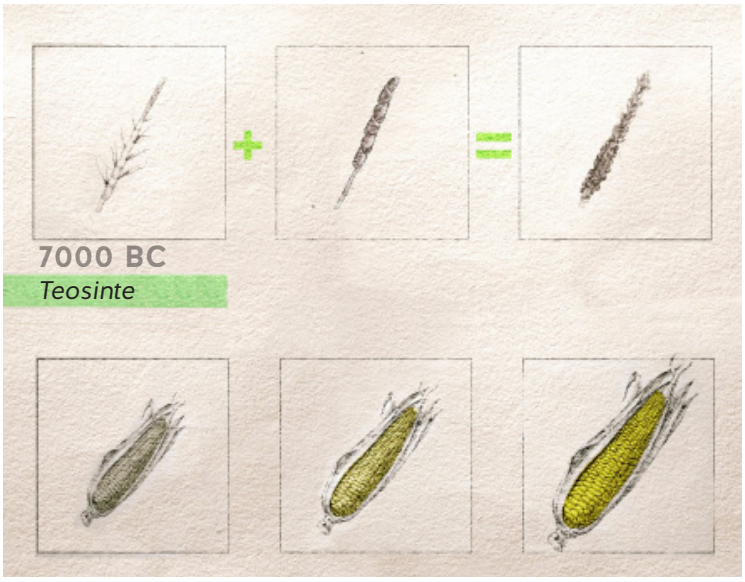
The survival of our species has always depended on advances in food and agriculture. If few people dispute this statement, then why do we have so much conflict, confusion, and distrust in discussions around food and agriculture? The answer to that is complex, but let's begin with what most people can agree upon: Everyone wants safe, nutritious, affordable, and sustainable food for the entire planet. We also know that, as Dr. Neil deGrasse Tyson states in the film, "The profit motive is a double-edged sword. It can lead to innovation, as well as temptation." So the trick is to find the balance between promoting innovation and technology, while also checking and curbing the temptations of greed and power.

The good news is our global food and agricultural systems are the best they have been in the history of humanity. More people have access to safe and nutritious food than ever before. But at the same time, there are still huge problems: Too many people go hungry every day, and issues like obesity are real and daunting.

While it is healthy to be skeptical, if people are presented with overwhelming evidence that should alleviate that skepticism and they still don't change their minds, then they are no longer skeptics; they have become denialists. And that is not a helpful position.

We are witnessing the rise of a "post-truth" era where "alternative facts" may threaten our ability to innovate and thus survive one of the biggest challenges humans have ever faced: How are we going to feed over nine billion people by 2050? And while there isn't one perfect road that will get us there, the rigorous application of science is the best tool we have to help us chart a safe course through an uncertain future.

SELECTIVE BREEDING: A HISTORY OF CORN



HUMANS HAVE BRED *TEOSINTE* FOR THOUSANDS OF YEARS, turning a wild grass with only a few edible kernels into the modern, abundant corn we enjoy today.

"I might argue that a Chihuahua and a Great Dane are genetically modified relative to their ancestor, the wolf."

—Alison Van Eenennaam, Ph.D., University of California, Davis

GENETIC ENGINEERING IS A MODERN FORM OF PLANT BREEDING.

Almost all major food crops today are the products of human intervention or what Charles Darwin called *artificial selection*. The tasty corn, watermelons, and peaches we gobble up on a summer picnic are nearly unrecognizable from their wild ancestors. This is because humans have bred plants by selecting those with the most desirable traits since the beginning of modern agriculture, about 10,000 years ago. By the 19th century, Gregor Mendel's research on the hybridization of pea plants found inheritance patterns that further targeted results and led to the field of genetics. But since scientists did not yet know how to find the genetic needle in the haystack, mixing different kinds of plants together could produce negative unintended consequences like toxins or allergens. Conventional plant breeding methods remain a hit-or-miss process that is usually untested and unregulated for safety or environmental effects.

We can breed plants with more precision with a technique called *genetic engineering* (GE). In 1973, scientists inserted a gene from one bacterium to another, conferring that trait to the recipient organism, creating the first genetically engineered organism, often called a genetically modified organism or GMO in popular culture.

As agriculture is one of the world's most environmentally intense practices, producing greenhouse gases, depleting water supplies, polluting ecosystems with chemicals from pesticides and fertilizers, and clear-cutting forests for farms that lead to the loss of biodiversity, GE can also serve as an essential tool to address climate change. By inserting, silencing, or altering a gene or gene sequence, GE can protect crops from disease, pests, weeds, and drought, potentially reducing pesticide, fertilizer, and water use, increasing yield and income, improving nutrition and food safety, and contributing to a more sustainable environment.

THE SCIENTIFIC METHOD VS. THE SINGLE-STUDY SYNDROME

The Royal Society is the world's oldest scientific society in continuous existence. Formed in the 1660s and now comprising some 1,600 eminent scientists across the globe, their motto is *nullius in verba*, which means to take no one's word. Rather than being swayed by special interests who make up stories about the world around us to secure power, scientists arrive at facts by a systematic process called the *scientific method*. By making detailed observations of natural phenomena and using experimentation to test hypotheses, scientists draw conclusions based on the evidence. The scientific method is used in everyday life as well. Outside of scientific settings, it is often referred to as critical thinking, troubleshooting, or problem solving. With greater access to conflicting information at our fingertips, however, it can be difficult to uncover the truth about a complex scientific topic. It is much easier to find one simple, absolute explanation that does not require deciphering a lot of data, especially if the study confirms what you already decided to believe in the first place. Once we take part in this "confirmation bias" with a community of support around the idea, it becomes harder to change our positions later.

"I TRUST SOCIAL MEDIA like blogs like Vani Hari's or other moms that even just do a post. I trust what they say more than most medical doctors, more than the CDC, more than the FDA, more than the USDA, more than the EPA. That's real, I don't need a scientific study."

—Zen Honeycutt, Moms Across America

PHOTO: BLACK VALLEY FILMS

When some anti-GMO activists cherry-pick evidence in this way, they are engaging in what science journalist Andrew Revkin calls the "single-study syndrome": selecting only the studies that appear to support a position, while ignoring all scientific evidence to the contrary.

"AS A SCIENTIST, when nothing seems to be working, you have to think of alternative solutions."

—Dennis Gonsalves, Ph.D., Cornell University

THE SCIENTIFIC METHOD AND SCIENTIFIC CONSENSUS

"YOU NEVER TRUST ONE SCIENTIST OR ONE OPINION," says Dr. Pamela Ronald in the film. "You look at the consensus of experts in the field." Scientists are skeptics who challenge each other with great rigor in the quest for truth. Scientific consensus is achieved when most scientists, who are experts in their fields after many years of study, come to the same conclusion. Scientific consensus is a combination of the depth of knowledge, repeatability of the results, and conversation among scientists over time. As Dr. John Swartzberg says in the film, there are no absolute answers, and consensus is neither unanimous nor definitive forever. But science provides the best information we have to make the most informed decisions we can regarding the critical issues that affect our health and the planet. The scientific consensus is that GMOs currently on the market have no known negative health or environmental consequences. This consensus is based on over 2,000 peer-reviewed scientific studies conducted over 30 years by the world's leading scientific institutions. Over one hundred Nobel Laureate scientists agree.

GMOs continue to be the "most extensively tested crops ever added to our food supply," vetted by the Food and Drug Administration (FDA), the United States Department of Agriculture (USDA), and the Environmental Protection Agency (EPA) in the U.S. Even in Europe, where there are bans in place on GMOs, the European Commission concluded that GMOs are no more likely to produce unintended consequences than traditional plant breeding.

In the 1990s, the **PAPAYA RINGSPOT VIRUS** nearly destroyed this popular fruit crop in Hawaii. Scientist Dennis Gonsalves wondered if it would be possible to "vaccinate" the plant against this disease by using a gene from the virus itself. With the new technology of genetic engineering, Dr. Gonsalves and his colleagues saved both the fruit and an essential industry to the Hawaii economy.

FOOD FOR THOUGHT [CONT.]

WHAT IS SCIENTIFIC CONSENSUS?

VIDEO CLIP

Please click on the play button above to view the clip or go to bit.ly/2F9xNRL

AAAS
ADVANCING SCIENCE, SERVING SOCIETY

"(T)he science is quite clear: crop improvement by the modern molecular techniques of biotechnology is safe."

NATIONAL ACADEMY OF SCIENCES

"To date, no adverse health effects attributed to genetic engineering have been documented in the human population."

AMA
AMERICAN MEDICAL ASSOCIATION

"There is no evidence that unique hazards exist either in the use of rDNA (GE) techniques or in the movement of genes between unrelated organisms."

INSTITUT DE FRANCE
Académie des sciences

"All criticisms against GMOs can be largely rejected on strictly scientific criteria."

World Health Organization

"In addition, no effects on human health have been shown as a result of the consumption of such foods by the general population in the countries where they have been approved."

WHAT DOES IT MEAN TO BE "ORGANIC"?

As we learn from two organic farmers in the film, Emma Naluyima Mugerwa in Uganda and Raoul Adamchak at the University of California, Davis, organic farming practices have made people think about agricultural solutions in new ways, from lowering the toxicity and negative environmental impacts of farming inputs (insecticides, herbicides, and fertilizers) to finding ways to conserve to understanding how food is grown and brought to our tables. But both Emma and Raoul also know that there is no one perfect method of farming. It is important to note that while some try to make the conversations around farming and food very binary (right vs. wrong, good vs. bad, GMO vs. organic), FOOD EVOLUTION looks at the data and embraces the nuances of '"yes, and," "it depends," and the right of farmers to decide what is best for their particular situations.

Many pro-GMO and pro-organic farmers are using science-based thinking to find solutions. So let's get past misinformation and remind ourselves that if we must see two sides, they aren't organic vs. GMOs; they're science-based thinking vs. marketing misinformation. One aim of the film is to identify when some organic and natural food companies use misinformation and fear-mongering to sell their products. When they attempt to convince customers that buying organic is a safer and more nutritious choice, that is not only scientifically false; it is also unethical, especially when it makes people who can't afford organic products question their food choices.

