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## **Abstract**

This article examines the recent turn to entomophagy (insect eating) as a new source of nutrition in a world confronted by increasing population, degraded soils, and food insecurity. Although many regard entomophagy with disgust, there is a case to be made that many insects are much more nutritious, as well as greener and cleaner<sup>1</sup>, than many of the foods we regularly eat without thinking. Also, there is nothing new about insect eating or the belief in entomophagy as a sustainable and sensible practice. There is a long cultural history in countries such as Africa and Australia, for instance.

## **Keywords**

Food insecurity, insect eating, colonialism, Africa, Australia, Smeathman, Lewin

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***Abstract:** This article examines the recent turn to entomophagy (insect eating) as a new source of nutrition in a world confronted by increasing population, degraded soils, and food insecurity. Although many regard entomophagy with disgust, there is a case to be made that many insects are much more nutritious, as well as greener and cleaner<sup>1</sup>, than many of the foods we regularly eat without thinking. Also, there is nothing new about insect eating or the belief in entomophagy as a sustainable and sensible practice. There is a long cultural history in countries such as Africa and Australia, for instance.*

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In 2015, in a beautifully illustrated article in the *Australian Geographic* entitled ‘GRUB’S UP!’, the author entertains us with a global round-up of insect edibles. There is New Zealand’s huhu grub, which is supposed to taste like peanut butter; South America’s spicy red agave worms and apple-flavoured stinkbugs; Japan’s silkworm pupae, available ten to a skewer in restaurants; and Thailand’s nutty crickets and palm weevils with a hint of bacon flavor. Confronted by this new culinary craze, we find ourselves wondering if insects are just a trendy addition to our cities’ fine-dining menus or are they (as some restaurateurs claim) the solution to feeding the planet’s exploding population?<sup>1</sup> The United Nations’ Food and Agriculture Organization (FAO) would have no hesitation affirming the second claim. According to its major report entitled ‘Edible Insects’ (2013), with current food production needing almost to double to feed an estimated 9 billion people by 2050, the subject of insect consumption must be brought to the table:

Land is scarce and expanding the area devoted to farming is rarely a viable or sustainable option. Oceans are overfished and climate change and related water shortages could have profound implications for food production. To meet the food and nutrition challenges of today—there are nearly 1 billion chronically hungry people worldwide—and tomorrow, what we eat and how we produce it needs to be re-evaluated.

Inefficiencies need to be rectified and food waste reduced. We need to find new ways of growing food.<sup>2</sup>

In ‘Edible Insects’ the practice of entomophagy (insect eating) is presented as a significant new means of addressing some of these crises, in particular the alleviation of food insecurity, and the sustaining of nature and of human life. This article addresses our new interest in entomophagy but it also argues for the longer cultural history of this practice in Africa and Australia from the late eighteenth century onwards.

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<sup>1</sup> Penberthy, Natsumi. ‘GRUB’S UP?’, *Australian Geographic*, Jan/Feb2015, Issue 124, pp. 64-75. See <<http://www.storycentral.com.au/assets/releases/15112/australian-geographic-insects.pdf>>

<sup>2</sup> van Huis, Arnold et al. Foreword. ‘Edible Insects: Prospects for Food and Feed Security’. By Food and Agriculture Organization of the United Nations Rome, FAO Forestry paper, no. 171 (2013).

Denmark's Nordic Food Lab, established in 2008, has been operating at the scholarly rather than the sensationalist end of entomophagy. To satisfy our hungry world, the Lab offers an innovative 'Festival' menu, complete with recipes for delicacies such as 'Roast Locusts' and 'Moth Mousse'. Boasting that it crosses the disciplinary divide of the 'two cultures' by combining a humanities-focused interest in geographical place with a scientific interest in 'taste' (gastronomy) and nutrition, the Lab's mantra is simple: that the pursuit of good food is also the pursuit of biocultural diversity. Ecology, necessity, and appetite dictate that no single food can nourish us on its own. Furthermore, in a world afflicted by so many pressures—climate change, an exploding population, and land degradation—sustainability and diversity must go hand in hand and this requires us to consume a range of different local foods. Pest insects are presented as one of the best untapped food sources, and if the insects are local ones, all the better.

