

Man Eating Bugs: An Old Taste for New Times

Nigel Hayes

ABSTRACT: For most Australians the thought of eating insects evokes either revulsion or curiosity. More broadly, the food choices of people can be seen to reflect their different cultures and the different cultural rules governing, amongst other things, what is defined as good or bad to eat, how it is cooked, prepared, served and eaten. As Australians become increasingly aware of other cultures, they come into contact with food-choice examples which differ widely from their traditional preferences—and more flexibility in their own choices can be seen. Insect-eating is presented from several perspectives—evolution, historical, cultural, environmental and economic.

Most Australians have a love/hate relationship with insects; simply put, we love butterflies and bees but hate mosquitoes and cockroaches. How to recognize which insects are suitable for food, how to find and catch them, how to prepare and cook them, how and for what purpose to eat them are aspects of a relationship to nature that is almost totally 'foreign' to Australians. Of course, some Indigenous Australians continue to eat their traditional foods and for many of them that would include collecting and consuming insects of one species or another.

For most Australians however, the thought of eating insects (or entomophagy) evokes either revulsion or curiosity. Insects are not usually considered as food; 'we' don't eat them. Our 'cultured' view of nature is generally to see insects as abnormal or 'other' food items and as a part of nature that should be controlled or eliminated from our environment rather than being consumed and embodied into our selves. Our culture understands the eating of insects as something strange, something that 'other' cultures choose to do and we do not. Of course, while humans are omnivores able to eat almost everything that nature can provide, all cultures and societies make choices about what to eat and what not to eat. Nature might supply different foods in different parts of the world, but people in every region have traditionally picked and chosen among the foods that nature offers. These choices can be seen to reflect their different cultures and the different cultural rules governing, amongst other things, what is defined as good or bad to eat, how it is cooked, prepared, served and eaten. (Seymour, 2004)

That these rules and definitions vary between cultures in often quite dramatic ways is obvious. (Scholliers, 2001) Within Europe, for example, the French eat frogs and snails, turtle soup has become an English specialty, haggis (made of the heart, lungs, and liver of a sheep) a Scottish curiosity, and horse a Polish delicacy. Such culinary differences and preferences are plainly cultural, since snails, frogs, turtles, sheep and horses are found throughout Europe. So, of course, are insects. However, to this day, Europeans eat virtually no insects, yet people in Africa, South America, and Asia consume them in large quantities. That there is no logical reason not to eat insects and many compelling ones to do so is unimportant to most people from westernized countries like Australia; insects are not on 'our' menu!

One could, of course, point out that we already (knowingly and unknowingly) consume insects in our food. In fact, it is easy to suggest that the maximum permissible levels of insect infestation, filth and damage proscribed by Western health authorities are set as low as they are not because more insects would represent a hazard to human health but that they would be noticed by a public (overly) sensitised against insects in any shape or form. Aphids, for example, are almost certainly present on the leaves of most lettuce consumed in Australia, but in numbers too small to be obvious or perceptible to taste. Most people from the urban West take insects to be such an immediate danger to their hygienic living space or perceive them as such a threat to food security and human health that the sight of them in or around their food is often off-putting or nauseating, and always a cause for concern and action.

That some insects are dirty and dangerous is not in question. What is questionable, however, is whether many Australians truly appreciate insects and how dependent we are on them for (much of) our welfare. Most people in technologically advanced societies such as our own would probably be unaware that the vast majority of insects are ecologically, economically and socially beneficial and that without them we would struggle to survive. Ecological benefits offered by insects include pollination and biomass recycling. If there were no insects to pollinate them, there would be no flowers, fruits, nor vegetables. If there were no insects for them to feed upon there would be no fish in the creeks. If there were no insects to hasten decomposition our forests and fields and cities would be filled with dung and animal carcasses and organic (and other) waste and rubbish. Without insect scavengers the world would soon become covered by meters of organic waste and detritus. (Taylor, 1975)