HOW WILL WE ENSURE FOOD SECURITY FOR FUTURE GENERATIONS?

If the scientific consensus says GMOs are safe, why does the debate continue? Much of the reason is that the term GMO means something different to each person. Concern around GMOs may not be with science but with politics, perception, and the profit motive.

"We should have been much more transparent in reaching the public. You know as I look back, I wished that was something that we would have done earlier."

—Robert Fraley, Ph.D., Monsanto

Given the corporate track record, from tobacco companies hiding the health effects of smoking to oil companies denying climate change, to quote Dr. Neil deGrasse Tyson in the film: "Corporate greed and bias have broken the public's trust."

In the end, however, it is science-based thinking and repeatable data that confirmed the dangers of tobacco, the existence of climate change, and the safety of genetic engineering, as well as hundreds of things we take for granted every day of our lives.

The validity of the underlying science behind genetic engineering is separate from the uses it is put toward in society. Several different avenues can address concerns about how any technology may be employed. One way would be to increase transparency and accountability from the private sector and government around scientific and technological advances. Additional investment in science education can help the public become better informed.

Finally, in one of the most comprehensive studies ever produced on GMOs, the National Academy of Sciences concluded that one area of concern is the domination of the industry by large corporations, which could restrict access to the new technology for small farmers. Efforts to democratize our food system, putting power, knowledge, and resources into the hands of small farmers as well as consumers, can help strengthen our food system and generate confidence in it.

THE PROFIT MOTIVE IS A DOUBLE-EDGED SWORD

VIDEO CLIP

Please click on the play button above to view the clip or go to bit.ly/2odifEq

HOW WILL WE ENSURE FOOD SECURITY FOR FUTURE GENERATIONS? (cont.)

Another way to build trust in GE may be more user-friendly applications. GMOs are ubiquitous in our food supply but one reason the public may be skeptical is because they have yet to directly see the effects of the technology. Future GMOs are entering an exciting new phase that some refer to as GMO 2.0, where the benefits to consumers are much more evident. In FOOD EVOLUTION, we learn that scientists are working on non-allergenic peanuts and mosquitoes that can stop malaria, dengue, and even the Zika virus.

There are also more efforts to produce food for human consumption rather than commodity crops, from drought-tolerant maize and sugarcane to disease-resistant bananas, wheat, and potatoes. Scientists are looking at increasing the nutritional potential of food, including carrots that help people absorb more calcium or tomatoes with greater antioxidant properties.

Due to a deadly disease called *trypanosomiasis*, livestock cannot be raised on a third of the African continent, but GE cows could survive the disease, providing food and tilling fields for poor farmers.

Scientists are also finding ways to bring nearly extinct heirloom species, such as the American chestnut tree, back to life. Even further afield is the possibility of self-fertilizing crops, which pull nitrogen out of the atmosphere, increasing crop yield without pollution. Someday we may be able to grow biodegradable plastics, which would eliminate the need to use petroleum or coal to produce our current plastics that are damaging to our health and the environment.

"So, while we may have had a crisis of trust, when we come to our next evolutionary fork in the road, how do we decide which way to go? What kind of a future will we have if we turn our backs on credible evidence, sound science and repeatable studies? What impact will that have on ourselves, our planet and our future?"

—Dr. Neil deGrasse Tyson, FOOD EVOLUTION

There is no question that human activity has had an increasing impact on the planet and concerns about the effects of technology on our health and environment will persist as we enter a dangerous and uncertain future. While we can't return to the Garden of Eden, socially responsible science and technology can help us identify the problems and come up with answers. If we pursue solutions from a position of knowledge and reason, rather than misinformation and fear, the possibilities that science offers us are infinite.

HOSTING A CLASSROOM OR CAMPUS VIEWING OF *FOOD EVOLUTION*

HOW TO SCREEN *FOOD EVOLUTION*

Start by reading the Screening and License FAQs, which can be found on our website at: **https://www.foodevolutionmovie.com/faq/**

If you're interested in an educational screening, event, or getting involved in the Educational Outreach Coalition, contact Big Picture Educational at: **info@bigpictureeducational.com**

...and our educational team will get you started!

RECOMMENDED AUDIENCES

FOOD EVOLUTION moves quickly and is rich with information—much of which is quite nuanced. Yet while it may be sophisticated enough to spark debates among agricultural science professionals and post-graduate students, it is entertaining and accessible enough for any layperson: the intent of this film is to enlighten, inspire, and engage all audiences to rethink their position in the polarized discourse around technology and food.

Therefore, the film can be used with audiences from middle schools and high schools to communities and families, to universities, graduate programs, and for professional development.

In addition, the film, when paired with the lessons in this guide, provides an opportunity for classroom and community educators to explore all of these issues in the context of a number of educational standards, including civics, language arts, world history, the sciences, media studies, and media literacy, to name a few.

"We wanted to screen FOOD EVOLUTION because the film starts the process of breaking down an emotional and fraught issue into its component parts [...] We think it's a crucial next step in the conversation about feeding the world's population today and in the future. Everyone with an opinion about GMO foods, whether for, against or undecided, should see this film."

—Jane Metcalfe, founder, *NEO.LIFE*, and co-founder, *Wired magazine*

While the experience, prior knowledge, and existing biases of each screening group will be different, the conversation around scientific consensus, agricultural technology, and the many political, social, and economic factors, among others, that play into these themes can be perplexing and polarizing. Be sensitive to the level of exposure, knowledge, and experience of your audience and structure your discussion and activities to reflect that particular group.

PHOTO: MARIA CORPORAN, BLACK VALLEY FILMS

SCREENING GUIDELINES

PRE-VIEWING GUIDELINES

1. Create a chart on the chalkboard, white board, or chart paper.

CHALLENGE	SOLUTION

2. Ask the group, "What is one challenge that we are facing on a global scale?" Allow time for volunteers. Chart their responses on the board or chart paper in the "CHALLENGE" column.

3. Ask the group, "How would one begin to look for answers to these challenges? In theory, what sorts of steps should we take to find solutions?" Again allow time for volunteers and chart responses on the board or chart paper in the "SOLUTION" column.

4. Conduct a short, whole group discussion using some or all of the following questions as a guide:

   - How could you turn the challenges we listed into questions? How does viewing a problem as a question start the solution process?
   - What do all of these problems have in common? What do the solutions have in common?
   - What do you currently do that makes you part of the problem? What do you currently do that makes you part of the solution?
   - What else could you do to help solve these problems?
   - How can science help solve these problems?
   - What makes these problems global? How do you see them manifesting nationally and locally as well?

5. Before the film, ask the group, "By a show of hands, how many of you fear or have concerns about your safety or the safety of the environment with regard to GMOs?"

6. Count the hands so you can compare it to a show of hands after the film.

7. Then, provide a brief introduction based on your objectives. Refer to the About The Film section (page 7) of this guide for a general description and the Food For Thought section (pages 8-15) for background information and context on the topics of agricultural science, scientific consensus, GE technology, media literacy, and others.

POST-VIEWING GUIDELINES

1. Now ask the group again, "By a show of hands, how many of you fear or have concerns about your safety or the safety of the environment with regard to GMOs?" Count the hands so you can compare it to the show of hands from before the film.

2. Ask for volunteers who raised their hands before viewing, but not after viewing, to explain what changed their minds about GMOs. Encourage volunteers to share specific examples and moments from the film that they felt affected their opinions.

3. Conduct a whole group discussion using some or all of the following questions as a guide:

   - What is one thing that surprised you in this film?
   - What is one new piece of data that you got from this film about GMOs and the history of GE technology?
   - After watching this film, why do you think there is such a difference between public opinion and scientific consensus when it comes to GMOs?
   - After viewing this film, what are your thoughts on the role of independent science and scientists in society at large?
   - What are some ways you can advocate for the application of science and the scientific method in your daily life?
   - What are some small changes you can make to work toward a sustainable, environmentally friendly global food supply?

Note: For more in-depth discourse, see the Classroom Mini Unit and Questions for Further Discussion sections of this guide.

ACTION STEPS

Use the following project prompts to encourage viewers to take their learning beyond the classroom or screening room. Once they've gained new knowledge and insight, these project prompts can get them to turn that knowledge into action.

- Go to your local supermarket or take a look in your fridge or pantry and make a list of 10 packaged products that you eat most often (e.g., pasta, cereal, milk, snack bars). Look carefully at the packaging. Note specific details such as the colors, font sizes, images, and descriptive language. Note which aspects of the food the manufacturers chose to highlight—nutritional content? Flavor? Something else? Write down everything you noticed and then consider: What do these packaging choices tell you about the food? How does the package design influence what you think about the food? Find differences in packaging, nutritional values, and labeling in the foods you list. How are two different pastas packaged differently, and what perception does the consumer get from these different packages? After completing this exercise, consider: What purpose does food packaging serve, and why is it so influential in our economy?

- Research the difference in public opinions on GMOs in the United States, Europe, Asia, and Africa. Write a first-person monologue or journal entry from the perspective of a commodity or subsistence farmer from each of those continents and compare them. How do these personal narratives overlap? How are they different? What do you notice about each perspective in relation to the GMO debate? What can you learn about similar debates by completing this creative writing exercise? See if you can publish one or more of these narratives in a local or school newspaper, with an editorial about the global food crisis. What other ways can you use your writings to help your peers and neighbors to engage in a productive dialogue around science, technology, and the future of our planet?

- With your classmates, colleagues, or friends, create two small groups, one pro-GMO and the other anti-GMO. Each side will run a full campaign for its position. The campaign must include:

  - Campaign Video
  - Campaign Twitter (at least 15 tweets with cited facts)
  - Graphic Organizer that shows your campaign goals, an overview of your campaign, and full rationale behind it
  - 500-word Campaign Speech
  - Campaign Trail – Map out which states to visit, and which to fundraise in, and explain why you chose these geographical locations and how they relate to your campaign goals.

ACTION STEPS [CONT.]