Despite general agreement with early commentators like Vincent Holt that, historically, entomophagy has always formed part of human diet, the topic has only very recently started to capture worldwide public attention. Widespread disgust at the practice, especially in the developed West, undoubtedly counts for why the subject has been hitherto sidelined in food studies. A major reason for the aversion is cultural, with the prejudice customarily imbibed at an early age. As children we are told that, because insects are dirty, only uncivilized people would resort to eating them. The reality is that many insects are much cleaner and more nutritious than other foods we consume, such as the scavenging pig, live oysters, and bottom-feeders such as lobsters and eels. As Ronald Taylor says of oysters, once a poor man's food but today a luxury item: 'A more loathsome creature would be hard to find. And yet people eat them *alive*—their muscles contracting, their heart beating, fecal material passing through them'.<sup>3</sup> Jonathan Swift (1667-1745) would have been innocent of such stomach-turning anatomical knowledge, but his reservations were nevertheless captured in the quip that 'he was a bold man who first ate an

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<sup>3</sup> Taylor, Ronald. *Butterflies in My Stomach Or: Insects in Human Nutrition* California: Woodbridge Press, 1975, p. 17.

oyster'.<sup>4</sup> In contrast to the oyster, insects such as caterpillars and grasshoppers are amongst the earth's purest animals, for they are strict vegetarians who have never eaten anything but the sweetest and most nutritious plant material. So there is nothing rational about our widespread disgust at the thought of eating insects. There are also inconsistencies in our cultural valuation of certain insects whose products we do consume. For instance, we love honey, viewing it as the nectar of the gods, but looked at dispassionately, honey is nothing more than bee vomit. And of course we would never think of eating bees.

In 2012 Museum Victoria hosted a 'Bugs for Brunch' event for children and their parents as part of the Melbourne Food and Wine Festival. This gastronomic experiment was designed to see if children could be induced to unlearn their disgust at the prospect of eating 'creepy crawlies'. Many of the children overcame their horror, accepting that the insects sampled were not just tasty but nutritious too. The fact that many insects are good for us is just as well because, as any tired larder reveals, foodstuffs such as rice and flour are commonly infested with insects. Although we may not relish the idea, we are eating insects all the time, benefitting indirectly from their protein, fats, carbohydrates, calcium, vitamins and other minerals. The disgust we might feel at this is related to abjection—the fear that our bodily integrity has been breached—and yet much as we want to reject this apparent contamination, there is simply no avoiding it. Insects are already part of our food.

The myriad and inexorable intersections between the insect and human worlds are not just literal but metaphorical as well. As a recent article by Stephen Loo and Undine Sellbach argues, insects are always with us: 'thoughts buzz, skin crawls; we have butterflies in our stomachs and ants in our pants'.<sup>5</sup> This article, which takes a psychoanalytic approach to the ethical

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<sup>4</sup> Swift, Jonathan. *A Complete Collection of genteel and ingenious Conversation, according to the most polite mode and method now used at Court, and in the best Companies of England. In Three Dialogues. By Simon Wagstaff, Esq.* London: B. Motte and C. Bathurst, 1738, p. 120.

<sup>5</sup> Loo, Stephen and Sellbach, Undine. 'Eating (with) Insects: Insect Gastronomies and Upside-Down

communities we make with insects, is one of many to re-visit the little booklet published by Vincent Holt in 1885, entitled *Why not eat Insects?* This delightful book, which is currently enjoying a new lease of life thanks to the Natural History department of the British Museum, points out the paradox discussed earlier that, in spurning insects, we are rejecting food which is not just delicious and nutritious but also clean and ‘green’. Holt would also have agreed with today’s champions of entomophagy who stress the benefits of insects, not just to diet and food security but to ecosystems more generally. Insects require significantly less land and water than cattle, and emit fewer greenhouse gases and less ammonia than cattle or pigs.<sup>6</sup> The benefits to the environment of rearing insects for food can also be seen in their high feed conversion efficiency, thanks to their cold-bloodedness. Crickets, for example, require only two kilograms of feed for every one kilogram of bodyweight gain. In addition, insects can be reared on low value organic waste (both human and animal), transforming it into high protein products, in the process reducing environmental contamination. Holt’s other principal argument in favour of eating insects is the assistance this would give to farmers whose crops are regularly invaded by devouring pest insects.<sup>7</sup>

Our tendency to view entomophagy as uncivilized has a long history. As Mark McGranaghan has argued recently, the colonial stereotype of insect-eaters as ‘bestial, improvident, slothful, and degraded’ is everywhere in the literature of travel, exploration and anthropology.<sup>8</sup> But in his

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Ethics’ *parallax*, vol. 19, no. 1, 2013 pp. 12–28,

<<http://dx.doi.org/10.1080/13534645.2013.743290>>; accessed 11 Nov 2015.

