Edible insects – insects as food

Insects are a major source of food in many parts of the world: Asia, Africa, Australia, Latin America, and others.

Some data on insect consumption

- Approximately 500 species of insects are eaten around the world
- Over 200 species are eaten in Mexico alone

Some data on insect consumption

- Insects as a proportion of total protein intake:
  - Zaire: 10% overall but ranges from 22-64% depending on what region of the country
  - Columbia: 12-26% in the peak months (May – June). Insects are also a major source of fat (20%).
Edible insects (some examples):

**South Africa**: Mopane worms (*Imbrasia belina*)
**Mexico**: Chapulines (*Sphenarium* grasshoppers)
**Mexico**: maguey worm (*Xylentes redtenbachi*)
**Mexico**: escamoles (*Liometopum* ants)
**Angola**: termites (*Macrotermes subhyalinus*)
**Angola**: olumbalala (*Imbrasia eritii*)
**Africa**: palm weevil (*Rhynchophorus phoenicis*)
**Australia**: witchety grub (*Hepialidae*)

Australians love witchety grubs, the larva of a large moth known as the Bogong Moth (*Agrotis infusa*). Witchety grubs are a delicacy in Australia (the larvae are collected on acacia bushes).
Thailand
Insects on sale in the market

Insect orders consumed in Thailand

- Odonata (damselflies and dragonflies)
- Orthoptera (crickets, grasshoppers, katydids)
- Mantodea (mantises)
-Isoptera (termites)
- Hemiptera (water bugs, cicadas, backswimmers)
- Coleoptera (weevils, wood-boring beetles, diving beetles, etc.)
- Hymenoptera (bees, ants, wasps)

Some Thai recipes involving bees

- Fried queen bee larvae with fresh green peppercorns
- Queen bee larvae omelette
- Steamed bee brood in chili sauce
- Scrambled bee brood

From Chen et al. 1998

Japan

- hachi-no-ko - boiled wasp larvae
- zaza-mushi - aquatic insect larvae
- inago - fried rice-field grasshoppers
- senj - fried cicada
- sangi - fried silk moth pupae

Most of these insects are caught wild except for silk moth pupae. They are by-products of the silk industry. Silk moths are raised in mass for their ability to produce silk. The larvae, the young silk moths produce the silk. Once they pupate, they can no longer produce silk and are then used as food.

Africa:
- Angola
- Uganda
- Botswana
- Algeria
- South Africa
- Zambia
- Zimbabwe
- Mozambique
Algeria

Desert locusts were collected in large numbers:

“To prepare them, they are first cooked in salt water, then dried in the sun. The natives collect and prepare such considerable stocks that apart from their own needs, they have some for trading in the markets…. I have in my hands now two boxes of freshly prepared locusts and I convinced myself that they are quite an acceptable food. The taste of shrimps is very pronounced, with time they lose their quality.”

The consumption of desert locusts in Algeria

from DeFoliart 1989 (p. 22)

Africa

Palm weevils can be four inches long and more than two inches wide. The mature larvae are fleshy and grublike with a high fat content. These insects are collected from the trunks of palm trees. They are fried in a pot or frying pan and they are reported to be very delicious.

Africa – southern Africa

Method of preparation: caterpillars are de-gutted, then boiled, lightly salted and dried in the sun. They contain 50% protein when dried and are an important protein source in southern Africa. Harvests occur three times per year. 1600 metric tons harvested per year in South Africa alone!
Insect orders consumed by Yukpa people (Venezuela/Colombia border)

- Orthoptera (crickets, katydids)
- Lepidoptera (noctuid moths are popular)
- Coleoptera (weevils, wood-boring beetles, etc.)
- Neuroptera (dobson flies)
- Diptera (flies)
- Hymenoptera (stingless bees, ants, paper wasps)

From K. Ruddle 1973

The Yukpa (Venezuela/Colombia border)

- Paper wasps are collected and the larvae steamed or fried

Edible insects in Peru

- Peru: coconut palm grubs in the Amazon
I have eaten both cooked and raw coconut palm grubs (called suri by the local people in the Peruvian Amazon). Cooked on skewers, they taste kind of like BBQ pork - raw, like cheese curds (but don’t eat the chitinous jaws!).