- Any time a person seeks to answer a question with replicable evidence, they are employing the scientific method. Think of some examples of how a person might employ replicable evidence, hypothesis testing, research, and the other steps of the scientific method in everyday life (e.g., deciding on an item to purchase, treating a minor injury, choosing a restaurant, planning a trip, etc.). Write up a "case study" showing how the steps of the scientific method can be utilized in this circumstance to come to a conclusion. Then, write up a contrasting case study wherein the scientific method is NOT utilized. How might the decision be made based on emotions, hearsay, and assumptions, rather than facts? How is the outcome affected? *Note: For more information on the scientific method, please see page 27 of this guide.*

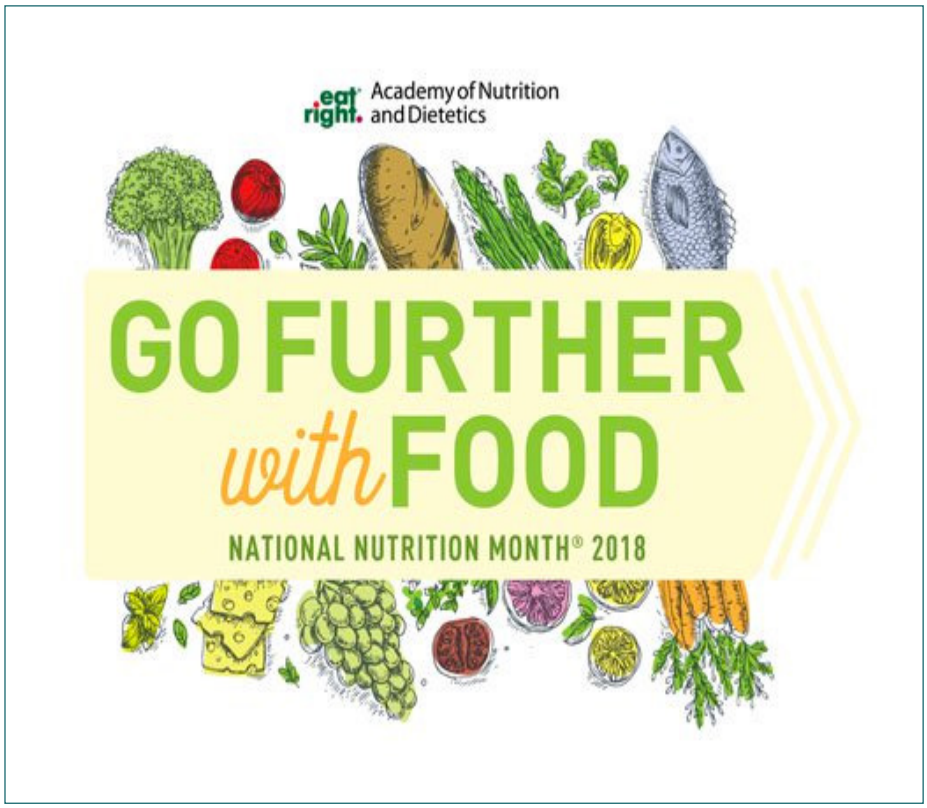
- Research how organic farms operate. How are they created? What makes a farm organic? What does a farmer need to do to make his or her farm an "organic farm"? Next, visit your local farmers market and find out which farmers use organic or conventional agricultural practices. Which use GM seed? Which use pesticides? Is the line between practices as clear as you thought? Map out a plan for a personal or community garden, taking ideas from organic farming to create a sustainable source of food for the community.

- At the Intelligence Squared U.S. debate, Margaret Mellon says, "If you want to feed hungry people around the world, I can give you a list of ten things to do. You can build roads, you can raise their incomes, you can change the role of women, you can help people make their own decisions about what they want to grow and help them grow it." Robert Fraley responds, "I absolutely agree. It's a complicated question that will take all of the tools we have. I couldn't agree more." Both sides of the GMO debate fiercely defend their positions, but to come to a consensus on GMOs, we need to find common ground. Make a list of the most likely areas where each side might start to find agreement and invite someone on each side to try to agree.

- In a healthy intellectual environment, scientists, policymakers, politicians, academics, and citizens are able to fiercely defend their positions, but simultaneously find common ground to establish consensus and successfully create change—and be willing to change their minds, if the facts deem it necessary. Create a list of topics or issues where you think opposing sides might find common ground in order to create consensus. Invite members of your community to come together to discuss the issue and see if they can find points upon which they agree.

ACTION STEPS [CONT.]

- Host a debate between friends, family, or colleagues about any "hot-button" issue in today's headlines. Who is pro, who is con, and what evidence do they use to support their positions? How do their positions relate to their stances on other scientific questions, to their political leanings, and religious beliefs?
- Consider joining your campus science club. Think of ways that science can be used and promoted on campus to create a more informed student body comprised of critical consumers of information.
- Design the kitchen of the future. Consider what is in your kitchen today. What will be there in 10 years? Reimagine the refrigerator and freezer. What new appliances might exist? What would shelf-stable food look like? How might smartphone technology be integrated into the kitchen? Consider how the future kitchen might deal with food waste. Will you have a 3D food printer? How will it work? Include a floor plan and be creative!
- How can we talk about FOOD and not talk about FOOD WASTE? What is food waste, and how can it be mitigated or repurposed? To explore these questions, do some research. How much food is thrown away or wasted in your school? What does your school do with extra food from the cafeteria or food that is thrown away as trash? Work with your peers to start a campus food recycling program, organize food donations to a local food bank, start a school garden, a school composting program, or another campus initiative that looks at ways that food waste can be put to good use.
- Research how science and technology can revolutionize personal nutrition. Will science allow us to personalize everything? Explain.
- What do you know about food fraud (e.g., fake sushi, purposefully mislabeled food, meat being passed off for a different grade)? What is it? Have you seen it? What are its implications? What can be done—in terms of science, policy, and industry—to put an end to food fraud?
- Research the history and evolution of shelf-life and best-by dates on food. What foods last the longest? Why are some foods dated differently than others? How are best-by dates calculated? Is this sort of shelf-life labeling a benefit or hindrance for consumers? Why?
- Conduct some research on the history of dieting and diets. What are some of the biggest diet trends and fads over the last 100 years? How has our culture's attitudes about diet evolved over the years? What seems to work, what doesn't, and why? How does agricultural and food technology relate to consumer diet trends?



JOINING THE EDUCATIONAL OUTREACH COALITION

Use this guide to host your own screening of FOOD EVOLUTION for a group in your area (for example, your school, church, public library) and provide an opportunity for an honest discussion about community concerns. Invite pro- and anti-GMO scientists, parents, students, and activists to participate. Consider planning your event around a special day or month like National Nutrition Month.

REMINDER: For more information on the coalition, including how to host a screening, go to

WWW.FOODEVOLUTIONMOVIE.COM/HOST-A-SCREENING/

OR

SCREENINGS@FOODEVOLUTIONMOVIE.COM

ABOUT THIS MINI UNIT

How does the public become informed about the important issues that affect us? What is the difference between opinion and fact, and how do these differences affect policy and public safety? How much of what we think is fact is actually opinion? How does public opinion form? These big questions and related issues are explored in this cross-curricular, multimedia lesson for middle and high school students studying the sciences, civics, media literacy, and more. While the lesson is geared toward participants aged 13-18, it can be easily modified for other age groups.

TECHNIQUES + SKILLS

Vocabulary building, large group discussion, small group work, critical and analytical thinking, supporting ideas with examples, comparing and contrasting information sources, research, listening skills, expository, creative, and responsive writing.

CURRICULUM CONNECTIONS

This lesson fits in perfectly with units that address curriculum standards in the sciences, including agricultural and environmental science, social studies, civics, media literacy, language arts, thinking and reasoning, film studies, conflict mediation and resolution, expository and creative writing, and service learning.

KEYWORDS + PHRASES

Scientific method, hypothesis, experiment, analyze, correlation, causation, spurious, conclusion, data, sustainability, genetics, modify, agriculture, climate, corporate, stakeholder, toxicity, perception, influence.

REQUIREMENTS

MATERIALS

- Whiteboard and markers, chalkboard and chalk, or chart paper and markers
- Monitor/projector, DVD player, or computer with internet access
- Notebook paper
- Student Handouts

TIME

- 6 periods

LESSON PREPARATION

MATERIALS

- Prepare a DVD player, television set or monitor, and a DVD of the film FOOD EVOLUTION
- Prepare copies of Student Handouts for distribution

SAMPLE STANDARDS ALIGNMENTS

CCSS.ELA-LITERACY.RI.9-10.4

> Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).

CCSS.ELA-LITERACY.W.11-12.2

> Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

CCSS.ELA-LITERACY.RH.11-12.3

> Evaluate various explanations for actions or events and determine which explanation best accords with textual evidence, acknowledging where the text leaves matters uncertain.

CCSS.ELA-LITERACY.RH.9-10.2

> Determine the central ideas or information of a primary or secondary source; provide an accurate summary of how key events or ideas develop over the course of the text.

CCSS.ELA-LITERACY.RH.9-10.4

> Determine the meaning of words and phrases as they are used in a text, including vocabulary describing political, social, or economic aspects of history/ social science.

CCSS.ELA-LITERACY.RH.11-12.7

> Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

CCSS.ELA-LITERACY.SL.11-12.1.B

> Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.

CCSS.ELA-LITERACY.SL.11-12.1.C

> Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.

CCSS.ELA-LITERACY.SL.11-12.1.D

> Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.

CCSS.ELA-LITERACY.W.9-10.1

> Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

SAMPLE STANDARDS ALIGNMENTS

MS-LS1-5 FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES

Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

MS-LS2-1 ECOSYSTEMS: INTERACTIONS, ENERGY, AND DYNAMICS

Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-LS3-1 HEREDITY: INHERITANCE AND VARIATION OF TRAITS

Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

MS-LS4-5 BIOLOGICAL EVOLUTION: UNITY AND DIVERSITY

Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.

MS-ESS3-5 EARTH AND HUMAN ACTIVITY

Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

HS-LS2-2 ECOSYSTEMS: INTERACTIONS, ENERGY, AND DYNAMICS

Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

HS-LS2-7 ECOSYSTEMS: INTERACTIONS, ENERGY, AND DYNAMICS

Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

HS-LS3-1 HEREDITY: INHERITANCE AND VARIATION OF TRAITS

Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

HS-ESS3-1 EARTH AND HUMAN ACTIVITY

Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

HS-ESS3-2 EARTH AND HUMAN ACTIVITY

Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.