<sup>6</sup> For the extent to which livestock farming is damaging the living world, see George Monbiot’s ‘Pregnant Silence’, 19<sup>th</sup> November, 2015.

<<http://www.monbiot.com/2015/11/19/pregnant-silence/>>

<sup>7</sup> Holt, Vincent M. *Why not eat Insects* (1885; reprinted with a new introduction by British Museum (Natural History), 1988).

<sup>8</sup> See McGranaghan, Mark. ‘In small things consumed: entomophagy in the Bleek-Lloyd narratives’, in

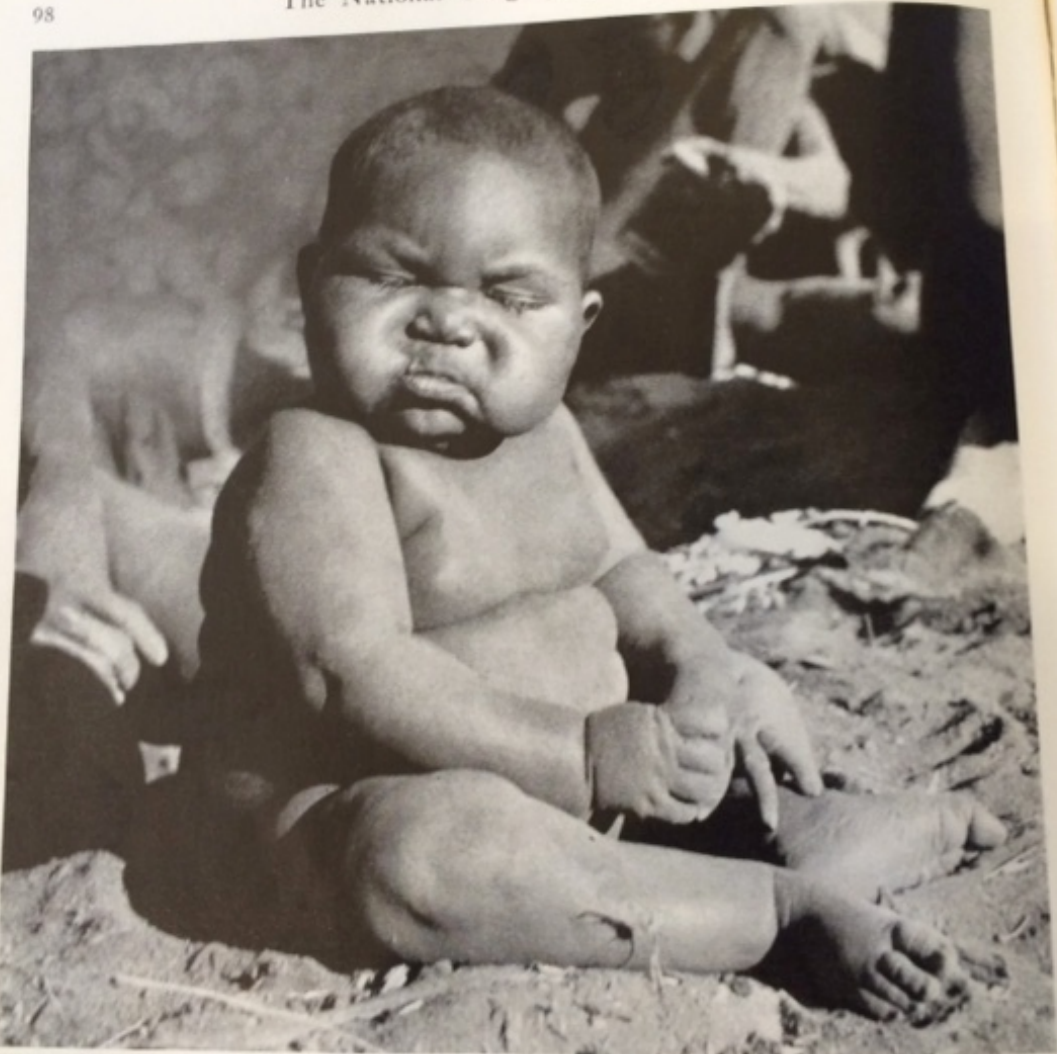
fascinating article on the South African Bleek-Lloyd archives of the 1860s and 1870s, McGranaghan shows how ambivalent this stereotyping can be. Examining how the /Xam hunter-gatherers divided up their insect world, he powerfully reconstructs the bushmen's interactions with insects and the ways in which these were integrated into wider subsistence practices. Similarly, in an article on Australian aboriginals in *The National Geographic Magazine* entitled 'Earth's Most Primitive People' (1946), the photo-journalist C. P. Mountford headlines the native food as 'not inviting' but then proceeds to describe witchetty grubs as follows: 'The large white wood grubs, although loathsome in appearance, are particularly palatable, although I must admit it took a lot of determination to eat the first one. They are, indeed, surprisingly similar to roast pork'. Although the journalist does not identify his hosts, they would appear to be the Pitjantjatjara people of the Mann Ranges in the far northwest of South Australia. Describing their traditional country as 'too bad to support even aborigines', Mountford somewhat perversely includes a photograph of a plump baby to emphasize the nutritional benefits of the natives' insect diet. Carrying as its jokey caption, 'Don't Bother Me When I'm Playing', the photograph appends a note: 'Fat and saucy, a native baby thrives on a diet of mother's milk, white grubs, and honey ants'.<sup>9</sup>