It is easy to see that the ecological 'offerings' of insects also have vast economic ramifications, and that these go far beyond the considerable, and more directly quantifiable, economic benefits of bee-keeping (apiculture) and silk production (sericulture). Insects also provide social

benefits in medicine, religion, art, handicrafts and human and animal nutrition. Given our dependency on insects to provide these benefits, it seems strange that we hold them in such disdain and have often sought to eliminate them from their habitat. Other cultures have, of course, developed different cultural attitudes, traditions and beliefs about insects which are linked not only to the environment and the availability of food but also to historic, geographic, economic, religious, psychological and pragmatic factors. (Ramos-Elorduy, 2009)

Some cultures attribute strength, vigour, prosperity, abundance and spirituality to various insect species. The scarab beetle, for example, gained sacred status in ancient Egypt as did the *jumil* which, in Mexico, were considered to introduce internally the souls of the ancestors and their qualities when eaten. Aztec kings had 'caviar' composed of the eggs of several species of aquatic Hemiptera specially prepared for ritual feasting. Hindus believe that the bee is the only animal that can communicate with God, the Chinese placed a cicada in the mouths of the dead and in Africa insects were fashioned in gold to denote their economic and alimentary importance. (De Foliart, 1999, Ramos-Elorduy, 2009)

At the time of the arrival of the First Fleet the traditional owners of Australia had developed an economic lifestyle based on hunting and gathering and a technology, mythology and culture that was finely tuned to the environment. They used insects from their surroundings extensively for food, medicine, and as part of their cultural beliefs. Numerous fables and myths about insects exist and many insects and their products were used in Aboriginal art. The importance of insects to Indigenous Australian cultures can be still seen in contemporary depictions of insects in the artworks that tourists buy and admire despite almost no understanding of the rich and varied relationships of Aborigines with insects. (Cherry, 1993)

The differences that exist between western and other cultural beliefs suggests that people's knowledge of, and relationships to, insects varies in quality and quantity depending, amongst other things, on their interest in the subject, their environment and the (perceived) relevance of insects to their lives. It is certainly true that many people separated from the natural world conceive of insects as insignificant (and/or disgusting) creatures that go largely unnoticed unless they cause problems such as a sting, a bite or an annoyance. However, while Australians and other people in westernized societies generally 'dislike insects in almost any shape or form, perhaps our greatest prejudice extends to their use as human food.' (Taylor, 1975, p. 16)

Of course, we don't extend this prejudice to all of the animal species without backbones. Many Australians readily eat oysters, scallops, abalone and clams and, to a lesser extent, snails. More pertinently, we

also eat animals such as crabs, prawns, shrimp, and lobsters that are closely related biologically to insects: just place a locust next to a lobster and note the similarities! While it is true that, for a variety of reasons, not all of these animals are eaten by every Australian, in general they are readily available and widely eaten, usually with much enthusiasm and pleasure. That we eat the lobster and not the locust would seem absurd to many people from societies who practise entomophagy. That some Australians might think the eating of insects to be “strange” or disgusting dietary habit is, patently, just as absurd.

While there is nothing inherently wrong in preferring a diet of ‘meat and potatoes’ it is both troubling and historically problematic that we might regard such a diet as somehow superior to the diets of other people. It is probably important here to note the role that food plays in the representation and identity of a person. The relationship between food and identity is a complex one that is caught under its simplest form in the saying, ‘you are what you eat’. Understanding what we don’t eat, and why, is (by extension) equally important if we are to better understand ourselves and our ‘place’ in the world. In this regard the fact that almost all known hunter-gatherer societies, both past and present, consume or consumed various insects as a ‘normal’ part of their diet might be very pertinent.

The association of eating insects to the hunter-gatherer stage of human evolution, and a belief that it ‘belongs’ there, may be major factors in the rejection of entomophagy by western people accustomed as they are to traditional, Enlightenment notions of ‘progress’; we may unconsciously reject the eating of insects as ‘primitive’. (Vane-Wright, 1991) How something could ‘taste’ primitive is unclear. The diets of most traditional hunter-gatherer societies certainly contain many tasty and nutritious foods, insects included, that most modern western people have generally never eaten or thought about eating even when given the opportunity. The recent, somewhat patchy and stilted development of native, or ‘bush tucker’ foods in Australia is a case in point.