HS-ESS3-4 EARTH AND HUMAN ACTIVITY

Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

HS-ETS1-1 ENGINEERING DESIGN

Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS1-2 ENGINEERING DESIGN

Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

PROCEDURES DAY ONE

1. As students enter the classroom, distribute Student Handout: Medical Press Advisory (page 44).

2. Allow 5-10 minutes for them to read the advisory and take notes on what they've read.

3. After the class has had time to read and notate the handout, conduct a short, whole group discussion, using the following questions as a guide:

   - What are your thoughts on this press release?
   - What questions does the press release raise for you?
   - Do you think that this press release is accurate or inaccurate? Why?
   - What scientific information does this release communicate?
   - What data does the press release reference to back up its claims?
   - How might you go about proving or disproving the claims set forth in the press release?
   - What words are used in the document to give the claims authority?
   - What other tactics are used to make the information in the release seem authoritative?
   - Can you relate this document to anything you've ever encountered in "real life"? Explain.

4. Ask the class, "What is the scientific method?" and allow time for students to volunteer their own responses.

5. Explain that the scientific method is a process used by scientists to solve questions or problems, using observation, experimentation, and analysis.

6. On the chalkboard, white board, or on chart paper, outline the following steps that comprise the scientific method:

   1. Ask a Question
   2. Offer a Hypothesis
   3. Test the Hypothesis with Experiments
   4. Analyze the Data
   5. Draw Conclusions

7. Discuss each step with the class, allowing for student volunteers to offer examples and definitions of each step. Record student responses on the board.

8. Ask the class if they think the authors of the press release used the scientific method (or relied on scientifically proven information as their source). Ask them why or why not? Allow a few minutes for a robust debate.

PROCEDURES DAY ONE [CONT.]

9. Offer the following information: It is true that the following ailments increase during the summer months in North America and that certain cancers can be traced to activities that take place more often during the summer (skin cancer from sun exposure, pancreatic cancer from carcinogens in charred meat).

   - Water-borne illnesses, including gastroenteritis, eye infections, skin lesions, and more
   - Food poisoning
   - Drowning
   - Heatstroke
   - Sunburn
   - Lightning strikes
   - Lyme disease
   - West Nile virus
   - Poison ivy, oak, sumac
   - Car accidents
   - Ear infections
   - Burns – from grills, fireworks, bonfires

10. Point out that while there is a higher incidence of these illnesses and ailments in the summer months, it is NOT true that sunlight is toxic. Ask the class: If there is a higher incidence of these ailments when there is more exposure to sunlight, then WHY is it not proof that sunlight is toxic?

11. Write the following terms on the board: CORRELATION and CAUSATION. Explain that correlation is when two pieces of information relate to one another in some way and that causation is when one piece of information CAUSES the other. Many times, data can CORRELATE to one another, but neither data point CAUSES the other. Offer the example: "Every time a traffic light turns red, the taxi I'm riding in stops." In this example, the light turning red CORRELATES to the taxi stopping, but does not CAUSE the taxi to stop. Or, "When I am exposed to additional sunlight, I am at a higher risk for poison ivy." Longer days may correlate with a higher risk of poison ivy, but it does not CAUSE poison ivy infection.

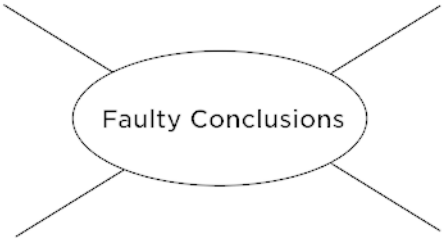
PROCEDURES DAY ONE [CONT.]

12. Elicit additional examples from the class of two data points that might correlate but not be causal.

> **NOTE:**
>
> For fun, share the website "Spurious Correlations" with the class, created by a student at Harvard University, which displays graph after graph of data sets that correlate but are otherwise unrelated, including, for example, the consumption of margarine to divorce and the total revenue generated by arcades to the number of doctorates awarded:
>
> **http://www.tylervigen.com/spurious-correlations**

13. Remind the class that there was a time when everyone—even scientists—believed that the earth was flat. Ask for volunteers to call out some of the observations that lead people to come to this conclusion (e.g., the straight horizon, the appearance of the sun and moon, their belief in multiple gods, etc.).

14. As a quick recap, discuss the various ways that people can come to faulty conclusions: correlation vs. causation, assumptions based on superficial evidence, fear, incomplete analysis of data, etc. Map the students' responses on the board or on chart paper as a word web:



15. Break the class up into pairs and distribute a copy of Student Handout: Scientific Method (page 45) to each pair.

16. Instruct the pairs to complete the first column based on the press release handout. What sorts of experiments and analysis would they conduct in order to arrive at the conclusion that the hypothesis is correct? Then, allow time for them to imagine the experiments, data, and analysis they might complete in order to arrive at the conclusion in the second column. Allow 15 minutes for this activity.

PROCEDURES DAY ONE [CONT.]

17. Once the pairs have had time to complete the handout, conduct a short debrief as a whole group. You can use some or all of the following questions as a guide:

    - What sorts of experiments might show data that support either hypothesis?
    - How important is the analysis phase? Is it possible to analyze the same data in different ways? If so, how might a scientist figure out the accurate conclusion?
    - How would you figure out if data were causal or correlating?
    - How does this exercise illustrate how a person could come to a faulty conclusion?
    - How does this chart relate to the issue of "fake news"?
    - How could a similar approach to the scientific method be used to analyze other kinds of information, like current events or societal trends?
    - How is this exercise useful for critical thinking and media literacy?
    - Are there any statistics that you assumed to be true that you can question now after conducting this exercise? Explain.

18. Tell the class that in the coming days they'll be watching a film that explores the different ways that people consume media and information and how we as a society arrive at widely held conclusions. The film uses a big question to explore this topic, one that affects every person on the planet.

19. Write the big question on the chalkboard, white board, or chart paper and read it aloud to the class:

    "How can we successfully feed the world's growing population?"

20. Explain that this is a problem that scientists, corporations, universities, and farmers around the world are trying to solve. Because there are so many stakeholders and factors playing into this issue, there are many conflicting ideas and these ideas are becoming more and more polarized. Tell the class that it will be up to them to use the scientific method, and the critical analysis skills that they examined in class thus far, to come to their own conclusion on this complicated conversation.

21. For homework, instruct students to conduct some preliminary research in order to complete Student Handout: An Introduction to the Problem of Food Sustainability (page 46). They should use the critical analysis that they acquired in class to assess the accuracy of their sources. Remind students to look for data-backed research, pay attention to the analysis of the data that is presented and the citations listed on the sources they use, and to question correlation vs. causation, focusing on sources that are science-based.

PROCEDURES DAY TWO

1. Before the start of the class, write the following quote on the chalkboard, white board, or chart paper:

   "What if, when trying to do the right thing, we got it wrong?"

2. Allow 5-10 minutes for the class to free write using this quote as a prompt. Encourage students to think of a time when they, someone they know, or society at large acted with the best intentions, but because they did not analyze all the information available, ended up getting it wrong—and how this affected everyone involved.

3. After a period of silent writing, ask for volunteers to share what they wrote. Encourage cross discussion among the students using the following questions as a guide:

   - What decision did you write about?
   - What were the good intentions of the person or people who made the decision?
   - How did the decision maker interpret information inaccurately?
   - Why was this decision the wrong one?
   - What were the immediate and/or long-term consequences of this decision?
   - Once it was clear that the wrong choice was made, how could the decision be reversed or the situation be rectified?

4. Distribute Student Handout: Viewing Log (page 47). Explain that this will be used to take notes as they watch the film on what they see. Instruct students to use the space carefully as the logs will be used for much of the film.

5. Screen the first segment of FOOD EVOLUTION, from the beginning of the film to timecode 12:19.

NOTE:
In this segment, viewers are introduced to the main questions raised in the film, to the topic of GMOs, and to the county council meeting where the issue of legalizing GMOs on the Big Island of Hawaii was debated.

PROCEDURES DAY TWO [CONT.]

6. Conduct a whole group discussion using some or all of the following questions as a guide:

- What are some of the main issues that are creating food sustainability problems for the future?
- What are some of the main issues that are creating confusion around food sustainability and agricultural technology?
- At the beginning of the segment, why does it appear that Margaret Wille wants to ban GMOs on her island? Why are the filmmakers questioning her motives by the end of the segment?
- Who is Jeffrey Smith, and what makes him an expert on agricultural technology?
- Are GMOs, as one protester said, "a thoughtless invasive species"? Why or why not?
- One protester called proponents of GMOs "mad scientists." Why did he say that?
- Why does Jeffrey Smith claim that eating GMO papayas could make people sick? What is Michael Shintaku's response to Smith's claims?
- One speaker says, "The face of this issue is not the papaya. The face of this issue is these huge, multinational companies." Why is this significant?
- Charles Benbrook claims that the main health issue with GMOs is that they increase the use of pesticides. Why would GMOs generate more pesticide use?
- Brenda Ford states, "There is no middle ground. You're either going to be GMO allowing, or you're going to be organic. They cannot coexist." Do you agree or disagree with this statement? Could there be a middle ground? Did Hawaii County end up finding a middle ground in the end?
- Vandana Shiva claims that GMOs are an "extension of pesticides, not a substitute or an alternative to them." Why would she say this?
- What is the common thing that all the scientists in this segment are saying?
- What do you notice about the qualifications of each person featured in this segment? What about their qualifications would indicate that they are (or are not) experts in the field of biotechnology or agricultural science?
- Stephanie Seneff shows a chart that illustrates a correlation between the use of pesticides and the incidence of autism. What do you know about data sets that CORRELATE? And what does this chart have to do with GMOs?
- Discuss the correlation between genetic engineering and breeding, or artificial selection.
- What are some examples offered of genetically engineered products, and what problems do they solve?

PROCEDURES DAY TWO [CONT.]