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*Before Farming*, no. 4 (2012), pp. 1-16.

<sup>9</sup> See Mountford, C. P. 'Earth's Most Primitive People', *The National Geographic Magazine*, January, 1946, vol. 89, number 1, pp. 89-104; reference, p. 100.





**"Don't Bother Me When I'm Playing"**

Fat and saucy, a native baby thrives on a diet of mother's milk, white grubs, and honey ants. The child's home is in the Mann Range (text below), where previous travelers' reports indicated that the country was too bad to support even aborigines. The author found the aborigines particularly fond of their babies, always fussing over them; he never saw a child spanked (page 89).

*Figure 1. 'Don't Bother Me When I'm Playing'; photograph by C. P. Mountford, The National Geographic Magazine, January 1946, p. 98.*

In the 19<sup>th</sup> and 20<sup>th</sup>-century archive, entomophagy is more often than not deployed as a marker of the uncivilized or savage. This hostility to insect eating is less true of the eighteenth century,

however, before the consolidation of European empires. The wealthy London silversmith and insect collector Dru Drury (1725-1803) is a case in point. In order to enhance his cabinet, Drury financed collectors to hunt out specimens around the world—Australia, Africa, Asia and the Americas. He also published a three-volume set of exotic entomology in which he figured and discussed many of his most rare and valuable insects. In the Preface to volume 1, published in 1770, he spoke of the value and usefulness of insects in terms of medicine, dyes, and clothes. He then follows up this discussion of utility with the statement that, when it comes to insects, ‘there is no part of the world where they do not directly or indirectly serve as food’. Of the locust figured in Plate 50 of volume 1 he comments that this insect is eaten by many in Asia and Africa, and that during plague time

their inconceivable numbers . . . obscure the light of the sun, and make the inhabitants tremble for their vegetables. It is at those times the Asiatics and Africans gather them, and eat them with much delight, dressing them, either by stewing, or frying them with oil; they also pickle and sell them publicly in some of the markets of the Levant, and many other parts.<sup>10</sup>

The natives’ delight (Drury suggests) stems as much from the eradication of a crop pest as to the locust’s wonderful flavour. But what is most notable is that at no point does he convey this information with any disgust or criticism of the locust eaters for improvidence and bestiality. Of course St John the Baptist fed on ‘locusts and wild honey’ so the biblical resonance may in part explain his positive account, but as we read further in his Preface we see that Drury is not at all inhibited in describing the eating of other ‘delicious’ insects. One such is the caterpillar belonging to the Jamaican beetle, *Damicornis*, considered in the West Indies as a ‘dainty’ and diligently sought after by its white creole admirers.

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<sup>10</sup> Drury, Dru. *Illustrations of Natural History. Wherein are exhibited . . . Exotic Insects. According to their different Genera*, Vol 1, p. x. London: Printed for the Author, 1770, Vol 1, p. x.