From Rick Gillis (University of Wisconsin)

Edible insects in Mexico

The maguey worm is a delicacy in Mexico – this is the worm in tequila. Why?

Mexico: maguey worm (Xylentes rodtentbachi)

Edible insects in Mexico

Mexico: Chapulines (Sphenarium grasshoppers)
[Red color comes from chilis]

Edible insects in Mexico

Mexico: Escamoles (Liometopum ants, harvested from the roots of agaves)

“Mexican caviar”

Show video – insect cuisine in Mexico
From: Insectia by George Brossard
Insects a la Carte (8 mins)

https://www.youtube.com/watch?v=VvJODSm0GYM
Native Americans

"We followed them on horseback and I noticed that there were but very few crickets left behind. As they went down, the line of crickets grew thicker and thicker till the ground ahead of the drivers [men, women and children] was black as coal with the excited, tumbling mass of crickets."

"I went down below the trenches and I venture to say there were not one out of a thousand crickets that passed those trenches."

Maj. Howard Egan, 1850

Mormon cricket: Anabrus simplex (Tettigoniidae)

Nutritional value of some insects compared to chicken (per 100g)

<table>
<thead>
<tr>
<th></th>
<th>Emporor moth</th>
<th>Palm weevil</th>
<th>Chicken</th>
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<tbody>
<tr>
<td>Energy (kcal)</td>
<td>370.5</td>
<td>561</td>
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<tr>
<td>Protein (g)</td>
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<td>Lipid (g)</td>
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<td>Iron (mg)</td>
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<td>Thiamine (mg)</td>
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<td>Riboflavin (mg)</td>
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<tr>
<td>Niacin (mg)</td>
<td>5.20</td>
<td>7.78</td>
<td>5.03</td>
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</table>

Nutritional value of insects

Caloric content of insects is very high

- Corn (high energy food): 320 kcal/100g
- *Macrotermes* (termites): 613 kcal/100g
- *Rhynochophorus* (palm weevil): 561 kcal/100g
- *Xylocen TimeSpan* (maguey worm): 516 kcal/100g

You may already be eating insects

Insect parts per 100 grams:

- Chocolate - 80 Insect Fragments
- Canned Citrus Fruit Juice - 5 Fly Eggs or 1 Maggot
- Canned Corn - 2 Insect Larvae
- Frozen Broccoli - 60 Aphids, Thrips, or Mites
- Frozen Brussels Sprouts - 60 Aphids, Thrips, or Mites
- Ground Cinnamon - 800 Insect Fragments
- Macaroni and Other Noodle Products - 100 Insect Fragments
- Mushrooms - 20 Maggots
- Peanut Butter - 60 Insect Fragments
- Tomato Sauce and Pizza Sauce - 30 Fly eggs or 2 Maggots
- Wheat Flour - 150 Insect Fragments

You may already be eating insects

This label was originally designed to hide insect bodies from consumers

Why don't we eat insects?

Insects are closely related to Crustacea (crabs, shrimp, etc.)
If you want to get started...

Man Eating Bugs by Peter Menzel & Faith D'Aluisio
Eat-A-Bug Cookbook by David George Gordon
Creepy Crawly Cuisine by Julieta Ramos-Elorduy, Ph.D.
Entertaining with Insects by Ronald L. Taylor

Widely available insects for home cooking:

1. Honey bee larvae – excellent sautéed in butter or deep fat fried. Taste like walnuts, sunflower seeds or rice crispies.
2. Crickets (Acheta) – some recipes: tempura cricket with vegetables, cricket seaweed salad, cricket pot pie, chirping stuffed avocados, etc.
3. Wax moth larvae (Galeria) – thin-skinned, tender and succulent; best when fried in hot vegetable oil (taste like potato chips or corn puffs).

If you want to get started...

http://www2.ville.montreal.qc.ca/insectarium/