7. For homework, students should write an expository essay about the relationship between science, fake news, and alternative facts in modern culture that either supports or refutes the Mark Twain quote from the beginning of the film: "It is easier to fool people than to convince them they have been fooled."

NOTE:

Remind students to bring their Viewing Logs to their next class meeting, as their notes will be used for classwork and the Log will continue to be utilized as they resume viewing the film.

PROCEDURES DAY THREE

1. Divide the class into 5 groups. Assign each group one of the following themes:

   Group 1 – Climate Change & GMO
   Group 2 – Corporate Distrust & GMO
   Group 3 – Alternative Facts/Fake News & GMO
   Group 4 – Science and Technology & GMO
   Group 5 – World Health & GMO

2. Draw the following graph on the chalkboard, white board, or on chart paper:

3. Tell the class that they'll be working in small groups to go through their Viewing Logs from yesterday and arranging the notes they took on their particular theme on this graph. One side of the graph represents one extreme of an argument or outcome, for example, "completely safe," "completely corrupt," or "completely false." The other side is the opposite, such as "completely toxic," "completely ethical," or "completely true."

4. Allow 10-15 minutes for students to work in small groups, first identifying which extreme position they're charting and then placing their notes from yesterday's viewing on this continuum. Encourage students to look for notes that fall in the center of the graph, in that "grey zone."

5. Reconvene as a class so each small group can report back to the larger group. Conduct a short debrief on the activity using some or all of the following questions as a guide:

   - Approximately what percentage of your groups' notes fell into one extreme or the other?
   - How much of your groups' notes were in the "grey zone"?
   - As you hear from the other groups, how much of their notes seem to be in conflict with yours? What are we noticing about each of your group's notes and how your information relates to one another's?

PROCEDURES DAY THREE [CONT.]

6. Tell students to turn their attention to the screen, as they will be watching the next segment of FOOD EVOLUTION. Instruct them to continue taking notes on their Viewing Logs.

7. Screen the next 12 or so minutes of the film, stopping at timecode 24:18, just before the narrative shifts from the Hawaiian papaya to banana wilt in Uganda.

> **NOTE:**
> In this segment, viewers learn that the Hawaii County Council grandfathered in the Rainbow papaya, still making all other GMOs illegal. Viewers also learn how the scientists behind the Rainbow papaya used the scientific method to develop a disease–resistant, "vaccinated" papaya, and viewers begin to see the huge divide between scientific consensus and public opinion.

8. After the class views this segment, conduct a large group discussion on what the class just saw. Use some or all of the following questions as a guide:

   - What tensions are shown between protesters and farmers in Hawaii? Why do you think there is this tension?
   - What feeling do you get about Margaret Wille's position in her interview in this segment? Why do you think you're getting this feeling about her position?
   - What might be considered hypocritical about the Hawaii County Council allowing the Rainbow papaya while banning all other GMOs?
   - Why does it undermine the council's fears about GMO safety when they allow the genetically modified Rainbow papaya?
   - What happened to the papaya industry on Hawaii before GE?
   - Where did the idea of the Rainbow papaya come from?
   - How did scientists use the scientific method to develop the Rainbow papaya?
   - How did they distribute the new, disease-resistant papaya seeds to papaya farmers?
   - Why did a vocal opposition develop against GE technology?
   - What do you notice about the tone of the media coverage of GMO technology?
   - What does Andrew Kimbrell claim regarding the dangers of GE agriculture?
   - Why is there such a large gap between public opinion and scientific opinion on the subject of GMO technology?

PROCEDURES DAY THREE [CONT.]

- Michael Pollan talks about the dangers of "fear-mongering." What does he mean by this?
- What is the difference between scientific opinion and scientific consensus? Why is this an important distinction?
- The film points out that scientific consensus shows that GMOs are safe to eat and safe for the environment. Why, then, does the film say we should continue to assess GMOs on a case-by-case basis?
- What is your perspective on Jeffrey Smith based on his depiction in this film?
- How do Michael Shintaku and Dennis Gonsalves analyze the video from the council meeting? Why do they think the council voted the way it did?
- According to Michael Shintaku, what makes the GMO debate so confusing? What do people on both sides of the debate have in common?
- What might be some "real-world consequences" of acting against scientific consensus?
- What examples of information that could fall into the "grey zone" did you notice in this segment?

9. For homework, students should write a one-page expository essay in response to the following essay prompt, which can be written on the chalkboard, white board, or chart paper, or, alternatively, copied and distributed to each student:

ESSAY PROMPT

Allison Van Eenennaam calls GMO technology a "politicized scientific topic." Why do you think she uses this term? What does this term mean to you? What are other "politicized scientific topics"? Why would a scientific topic become politicized, and what impact—both good and bad—might politics have on science? How does the "grey zone" play into the phenomenon of "politicized science"? Do you think there is a place for politics in science? Support your opinion using examples from the film FOOD EVOLUTION.

PROCEDURES DAY FOUR

1. Before class, write the following prompt on the chalkboard, white board, or on chart paper:

   > Brainstorm a list of all the stakeholders—in this country and worldwide—who have a vested interest in agriculture. Next to each stakeholder, list what, exactly, their interests are. Think outside the box to all the people, from consumers to heads of state and everyone in between, who care on some level about the success, cost, quality, and accessibility of the agricultural industry, and list those people alongside details about what you think their interests/concerns would be.

2. If students need an example to get going, suggest, for example, "farmers – they want to make money on their crops so they're concerned with raising healthy, robust plants" or "families – they want safe, abundant food."

3. After 5-10 minutes have elapsed, ask students to stop writing. Ask for volunteers from the class to share one of the entries from the list they wrote.

4. Track student responses on the board or chart paper.

NOTE:
If no one mentions the following stakeholders, make sure you add them to the list on the board and elicit their corresponding likely concerns from the class: farmers, agricultural corporations, scientists, consumers, governments.

5. Once a good amount of responses are tracked on the board, ask the class, "What do ALL of these stakeholders have in common? What is one thing that they ALL want to see happen?" Write these responses on the left-hand side.

6. Then ask the class, "What are some things that only SOME of these stakeholders want? What are some outcomes that would be good for some, but not others?" List those on the right-hand side.

7. Ask the class which of these stakeholders feel the most trustworthy. Ask whose interests they think coincide or overlap most with theirs. Allow the class to discuss and defend their responses in a whole group discussion, encouraging cross-conversation among students.

PROCEDURES DAY FOUR [CONT.]

8. Break the class up into pairs. Distribute Student Handout: Competing Interests (page 48) to every student.

9. Explain that they will be watching the next 20 or so minutes of the film. In it, they will meet many stakeholders in the debate over GE technology and food sustainability and will begin to understand more about what each of these groups is fighting for. As they watch, they should make note of who they are introduced to (by name or occupation), and what their most pressing interests or concerns are, on the bottom of their handout.

10. Screen the next segment of the film, from timecode 24:18 to timecode 43:16.

> **NOTE:**
> In this segment, viewers learn about another agricultural crisis, that of banana wilt in Uganda. They meet both subsistence farmers and commodity crop farmers. Viewers learn about the main GE crops that are manufactured by Monsanto, as well as the Seralini rat study and the Monsanto corporation's history with toxic chemicals, which fuels much of the public fears around GE technology. Viewers learn a bit more about the activists in this space and what their main beliefs and biggest fears are.

11. After the class watches the segment, conduct a whole group debrief, using some or all of the following questions to guide the discussion:

- Why is banana wilt so devastating to the economy and people of Uganda?
- What are some non-GE efforts to fight banana wilt? Are these curative or preventative? What is the difference?
- What is the GE solution to banana wilt that is being explored?
- Why are the Ugandan farmers afraid of GMOs and GE technology?
- What are some of the problems with the Seralini rat study? Why did this study have such a huge impact on public opinion on GMOs?
- Why do you think one study can have such a huge impact? What does that say about people's existing beliefs about the trustworthiness of corporations and governments?
- Is it "easier to sell fear than to sell science"? Explain.
- Why are people so suspicious of corporations? How have corporate greed and bias broken the public's trust?

PROCEDURES DAY FOUR [CONT.]

- Why is Monsanto "one of the most hated companies in the world"?
- What is Bt? Is it toxic? How is Bt used as a pesticide?
- What is Bt corn?
- What are "Roundup Ready" seeds?
- What are the perceived positive attributes of Bt and Roundup Ready GMO seeds? What are the perceived negative attributes of these same seeds? Which of these are backed by scientific consensus? Explain.
- How is Monsanto making money on GE technology?
- How has the use of GMOs INCREASED the amount of pesticides used? How has the use of GMOs DECREASED the toxicity of the pesticides used?
- Why are people against Monsanto—even in the face of contradictory science?
- How has the public conflated their concerns about toxic chemicals, the trustworthiness of Monsanto and other big corporations, and the safety of GMOs? Why is this a mistake?

12. After a short discussion, allow students to work in pairs to complete their handouts, "plotting" each stakeholder on the Venn diagram according to their interests and concerns.

> **NOTE:**
> As an example, a stakeholder who is most concerned with making money, but secondarily with human health, will plot somewhere on the bottom of the blue circle, where it overlaps with the red.

13. Once pairs have finished plotting their diagrams, reconvene as a large group. Allow 10 minutes to discuss this activity, using some or all of the following questions as a guide:

- Who were some of the stakeholders you listed from the segment?
- Do any of the stakeholders have the exact same concerns and interests? Which stakeholders are closest to each other in terms of what their concerns and interests are?
- What do you notice about the plot points on your diagram? Are they clustered together or scattered apart?
- Do you think these three concerns (environment, economy, health) are mutually exclusive? Or is there a real-life overlap among them?
- What does this exercise teach you about the agricultural industry as a whole and about the GE debate specifically?

PROCEDURES DAY FOUR [CONT.]

14. For homework, students should write a one-page opinion paper defending or refuting the following quote as a thesis and supporting their opinion with real-life examples and research.