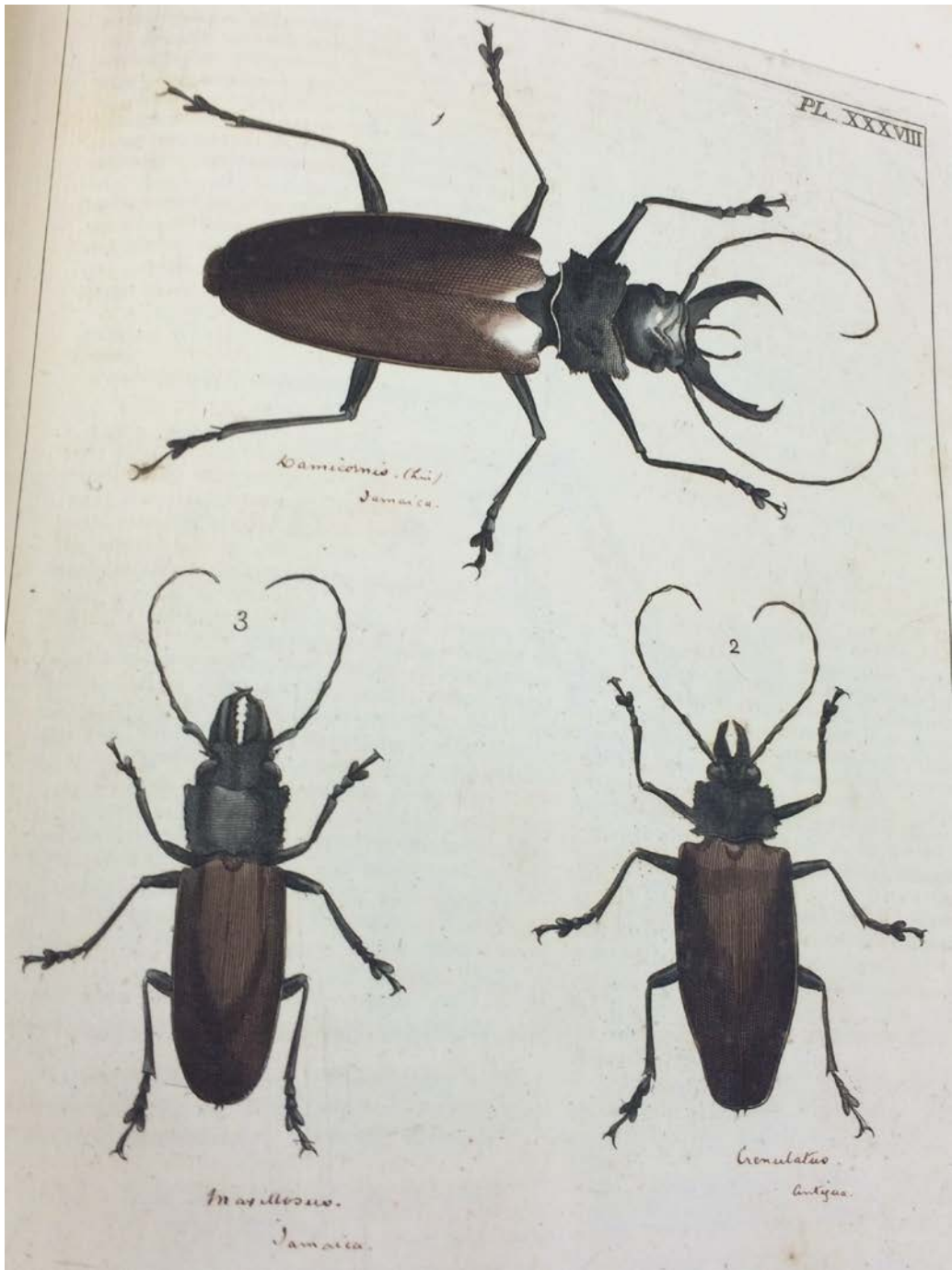


Figure 2. *Damicornis* (Jamaica) in Dru Drury, *Illustrations of Natural History. Wherein are exhibited upwards of Two Hundred and Forty Figures of Exotic Insects. According to their different Genera* vol 1 (London: Printed for the Author, 1770), Fig. 1, Plate 38.

