

## ENTOMOPHAGY OUTLINE

- I. What is it (SLIDE 2)
- II. Brief History of Entomophagy (SLIDE 3)
  - a. In the Middle East, as far back as the 8th century BC, servants were thought to have carried locusts arranged on sticks to royal banquets in the palace of Asurbanipal (Ninivé).
  - b. The first reference to entomophagy in Europe was in Greece (SLIDE 4), where eating cicadas was considered a delicacy.

Literature from ancient China also cites the practice of entomophagy. Li Shizhen's *Compendium of Materia Medica*, one of the largest and most comprehensive books on Chinese medicine during the Ming Dynasty in China (1368–1644), displays an impressive record of all foods, including a large number of insects. The compendium also highlights the medicinal benefits of the insects.

- c. The practice of eating insects (SLIDE 5) is cited throughout religious literature in the Christian, Jewish and Islamic faiths.
- d. The Bible speaks of locusts as food in the book of Leviticus, most probably in reference to the desert locust, *Schistocerca gregaria*.

(SLIDE 6) Yet these may ye eat of every flying creeping thing that goeth upon all four, which have legs above their feet, to leap withal upon the earth (Leviticus 11: 21)

Even these of them ye may eat; the locust after his kind, and the bald locust after his kind, and the beetle after his kind, and the grasshopper after his kind (Leviticus 11: 22)

- e. (SLIDE 7) There are 8 species of flying insects permitted to be eaten in the Torah ... 2 grasshoppers, 2 crickets, and 4 locust. Westernization has caused Jews who previously ate locusts to reverse their habits.
- f. There are several references in Islamic (SLIDE 8) tradition to insect eating – including locusts, bees, ants, lice and termites (El-Mallakh and El-Mallakh, 1994). The large majority of references are to locusts, specifically mentioning permission to consume the creatures:

It is permissible to eat locusts (Sahih Muslim, 21.4801)

Locusts are game of the sea; you may eat them (Sunaan ibn Majah, 4.3222)

Locusts are Allah's troops, you may eat them (Sunaan ibn Majah, 4.3219, 3220)

- g. (SLIDE 9) Leading American entomologist Charles Valentine Riley, appointed in 1868 as the first State Entomologist for the state of Missouri, studied the plague of Rocky Mountain locusts that invaded many western states between 1873 and 1877.

(SLIDE 10) One famed sighting estimated that the locusts spanned 198, 000 square miles. This swarm weighed an estimated 27.5 million tons and consisted of some 12.5

trillion insects, which according to *The Guinness Book of Records* was the greatest concentration of animals ever recorded.

He advocated controlling the locusts by simply eating them!!

- h. British entomologist Vincent M. Holt (SLIDE 11) arguably had the most clout in bringing insects to a larger audience through his small booklet published in 1885 titled *Why Not Eat Insects?* How can the farmer most successfully battle with the insect devourers of his crops? I suggest that these insect devourers should be collected by the poor as food. Why not? Holt was clearly ahead of his time and entomophagy was never widely adopted into English food culture.
- i. (SLIDE 12) The Beauty of the Great Smoky Mountains
- j. Analysis of coprolites (SLIDE 13) found in the Ozark Mountains showed the remnants of ants, beetle larvae, ticks, and mites present. I'll break that down for you...scientists sorted through fossilized ( ) human poop and found leftover bits of insects inside. Yup. Cool huh?
- k. (SLIDE 14) Today, most cultures around the globe feast on insects – except USA, Canada, Europe. ( ) ( ) It's a **cultural taboo**.
- l. (SLIDE 15) Nearly 3,000 ethnic groups – 2 BILLION people that currently practice entomophagy around the world.

m. (SLIDE 16) > 2000 species of edible insects. Topping the list of edibles is the beetle, with 344 varieties to choose from for dinner. Ants, bees and wasps are close behind with 314. Butterflies, moths, grasshoppers and crickets are the other heavy hitters.

n. What's the most common? (SLIDE 17)

o. (SLIDE 18) One common rule of thumb you can follow is:  
Red, ( ) orange ( ) or yellow ( ), forget this fellow.  
Black, ( ) green ( ) or brown ( ), wolf it down.