> **"Everyone is entitled to their opinions and to their emotions but in the end we have to be grounded in the real science, otherwise we are aimless in our decision making—and this is true whether we are talking about vaccines, whether we are talking about climate change, or whether we are talking about GMOs."**
>
> **-Robert Fraley**

PROCEDURES DAY FIVE

1. Write two brands that the class will recognize (such as “Coke” and “Pepsi” or “Burger King” and “McDonald’s”) on opposite sides of the chalkboard, white board, or a piece of chart paper.

2. Ask the class what they think of, what comes to mind, when they see these brands. What colors do they “see” in their mind’s eye? What flavors? What sounds or music do they hear? Is there an experience or memory that comes up when they think of this word? Allow for a quick free-association brainstorm, noting student responses as a word web.

3. Ask the class what they notice about the words that they listed. What sorts of associations, assumptions, and feelings do they attribute and equate to each of the brands? Why do they think this is the case? How has their perception of that particular food, beverage, activity, etc., been shaped by the branding?

4. Now, write the word “NATURAL” on the chalkboard, white board, or on chart paper. Again, ask the class what they think of, what comes to mind, when they see this word. Once again, allow for a broad, free-association brainstorm, noting student responses as a word web.

5. Allow for a brief discussion of how we establish associations, feelings, memories, and assumptions about certain words. Ask the class if there are any other words they can think of, that when they hear them, they have associations with feelings or experiences.

6. Count the class off in 4’s. Assign each number a different word:

   1’s – ECONOMICS
   2’s – EMOTIONS
   3’s – OPTICS
   4’s – NUANCE

   Take a moment to define each term with the class so they have a full working meaning of each word.

7. Instruct students to take out a piece of notebook paper and a pen, and write their word on the top of the page. Explain that they will be viewing the next 20 minutes of the film FOOD EVOLUTION. As they watch, they should take special note of moments, examples, quotes, or scenes in the film that they could relate to their word. Encourage students to be creative in their analysis and explain that while they are watching the whole segment, they’re viewing it through the lens of their theme.

PROCEDURES DAY FIVE [CONT.]

NOTE:

For the purpose of this lesson, students should consider "economics" as money, global division of wealth, and how it relates to communities, nations, companies, and individuals. Students should consider "emotions" as a person's feelings and responses about certain things and experiences, such as guilt, fear, disgust, trust, or confusion. Students should consider "optics" as perception, how things appear to people, what people assume about other people or things. "Nuance" should be considered the grey area between two extremes, where things are not black and white, right or wrong, one thing or the other—where understanding requires higher-level analytical thinking skills and can't be boiled down to a simple yes or no.

8. Screen the next 20-minute segment of FOOD EVOLUTION, stopping at timecode 1:04:30.

9. Divide the class into their small groups so that the 1's are sitting with the 1's, the 2's with the 2's and so on. Give the class 10 minutes to discuss and compare their findings with the other members of their groups.

10. While the groups are convening, write the following question on the chalkboard, white board, or on chart paper:

    How are influences besides science affecting the application of new technology to solve the problem of feeding the world?

11. Reconvene as a large group and pose this question to the group. Based on the segment they just watched, and the conversations they've been having, how are influences besides science affecting the application of GM and other new technology to solve the problem of feeding the world?

12. Distribute Student Handout: Influences and Influencers (page 49) to the class and instruct students to complete it for homework.

PROCEDURES DAY SIX

1. Begin class by taking an inventory of all the themes, stakeholders, and concepts that have been raised over the course of the viewing of FOOD EVOLUTION. List all the words that the class offers on the chalkboard, white board, or chart paper.

2. Once the class has generated a good list, ask the students about the last time they changed their minds. What was their first belief? What happened to get them to rethink or revisit this belief? Who helped them to change their mind? Elicit volunteers from the class to share their stories. After a few volunteers have shared, conduct a short discussion:

   - Is changing your mind a strength or a weakness?
   - If you change your mind on a subject, does that undermine the validity of your opinion?
   - When you hear that a vocal expert or a leader has changed their mind on a high-profile issue, what do you think of that person? Why do you think this?

3. Screen the final 29 minutes of the film.

> **NOTE:**
> In this segment, students will watch a live debate on the pros and cons of GMOs. They'll hear more from the scientists leading the charge in support of GE agriculture, more from the scientists leading the charge against it, see how and why many environmental activists insist on protesting GMOs in spite of what science says about its safety, and how science is starting to win the war of public opinion.

4. As a longer-term culminating homework assignment, students should research and write a five-page paper that answers the question:

   What kind of future will we have if we turn our backs on credible evidence, sound science, and repeatable studies? What impact will that have on our planet, our future, and ourselves?

Encourage students to explore this question in terms of the natural sciences and the scientific method, or in terms of the social sciences and media literacy, or another application of their own.

MEDICAL PRESS ADVISORY

Directions: Read the press release below. Write down any questions and observations that you have. These notes will help inform the discussion to follow.

Newswire
FOR IMMEDIATE RELEASE

MEDICAL PRESS ADVISORY: Sunlight Shown to be Toxic to Humans
Washington, DC

CAUTION! Exposure to sunlight might actually be TOXIC. THE FACTS: In North America, our highest exposure to sunlight is when the days are the longest, during the months of June, July, and August. Also during these months, people throughout the US are at an astonishingly higher risk for dozens of related health issues, including deadly accidents, bacterial and viral infections, persistent and debilitating skin disorders, and certain cancers. Studies show that over 48 million Americans will become sickened this year alone. CONCLUSION: Based on the data, exposure to additional sunlight could be making us SICK! To stay safe, the public should remain indoors as much as possible this season. Analysis: Avoid being outside at all costs to evade getting sick, injured, or DYING this summer from deadly exposure to sunlight.

END

###

THE SCIENTIFIC METHOD

Directions: Complete the chart below. In the column labeled Option #1, fill in answers based on your assumptions about how the authors of the "Medical Press Advisory" came to their conclusions. In the column labeled Option #2, come up with your own, new hypothesis and describe how you'd go about using the scientific method to prove or disprove it.

Scientific Method	Option #1	Option #2
Ask a Question	Why is there an increase in certain ailments during the summer?	Why is there an increase in certain ailments during the summer?
Construct a Hypothesis	Sunlight is toxic.	
Test the Hypothesis with Experiments		
Analyze the Data		
Draw Conclusions		

AN INTRODUCTION TO THE PROBLEM OF FOOD SUSTAINABILITY

Directions: Conduct preliminary research on each of the topics below. Then, write 5-10 sentences for each, explaining how the topic **relates to the future of global food sustainability and the challenge of feeding the planet's population.**

1. Climate change

2. Corporate mistrust: Recent corporate scandals and how they've shaken public trust, the fear of corporate greed vs. the better good

3. The global economy: How increased trade, increased international imports and exports, and international travel have increased our interdependence on food sources and the spread of human, livestock, and agricultural disease

4. Today's culture of information sharing: Increasingly polarized opinion camps, the conversation around "fake news," "alternative facts," and the "post-truth," 24-hour news cycle

5. Technology and science

6. Global population growth

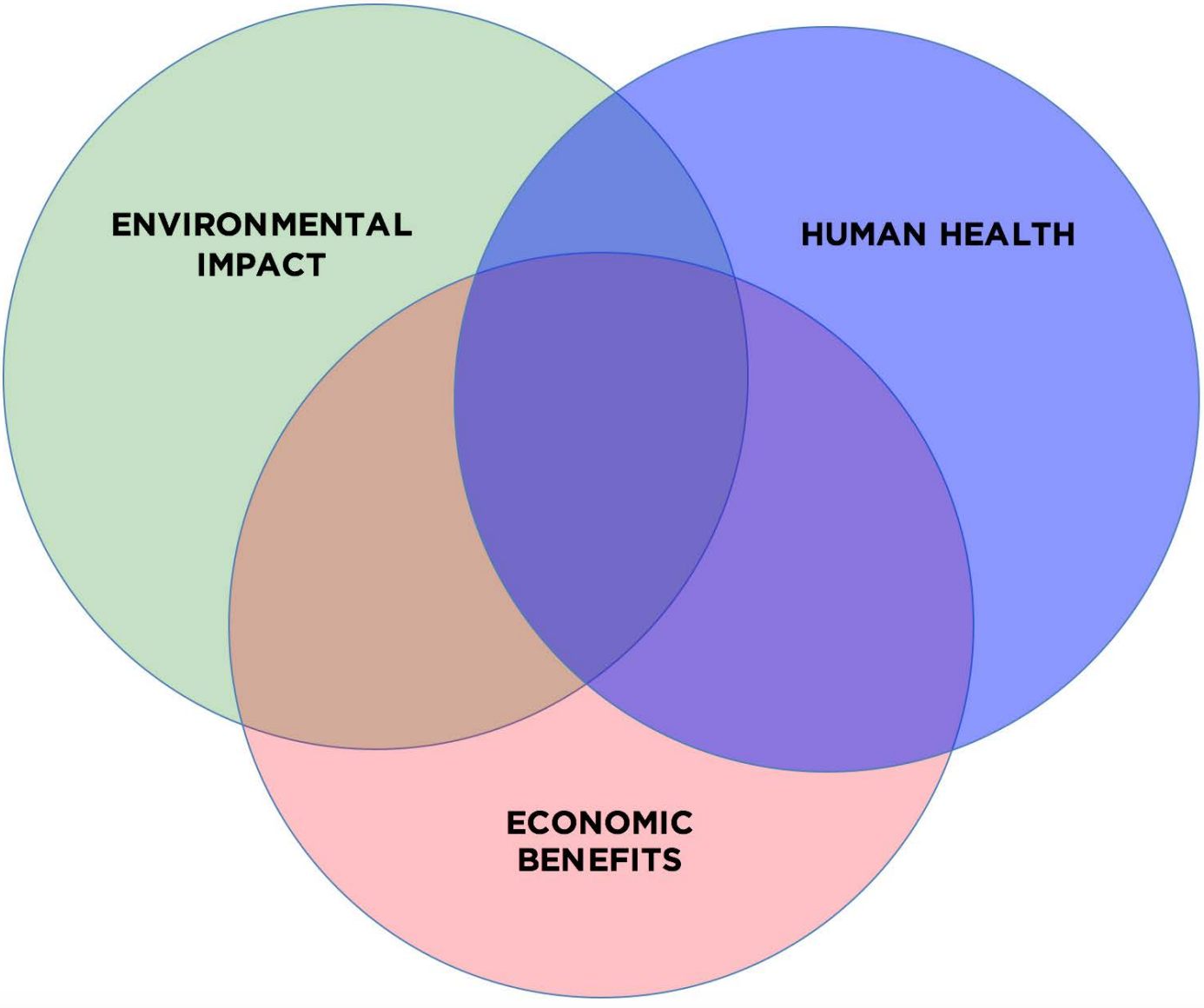
VIEWING LOG

Directions: As you watch FOOD EVOLUTION, use this viewing log to take note of moments in the film that relate to each topic. Be as specific as you can.