Most Australians would be aware that Indigenous Australians ate witchety grubs and honey ants. Many would also have heard of Bogong moths and the feasts and ceremonies associated with their harvest. Less commonly known perhaps, is that Indigenous Australians also ate, amongst other things, bardee and cossid moth larvae, the brood of the stingless bee, earthworms, grubs, scale insects, lerps and mangrove worms. The late 1980’s saw an increasing interest in these and other types of native foods with bookstores stocking bush tucker texts, television broadcasting bush tucker shows and several ‘up-market’ restaurants (such as Rowntrees on Sydney’s North Shore) placing witchety grubs on the menu. For a time the Australian chain Country

Comfort Inn even made native foods the signature of its restaurants. (DeFoliart, 1999)

Unfortunately, despite Tindale and others describing lightly roasted witchety grub as a gourmet's delight, (DeFoliart, 1999, p. 35) the taste for these and other insects never really took off. It is fair to suggest that the general unpopularity of insects has seen most of them removed from restaurant menus. While many Australians might 'toss a shrimp on the barbie' few would consider doing the same with a grasshopper. Knowing that grasshoppers are called grass-shrimp in many parts of Asia would probably have little effect on most people's opinions and habits. If asked today which native or bush tucker foods they know about or have tried, most Australian's would discuss kangaroo, crocodile, warrigal greens, and lemon myrtle, for example, rather than any of the commonly available edible insects that this continent produces.

Obviously, not all insects are edible, and some which are have strong and unusual tastes. Given the large proportion of Australian insect fauna which evolved consuming the plant chemicals produced by Eucalyptus and Acacia species, it is no surprise that most of the larger grubs consumed in Australia are wood or root feeding species. In fact, there are no records of any large foliage chewing species being consumed in Australia, nor, interestingly, of any Aboriginal use of grasshoppers, locusts or shield shrimps, all of which are eaten in other nations and cultures. (Yen, 2009)

Obviously, the reasons Indigenous Australians preferred to hunt, gather and consume some insect species and not others are complex and culturally significant. However, that Indigenous Australians eat ants but not locusts, for example, is no more surprising, complex or cultural than the fact that 'we' eat lobsters but don't eat ants. Insects of some type or another obviously played a vital part in the diet of Indigenous Australians and most other hunter-gatherer societies. While the rise of agriculture around 10,000 years ago and its subsequent spread certainly influenced and altered human attitudes to insects, it did not stop humans from consuming them. Eating the bugs as a form of insect control is one obvious way that humans took advantage of the insects attracted to farmed land. Most scientists agree that humans have always eaten insects of one species or another and that insects have always played an important part in human nutrition. It seems, from the evidence, that edible insects were taken by most people in most places for most of the time and that this seemingly universal human habit has evolutionary origins.

Hints of these origins can be seen in the insectivory trait that is common amongst all primates. The classification of humans in the order Primates, suborder Anthropeoidea, superfamily Hominoidea, reflects the close evolutionary relationship between humans and apes. While humans

can trace their physical progress through several million years of fossil records, it is enough to simply state here that apes and humans are mammals, that the first mammals evolved about 150 million years ago and that all mammals were once insectivores. Some, like the mole, still are. During the next 100 million years many mammals underwent a single dietary change such as the deer which went from insectivore to herbivore, the cats which went from insectivore to carnivore and the opossum which went from insectivore to omnivore. Around 30,000 million years ago our ancestors left the trees, extended their diets and, eventually, became the first scavengers to use tools. During this period a few mammals such as pigs, for example, made a second dietary change, from herbivore to superomnivore. Bears evolved from carnivore to superomnivore while the apes went from herbivore to supercarnivore. (Watson, 1988, pp. 33-34)

Only one mammal, man, made a third change of diet, from supercarnivore to total omnivore. This sequence begins about 3 million years ago when our ape-man ancestors began to walk erect and to use tools to hunt. The use of fire by Peking man around 500,000 years ago was followed by Neanderthal man's development of more complex food gathering tools and storage techniques. By the time of Cro-Magnon man's more refined tools and technologies about 30,000 years ago the change to a complete diet was achieved. (Watson, 1988, p. 34) Of course, humans are not, as was once thought, alone in their use of tools.