III. (SLIDE 19) Current status of Entomophagy

a. You Tube video ( )

b. (SLIDE 20) Eat more insects?? **FAO Executive Summary**

..."Insects as food and feed emerge as an especially relevant issue in the twenty-first century due to the rising cost of animal protein, food and feed insecurity, environmental pressures, population growth and increasing demand for protein among the middle classes. This, alternative solutions to conventional livestock and feed sources urgently need to be found. The consumption of insects, or entomophagy, therefore contributes positively to the environment and to health and livelihoods."

c. (SLIDE 21) Showing up in FSE throughout the USA.

- d. (SLIDE 22) USDA is funding insect farming projects for human food production.
- IV. (SLIDE 23) The big question ... ( ) Why ..... would we want to eat insects?
- a. (SLIDE 24) Cannot feed the growing population ..... ( ) Why?
  - b. (SLIDE 25) **Food scarcity** (darker color = more underfed).
    - ( ) Food is the new oil and land is the new gold!
    - (SLIDE 26) Food prices doubled in last 10 years
    - ( ) Key staples to double again in 20 years
    - (SLIDE 27) New politics of food scarcity
  - c. (SLIDE 28) **Land availability** (33% increase in population by 2050 requires 100% increase in global food production).
  - d. (SLIDE 29) Land use. Biofuels vs. food

Nearly 60% of global land deals in the last decade have been to grow crops that can be used for biofuels.
  - e. (SLIDE 30) **Cultural issues**

Western culture = disgust, primitive behavior. Disgust is one of our most basic emotions – the only one that we have to learn – and nothing triggers it more reliably than the strange food of others. (Herz, 2012)

- a. (SLIDE 31) Western culture is synonymous with nuisance. In short, the acceptance or rejection of entomophagy is a question of culture.

Native Americans, such as those who lived freely in what today is called the state of Utah, were very accustomed to eating grasshoppers, locusts and crickets.

On their first tasting of shrimp, the Goshute Indians are reported to have named the creatures “sea crickets”.

- f. (SLIDE 32) **Nutrition**

- a. 100 grams of crickets contains 122 calories. Only 49.5 calories come from fat. Where you really see the nutritional value is in the 12.9 grams of protein. They also have about 5 grams of carbohydrates. Crickets also contain a lot of calcium.

- i. Production / Resources

- g. (SLIDE 33) In addition .... People are becoming more **health conscious??**

- V. (SLIDE 34) **Producers**

- a. Several big producers    
    - 1. Dairy free, soy free, gluten free, paleo free, all natural, high protein
  - b. DIY also!!!!
- VI. **(SLIDE 35) Products**
- a. **(SLIDE 36)** Market is growing fast. Doubling almost every 2 years.
- VII. **(SLIDE 37) Are they safe to eat?**  Good question!!
- a. **(SLIDE 38)** Zoonotic diseases
  - b. **(SLIDE 39)** Hazards
- VIII. **(SLIDE 40) How do you know?**
- a. No comprehensive regulations
  - b. Challenges facing regulators
- IX. **(SLIDE 41) Challenges in regulating entomophagy facilities**
- a.  Approved source
  - b.  Understanding the process
  - c.  Understanding the hazards
  - d.  Training staff

- e. ( ) No specific regulations
- f. ( ) Establishing jurisdiction

X. (SLIDE 42) Regulation

- a. Codex Alimentarius Standard 152-1985
- b. (SLIDE 43) Addresses in 20 states .... 6 regulation for crickets;  
2 previously regulated; 9 inquiries; 2 current retail  
regulations
  - Main insect is crickets
  - GMP used
  - GMP not process or product specific
- c. (SLIDE 44) Preventive Controls for Human Food (PCHF)
  - i. Relies on industry for ID of hazards
  - ii. Relies in industry to verify / validate hazard controls
- d. (SLIDE 45) FD&C Act
- e. (SLIDE 46) Insect protein supplements
- f. (SLIDE 47) No guidance yet from FDA... but developing  
guidance documents



- XI. **(SLIDE 48) Until then ....**
  - a. GMP / Modified GMP
  - b. OR .....??

**(SLIDE 49) Bon Appetite'**

**(SLIDE 50) Contact information**

END