CLIMATE CHANGE & GMO	CORPORATE DISTRUST & GMO	"ALTERNATIVE FACTS" & GMO	SCIENCE & TECHNOLOGY & GMO	WORLD HEALTH & GMO

COMPETING INTERESTS

Directions: As you watch FOOD EVOLUTION, make note of the stakeholders you meet. Write them down at the bottom of the page. Then, either in the box or on a separate page, write down examples as they arise of what these stakeholders are focused on, what they are fighting for and against. Then, with your partner or small group, "plot" each stakeholder on the Venn diagram below, according to his or her interests and concerns.



Who are some of the main stakeholders in the debate over agricultural technology that you meet in the film FOOD EVOLUTION? List as many as you can by name or occupation as you watch.

INFLUENCES AND INFLUENCERS

Directions: Based on the film FOOD EVOLUTION as well as the conversations conducted in class, complete this chart, listing how each influence across the top affects each of the stakeholders listed on the left. Then, on the back side of the paper, write 1-2 paragraphs that answer the following question:

How do all of these influences, combined with the actions of all of these stakeholders, affect the adoption and application of cutting-edge agricultural technologies like genetic engineering that, if adopted, could solve the problem of food security?

	ECONOMICS (the haves and have nots; developing nations vs. the US; the cost of organic foods vs. fast foods; personal and corporate profits, etc.)	**EMOTIONS** (fear, guilt, anxiety, worry, shame, love, insecurity, trust, faith)	**OPTICS** (perceptions, confirmation bias, assumptions, associations, affiliation)	**NUANCE** (complicated information, subtlety, partial truths, analytical and critical thinking)
ACTIVISTS				
GOVERNMENTS				
SCIENTISTS				
CONSUMERS (FAMILIES)				
AGRICULTURAL INDUSTRY (CORPORATIONS AND FARMERS)				

QUESTIONS FOR FURTHER DISCUSSION

- Early in the film we see several people say they are against GMOs, but they admit they don't know what GMOs are. How can people be fearful of things when they don't know what they are?
- How might you communicate about scientific topics differently, now that you have seen FOOD EVOLUTION? What will you do if the facts are not enough in your discussions with others about GMOs?
- Mark Lynas, Nathanael Johnson, and Bill Nye changed their opinions about GMOs. In the film, we see even staunch anti-GMO advocates appear to give in when Andrew Kimbrell admits there are some positive applications of GMOs and Margaret Wille permits grandfathering the Rainbow papaya into public policy in Hawaii. Has your opinion about GMOs changed since watching the film?
- The Pew Research Center report shows that 88% of scientists believe GMOs are safe for human consumption, compared to only 37% of the public, creating the largest gap of any politicized scientific topic. What accounts for this large gap? The majority of the public trusts the scientific community on evolution, vaccines, and climate change. Why does the public trust science on some issues and not others?
- A film only has so many topics that it can cover. What are other topics that you wish had been covered in FOOD EVOLUTION?
- Answer Tamar Haspel's question: When was the last time you changed your mind about an issue of substance? What made you do it?
- What are some common myths about GMOs?
- One of the benefits of GE technology is the engineering of crops to be resistant to pests, which translates to putting fewer pesticides into the environment. What are some of the other benefits of GE technology? What are other creative uses of GE technology that might be beneficial to society?
- Vani Hari, the Food Babe, and Zen Honeycutt want food that Mother Nature or God made: they trust it because it is "perfect." Many new trends such as the Paleo Diet or raw water movement seek to return to purely natural foods. What is the definition of "natural food"?
- Nathaniel Johnson says, "Technology doesn't have a moral valence. It's how the technology is used." Is this true? Can or should technology be created outside of moral or ethical considerations?

- Earlier forms of plant breeding prior to GE, including chemical and radiation treatments, can produce unintended consequences such as toxins and allergens. What might be some of the consequences of GE technology? Is there any innovation that has no unintended consequences? Both pro-GMO and anti-GMO sides use facts to support their case. How can we know which side is right? Can there ever be "alternative facts"?

- Mark Lynas says confirmation bias or choosing to believe information that supports your pre-existing beliefs may be necessary for mental health but is also dangerous because it means we do not change our minds even when presented with evidence. Why do so many of us engage in confirmation bias and what does it take to change our minds? If so many people continue to believe studies that are debunked by scientific consensus, what better method is there for disproving false information?

- Jeffrey Smith and Charles Benbrook acknowledge that fear may be a factor in deciding to take a position about GMOs. Do you think the anti-GMO groups and companies are exploiting fear and, if so, why? Is sharing the concerns of feeding the growing global population without GMOs exploitative?

- What are some other ways to address the critical problems of food insecurity, climate change, and environmental sustainability through science? What are some ways to address these problems through social science, such as politics or psychology? It is often said that technology advances faster than human capacity to adjust socially. Are there ways in which a scientific approach conflicts with a social science approach? Can these solutions work together in tandem?

- The film acknowledges that corporate greed has broken the public's trust. Neil deGrasse Tyson says, "The profit motive is a double-edged sword. It can lead to innovation as well as temptation." How can we ensure the protection of public health and the environment are prioritized? What if protection conflicts with profit? How can large corporations win back the public's trust?

- One of the complaints of anti-GMO activists is that Monsanto owns both Roundup Ready seed and pesticide, using the crisis as a solution to create an endless market for itself. Is this a problem or is it an effective way to ensure there is the money needed to explore solutions to problems? Should DNA be patented as intellectual property? What benefits and dangers are there associated with this approach?

- Farmer Motlatsi Musi says, "Americans: Beware. Please be informed. Whenever you say 'no' to GM technology you are suppressing Africa." How do developed world decisions impact developing countries? Why should we be concerned with these effects?

QUESTIONS FOR FURTHER DISCUSSION [CONT.]

- Mark Lynas says, "Science is completely counter to activism." What does he mean by this? Are there any activists who use scientific consensus to support their causes? Or is there a reason for a separation between how activists and scientists see the world? Can scientists be activists?

- As a medical doctor, John Swartzberg advises that we eat fresh produce and whole grains for our health, no matter their origin. How does negative information about GMOs affect low-income people who cannot afford organic produce? In what ways are the pro-GMO and anti-GMO positions a class issue? Whose interests are at stake on the pro-GMO and anti-GMO sides?

- The scientists in the film endeavor to answer the question: How will we guarantee food security for our growing planetary population? How will we feed the world by 2050? Explore some possible technologies—aside from GM technology—that could help solve this challenge—for instance, aquaponics; vertical/indoor/city farming; alternative meat; water conservation; nanotechnology; drone technology; precision farming; microbiome research, and more.

- We saw an example in the film of how we might fight illness with food with "golden rice" preventing blindness in developing nations. What other science or technology could be packed into foods to help treat illness? How could this affect not only developing nations, but countries like the US, UK, and others?

- There is much discussion in the film about healthy food. Is there such a thing as healthy "junk" food? Or "healthy" food that's really junk? Why do some foods have so many calories? So much sugar, salt, or fat? How could we reduce those statistics with science?

- In a world where food security is not a given, do you think non-traditional proteins, such as insects, will become more widely consumed? Why or why not?

- Much is made of "locally sourced" food in the film. What exactly is local food? If you only ate local food, what would your diet consist of? Consider the answer for each season of the year. What would you have to eliminate from your diet in order to eat locally?

- One commonly utilized food technology is that of food replacements: mayonnaise without egg, bread without gluten, etc. Are these "replacement foods" better for the environment? Worse? Will people adopt it/eat them? Why or why not?

ADDITIONAL RESOURCES

American Association for the Advancement of Science
https://www.aaas.org/

American Medical Association
https://www.ama-assn.org/

American Society of Agronomy
https://www.agronomy.org/

Center for Science in the Public Interest
https://cspinet.org/

Crop Science Society of America
https://www.crops.org/

Food Tank
https://foodtank.com/

Genetic Literacy Project
https://geneticliteracyproject.org/

Global Footprint Network
https://www.footprintnetwork.org/

Institute of Food Technologists
https://www.ift.org/

National Academy of Sciences
http://www.nasonline.org/

National Center for Science Education
https://ncse.com/

U.S. Department of Agriculture
https://www.usda.gov/

World Health Organization
http://www.who.int/foodsafety/areas_work/food-technology/faq-genetically-modified-food/en/

ABOUT THE FILMMAKERS

PHOTO: REBECCA SANABRIA

DIRECTOR - PRODUCER - WRITER
SCOTT HAMILTON KENNEDY

Academy Award® nominee Scott Hamilton Kennedy is a writer, director, producer, cameraman, and editor. He has worked with legends like Roger Corman, directed music videos like Jimmy Cliff's international hit "I Can See Clearly Now," and on commercials, motion-capture animation, scripted and reality television. His documentary work includes Oscar-nominated THE GARDEN, about the struggle over the nation's largest community garden; Independent Spirit Award nominee OT: OUR TOWN, about the first play in 25 years at Dominguez High School in Compton; and the critically acclaimed FAME HIGH, which follows four students through a year at a competitive performing arts high school. Scott recently launched Time Capsule Movies, personalized documentaries that can be shared for generations at timecapsulemovies.com. Scott resides in Los Angeles with his wife Catherine Borek, their two daughters Tessa and Eden, and their dog Pepper. For more information, please visit blackvalleyfilms.com.