Television documentaries have shown the termite-fishing techniques employed by man's closest relative the chimpanzee and these have helped us understand that insects are food much sought after by our phylogenetic cousins, and that chimps use tools to get food otherwise difficult to come by. These aspects of chimpanzee material culture are seen by many as being significant for understanding early human diet. That 'primitive man and his cousins, the monkeys, have never at any stage shown any aversion to entomorphagy' (Bodenheimer, 1951, p. 5) is significant, suggesting as it does a type of 'innate' and accumulated knowledge about the nutritional value of insects.

While all humans require the same basic nutrients to keep them alive and healthy, human societies have adopted widely different approaches to satisfying the physiological needs for proteins, carbohydrates, vitamins and minerals etc. Analysis of many different insect species has shown them as good sources of proteins, lipids, carbohydrates and certain minerals and vitamins. While the minerals and vitamins present in those insect species studied are recorded as being at significant levels, the levels of proteins and fats are considered to be 'high' in relation to more 'normal' western foodstuffs. (Bodenheimer, 1951, Ramos-Elorduy, 1997, MacEvilly, 2000, Cerritos, 2009, etc.)



Deep-fried insects at a food stall in Bangkok, Thailand. This collection includes beetles, locusts and crickets, scorpions, chrysalis and worms.

Representative samples of (both immature and mature) insects and ‘traditional’ Western food sources (different types of meat, dairy products and some seeds and grains) have been analysed over the years to determine, amongst other things, the percentage of protein and fats they contain. Almost all comparative studies show that the levels of proteins and fats in insects are, generally speaking, higher than in most ‘traditional’ western foods. Analysis of mean values of protein percentages of insects in immature stages, mature stages and those of western sources have been shown to be 36, 38 and 19% respectively while mean values of fats were 31, 22 and 14%. (Cerritos, 2009)

While these statistics highlight the general nutritional advantage of consuming insects, the fact that some orders of insects (Homoptera—aphids [remember that lettuce!] cicadas etc., and Orthoptera - crickets, locusts, grasshoppers etc.) recorded protein values of more than 65% in the adult stage and more than 55% fat in the immature stages (order Lepidoptera—butterflies, moths etc.) should be seen as untapped potential. That the high amounts of proteins that insects can provide have also been shown to be ‘proteins of high quality’, meaning that they contain different types of amino acids in adequate proportions and that these proteins are easily digested by humans and other animals, is also significant. (Cerritos, 2009)

More importantly perhaps, insects are more efficient in transforming plant biomass into animal biomass than conventional western livestock and mini-livestock. This is partially because insects are poikilothermic, or cold-blooded, and thus do not have to spend large amounts of their energy and nutrients in maintaining constant body temperatures. (De Foliart, 1999) When fed a diet of equal quality to the diet used to bring conventional (western) livestock to market condition, house crickets, for example, show a food conversion ration that is twice as efficient as pigs and broiler chicks, four times that of sheep, and six times higher than steers when losses in carcass trim and dressing percentages are counted.

Insects not only have higher conversion efficiencies but they also have high fecundity and the ability to 'recycle 'waste' products and other materials not presently utilised in food pathways. Insects breed and grow well in both small areas and industrial concentrations. Commercial production of insect protein for human and other animal consumption can therefore be seen to (have the potential to) be much more effective and 'cost' fewer resources than other, more traditional forms of animal husbandry. (Capinera, 2004) This is an especially important consideration given that livestock production, including feed-crop production, currently occupies almost 70% of the world's agricultural land (or 30% of the earth's landmass).

There is no argument that the rapid growth in the human population is increasing the demand for food. Nor is there any argument that increasing wealth (of individuals, societies, countries) means higher protein consumption. Historical patterns also suggest that, as wealth increases, a greater proportion of this protein is derived from meat. The increasing demand for animal protein from developing nations is accentuated by an increasing demand for animal protein as pet food in developed countries. The need to develop more sustainable and environmentally friendly food practices, technologies, and tastes is obvious given these facts and our limited energy (fossil fuel) and land resources.

More specifically, there is a need to develop different animals as sources of protein and energy. This is not only so the protein-energy deficiencies experienced in parts of the developing world can be addressed but also to help western societies reduce their environmental 'footprint'. Mass farming insects on the scale of chickens, pigs, sheep and beef would go some way to addressing both these issues. However, if insects are to take a more meaningful (and commercialised) place in the global provision of human nutrients, a fundamental change in western attitudes and taste is required. This 'normalizing' change requires an open mind as much as an open mouth, for insects will continue to be hard-to-swallow while they remain an example of the 'Other'.

Cultural background, familial attitudes and other aspects of personal identity to food can certainly influence responses to new experiences and other textures and tastes. While food is an obvious component of human survival and most humans would eat anything to survive, 'eating anything other than what has been learnt to be edible may be expected to cause fear and uncertainty'. (Cherikoff, 1989, p. 30) This is because all new or unknown food might be considered as able to make you sick or even kill you. The tendency to explore novel foods coupled with a need for change and increased selections, or neophilia, is opposed by neophobia or fear of the unknown and resistance to accept new foods. This 'omnivore's dilemma' is (partially) mitigated by seeing other people eat 'new' foods and by being given other forms of information about such foods that reassure they are safe, tasty and nutritious.

Food contains meanings as well as nutrients, however, and tasting occurs within cultural contexts. Eating traditions and customs accustom people to a specific range of foods and beverages. In the West that range does not include insects, at least not at present. That insects once played an important part in western diet is indisputable. The early Greeks and Romans certainly ate insects. Aristophanes, a foremost Greek poet of the 4th century BC wrote about the 'four-winged' fowl for sale in the markets. According to Bodenheimer (1951, p. 39) these four-winged fowl were grasshoppers which apparently were cheap and consumed by the poorer classes.

While the poorer Greeks ate locusts or grasshoppers the upper-classes preferred cicadas. Aristotle (3rd century BC) (cited in Holt, 1885, p. 38) wrote that the most polished of the Greeks considered cicada nymphs the greatest of delicacies. Pliny the Elder (as cited in Burr, 1939, p. 213) recorded that Roman epicures of his day (1st Century AD) highly esteemed the *Cossus* grub or larva of a large beetle that lived in the branches of elm (and other) trees. Cowan (1865, p. 27) says that the epicures 'who looked upon these *coffi* as delicacies' fattened them on meal, flour and wine before bringing them to the table.

The Bible also mentions the eating of insects. While the dietary laws in the Old Testament book of Leviticus lists pigs, rabbits, pelicans and weasels as foods forbidden to eat it also states that flying, creeping things' (i.e. insects) are 'unclean' and forbidden. But a single verse makes this exception; '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'. These are pretty large alimentary loopholes that suggest the lawmakers were responding to a real if unrecorded demand.

Unfortunately, most of the records we have of the Middle Ages relate primarily to the wealthy and religious classes who were able to read and to write and to record those things that were important to them. Because

of this, it is hard to work out exactly what the mass of 'ordinary' people ate during these times, but it is almost certain that many (if not most) Europeans supplemented their diet with at least some of the edible insects that shared the landscape. Aldrovandi certainly mentions (in 1602) not only the consumption of grasshoppers and cicada but also the eating of bees and ants and the eating of fried silkworms with 'obvious delight' by German soldiers in Italy. (Bodenheimer, 1951, p. 42) Enough historical fragments of this type exist to support the assertion that there is a fairly strong tradition of entomophagy in the West.

That we no longer eat insects simply suggests that tastes are subject to the pressures of cultural change brought about by new ways of thinking, environmental shifts, technological evolution, colonization, migration, affluence etc. What people eat today is not what people ate in the past, and this is especially true in the more materially and technologically developed societies of western heritage. The rise of modern, industrial societies over the past 300 years has increased personal choice while narrowing the overall diversity of human food supplies. There is no doubt that the Agrarian revolution brought about huge increases in global food production.