WRITER - PRODUCER
TRACE SHEEHAN

Trace Sheehan is the founder and CEO of Boomdozer, Inc., and director of development at Leftfield Pictures. Before launching Boomdozer, Sheehan co-founded the sales and production company, Preferred Content, responsible for critically acclaimed documentaries including JIRO DREAMS OF SUSHI and GRACE & MERCY. Sheehan graduated from Duke University with a degree in international business and has postgraduate degrees from the London School of Economics, the University of Cambridge, and the American Academy of Dramatic Arts. He is a member of the PGA and NPACT and is represented by the Kaplan Stahler Agency.

SPONSOR
IFT

The Institute of Food Technologists funded the documentary FOOD EVOLUTION to inspire discussion and show the critical role science and innovation play in building a safe, nutritious, and sustainable food supply for everyone. This film is intended to contribute to a rational conversation about science, facts, and food. The documentary was funded through IFT's financial reserves, derived from revenue generated primarily through membership dues, scientific publishing, events, and advertising, and without contribution from any other organization or company. IFT wanted to fund a documentary dealing broadly with the challenge of feeding an estimated global population of nine billion people in 2050. We approached several high-quality filmmakers, including Scott Hamilton Kennedy. While we funded the film, it represents the vision, full creative control, and final cut that Kennedy and his partner on this project, Trace Sheehan, have maintained throughout the project. We worked with Scott Hamilton Kennedy because he is known for his skill and integrity. We knew he would come at this project from a completely fresh, objective vantage point.

FOOD EVOLUTION focuses on the GMO debate because the director found it to be emblematic of the public misunderstanding about the science of food and food sustainability. We believe Scott's film is thought-provoking, fair-minded, and an important contribution to gaining a better understanding of the critical role sound science plays in the global food system. Unlike a trade association, IFT is a non-profit scientific association comprised of 17,000 scientists from 95 countries representing multiple disciplines, innumerable perspectives, and shared commitment to science. We are committed to a world where science and innovation are universally accepted as essential to a safe, nutritious, and sustainable food supply for everyone. We are proud to have funded this important film and hope that it will encourage informed discussions about sound science.

NARRATOR - SCRIPT CONSULTANT
DR. NEIL DEGRASSE TYSON

Dr. Neil deGrasse Tyson is an astrophysicist with the American Museum of Natural History, where he also serves as director of its world-renowned Hayden Planetarium. Dr. Tyson was the host and narrator for *Cosmos: A Spacetime Odysse*y, a series that appeared in 181 countries in 45 languages and won four Emmy Awards, a Peabody Award, two Critics' Choice Television Awards, as well as a dozen other industry recognitions. He served as host of PBS's NOVA ScienceNOW and the popular radio show and podcast StarTalk, which is the first-ever science-based TV talk show on the National Geographic Channel, where it earned two Emmy nominations. In addition to dozens of professional publications, Dr. Tyson writes for the public. His books include *Astrophysics for People in a Hurry,* which debuted at number one on the *New York Times* bestseller list. He is the recipient of twenty honorary doctorate degrees, the NASA Distinguished Public Service Medal, and was elected a fellow of the American Academy of Arts and Sciences in 2015.

ABOUT IFT

WHAT IS FOOD EVOLUTION ABOUT?

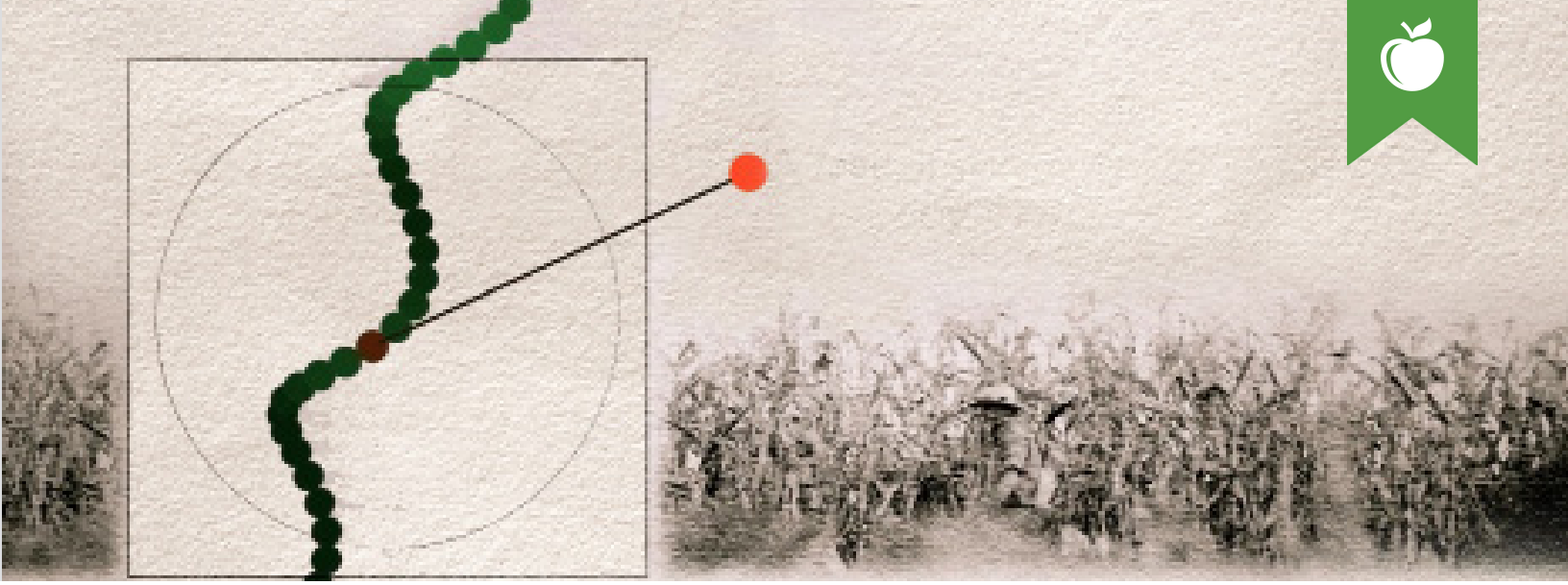
FOOD EVOLUTION looks at one of the most critical questions facing the world today—that of food security—and demonstrates the desperate need for common sense, solid information, and calm logical deliberation. Using the often angry and emotional controversy over genetically modified foods as its entry point, the film shows how easily fear and misinformation can overwhelm objective, evidence-based analysis. FOOD EVOLUTION takes the position that science and scientists hold the key to solving the food crisis. But whose science? In the GMO debate, both sides claim science is on their side. Who's right? How do we figure this out? What does this mean for the larger issues of food security, sustainability, and environmental well-being? FOOD EVOLUTION seeks to answer these critically important questions.

WHY DID IFT DECIDE TO PURSUE THE MAKING OF FOOD EVOLUTION?

The film was part of our endless pursuit of the IFT Vision: A world where science and innovation are universally accepted as essential to a safe, nutritious, and sustainable food supply for everyone. When we launched FutureFood 2050, to celebrate IFT's 75th anniversary, we wanted to tell the multi-dimensional story of science, scientists, facts, and food, and how we're going to feed the nine billion people expected worldwide by 2050. We hired an independent editor and several independent journalists to write the thought-provoking articles for FutureFood 2050. This film was the culmination of these efforts. The same approach was taken—find the best storyteller and documentarian (Scott Hamilton Kennedy) and give him creative control to tell a story that will begin a rational discussion about sound science.

HOW DID IFT SELECT THE DIRECTOR?

We interviewed 5-10 potential directors and selected Scott Hamilton Kennedy, based on his passion for film, his experience, his award nominations, and his vision for this film. It was important this person not be involved with the food industry in any way so they would be able to present an independent viewpoint. Kennedy is an Academy Award® nominated director who has directed THE GARDEN, FAME HIGH, and other films.



HOW WAS IT DETERMINED THAT THE DEBATE OVER GMOS WOULD BE CENTRAL TO THE FILM?

Our original inspiration was a film that would highlight the science of food. This was a broad and open-ended vision, for which the director would interpret and determine the best way to tell a compelling story and inspire thinking about the role of science and innovation in our food supply. Scott Hamilton Kennedy told us he went this direction because he saw GMOs as a proxy for the larger debate over the widespread public misunderstanding of science. The larger issue addressed in the film is how we make decisions about science overall and the consequences of making decisions based on emotions and ideology as opposed to data and scientific evidence.

HOW MUCH DID IFT INFLUENCE THE CONTENT OF THE FILM?

From its very origin, the director has had total creative control, including approval of the final cut. Scott Hamilton Kennedy came into the project as a documentarian who did not have a scientific background and was neither for nor against genetic engineering in food. As an experienced documentarian, Kennedy went where the research and interviews led him and the story unfolded as he learned more about the science of food. While IFT funded the film, the message and conclusions drawn from the film are entirely those of the filmmakers, but we believe the film serves as an opportunity to demonstrate the rational conversation that can be had about the nature of science and food and what that means to feed the world.

DID OUTSIDE COMPANIES PROVIDE FUNDING FOR THE FILM?

No. FutureFood2050 and FOOD EVOLUTION were funded through IFT's financial reserves, derived from revenue generated primarily through membership dues, scientific publishing, events, and advertising, and without contribution from any other organization or company to bring a rational conversation about sound science in our global food system to a larger audience.

If you're interested in a corporate or community screening, fill out the Screening Application form or contact Matthew Chandler, Campaign Director, at matt@foodevolutionmovie.com. Our community screenings team will get back to you with all the information you'll need to license the film and host your own event.

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enlightening audiences everywhere

Big Picture is a leader in the fields of film education and media literacy, specializing in resource development and educational outreach for film and media projects of all kinds. We leverage film as a powerful educational tool to enlighten audiences, spark engagement, inspire social change, and cultivate new generations of filmgoers and filmmakers. For more infomation visit www.bigpictureeducational.com or contact info@bigpictureeducational.com.

FOOD EVOLUTION IS AVAILABLE FOR HOME VIEWING ON THESE PLATFORMS:

amazon video

Available on iTunes

hulu

YouTube

GET IT ON Google Play

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