Advances in agricultural technologies have continued to bring more plentiful, cheaper and hygienic food to the mass of the population in industrial societies. However, while the range and level of affordable nutrition has improved millions of people still have little or no control over their eating habits. Obesity is a major problem in developed societies while over a billion people daily suffer from malnutrition in less affluent parts of the world. In societies increasingly characterised by 'mass affluence' and cheap, abundant food, poor diet is a persistent problem as is the growth of modern food psychosis such as bulimia, anorexia and chronic obesity. Concerns about the 'healthiness' of industrial foods and the effects of their production, processing and distribution can also be seen to be increasing. In some poorer or 'less developed' societies/countries, globalization has exacerbated the social injustices of food production with many areas that once produced traditional food supplies being turned to the growing of cash crops for export rather than feeding the locals.

While human consumption and mass production of insects in and by the industrial west will not totally alleviate these concerns, problems and inequities, they might mitigate them to some degree. Research into, and conversations about, the different attitudes informing the use of edible insects in traditional societies and the reluctance to use them in the west is vitally important. In a small but not insignificant way, the incorporation of insects into 'normal' Australian diets might not only address the issues raised above, but also signal the development in this country of a more holistic and sustainable relationship to natural world.

We all 'hate' insects when they bite us. Learning to 'love' them might be as simple as us taking the first bite.

*

*

Bibliography

- Bodenheimer, F., *Insects as Human Food: A Chapter of the Ecology of Man*. (The Hague: Dr. W. Junk, Publishers, 1951).
- Burr, M., *The Insect Legion* (London: James Nisbett & Co, 1939).
- Capinera, J., *Encyclopedia of Entomology* (London: Kluwer Academic Publishing, 2004).
- Cherikoff, V., *The Bushfood Handbook: How to gather, grow, process & cook Australian wild foods* (Boronia Park, NSW: Bush Tucker Supply Australia, 1989).
- Cerritos, R., 'Insects as Food: An Ecological, Social and Economical Approach', *CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources*, 4.27 (2009).
- Cherry, D., 'Australian Aborigines', *American Entomologist*, 32 (1993), 8-13.
- Cowan, F., *Curious Facts in the History of Insects; Including Spiders and Scorpions* (Philadelphia, PA: Lippincott, 1865).
- De Foliart, G., 'Insects as Food: Why the Western Attitude is Important', *Entomology, Annual Review*, 44 (1999), 21-50.
- De Foliart, G., *The Human use of Insects as Food Resource: A Bibliographic Account in Progress* (Online book. Available from <www.food-insects.com> 2002).
- Holt, V., *Why Not Eat Insects*. (Online book. Available from <www.foodreference.com/html/artinsects0.html> 1885).
- MacEvilly, C., 'Bugs in the System', *Nutritional Bulletin*, 25 (2000), 267-268.
- Morris, B., 'Insects as Food Amongst Hunter-Gatherers', *Anthropology Today* 24 (2008), 6-8.
- Pilcher, J., *Food in World History* (New York and London: Routledge, 2006).
- Ramos-Elorduy, J., 'Anthropo-entomophagy: Cultures, Evolution and Sustainability', *Entomological Research*, 39 (2009), 271-288.
- Scholliers, P., *Food, Drink and Identity* (Oxford: Berg, 2001).
- Seymour, D., 'The Social Construction of Taste', in *Culinary Taste: Consumer Behaviour in the International Restaurant Sector*, ed. by D. Sloan (Oxford: Elsevier Butterworth – Heinemann, 2004).
- Taylor, R., *Butterflies in My Stomach: Or Insects in Human Nutrition* (Santa Barbara, CA: Woodbridge Press. 1975).
- Vane-Wright, R., 'Why Not Eat Insects?', *Bulletin of Entomological Research* 81 (1991), 1-4.
- Watson, L., *Omnivore: The Role of Food in Human Evolution* (Sevenoaks, Kent, UK: Sceptre, 1988).
- Yen, A., 'Edible Insects: Traditional Knowledge or Western Phobia?', *Entomological Research*, 39 (2009), 289-298.

*

*

*