Drury adds that some gentlemen are so ‘exceedingly delighted with it as to employ negroes on no other business but to go into the woods on purpose to procure these caterpillars, by digging them out of the bodies of certain trees’.<sup>11</sup> The re-direction of slave labour from the profitable sugar plantation to grub gathering for the tables of white West Indian epicures is testament to the high value placed on this caterpillar’s sweetness. Also notable is Drury’s conviction that, in general, insects are not just ‘famine foods’ eaten in times of desperate scarcity, but eaten out of choice for their exquisite tastiness.

By the time Drury published his third and final volume of exotic entomology in 1782, his chief collector in West Africa, Henry Smeathman, had returned to London, bringing with him a rich store of knowledge gleaned from surviving eight years in the tropics—four years in West Africa on the Banana islands, off the southwest tip of the Sierra Leone peninsula, and four years of touring around the West Indies. Smeathman collected all kinds of natural history specimens for his wealthy band of sponsors, but insects were his chief love and focus. Later, in a landmark essay in the *Philosophical Transactions of the Royal Society* (1781), he would make a name for himself as a termite specialist. Termites have always been one of the most popular of all insects eaten in the tropics; there is even a suggestion that stone tools were first invented to open their large nests for food.<sup>12</sup> Termites are high in protein, fat and calories, especially at the start of the rainy season when the winged insects (or ‘sexuals’ as they are sometimes called) take their nuptial flight, their bodies plump with reserve food stores to sustain them over the next few weeks as they busy themselves with reproduction and colony foundation.<sup>13</sup> Smeathman relished eating the winged termites, and recorded tasting notes with ‘several gentlemen’. There was

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<sup>11</sup> Drury, *Illustrations of Natural History*, Vol 1, p. xi.

<sup>12</sup> Taylor, *Butterflies in My Stomach*, p. 67.

<sup>13</sup> Bodenheimer, F.S. *Insects as Human Food: A Chapter of the Ecology of Man* (The Hague, 1951), p. 140.

general agreement that the termites made the ‘most delicious and delicate eating’, with one gentleman comparing them to ‘sugared marrow, another to sugared cream, and a paste of sweet almonds’. Nor was this delight confined to their human consumers, with Smeathman noting that termites were enjoyed by ants and other insects, as well as by birds and carnivorous reptiles.<sup>14</sup>

Smeathman quickly figured out that ‘doing as the natives do’ was clearly the most sensible course of action when trying to survive on Africa’s tropical disease coast. Although he was keen to retain his identity as a white man amongst the natives, he was ahead of his time in acknowledging geography as the foundation of gastronomy. According to Smeathman, European newcomers commonly made two mistakes when it came to diet. The first was that, upon arriving in Africa, they gorged themselves so greedily on the local produce that they ended up rejecting it altogether. This then left them hankering ‘after the flesh pots of Egypt —Fat, salt, Beef, Pork, ham & butter’. No matter how vile these ‘gross and incongruous’ imports were, Europeans on the coast loaded their stomachs with them.<sup>15</sup> The imported butter, for instance, was particularly offensive to Smeathman. In a letter home to Drury he dubbed it ‘*Essence of Bile*. The most filthy, rancid, stinking stuff’, good for greasing cart wheels but not much else. African butter, made from palm oil, was far superior, ‘sweet and well-tasted’ and ‘of a pale flesh Colour, smelling of Violets’. So, for the sake of his health, he sensibly decided to imitate the locals’ dietary preferences, which included an array of insects. After his return to England, Smeathman’s daring omnivorousness of African delicacies would become the stuff of legend, enhancing his reputation for robust curiosity and, in turn, his scientific credibility. He seemed immune to the sensations of disgust affected by more polite eaters, boasting of his relish for iguanas and monkeys but also his predilection for West African insects and worms.

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<sup>14</sup> Smeathman, *Some Account of the Termites, which are found in Africa and other hot climates. In a Letter from Mr. Henry Smeathman, of Clement’s Inn, to Sir Joseph Banks, Bart. P. R. S., Philosophical Transactions of the Royal Society of London* 71 (1781), 139-92; these refs, pp. 167-69.

<sup>15</sup> Letter from Henry Smeathman to Dru Drury, from the Banana Islands, 8 August, 1772. Extracts from Mr Smeathman’s Letters to Mr Drury, MS D.26; University Library, Uppsala, Sweden.

The most commonly eaten insect groups in West Africa, today as well as in the late eighteenth century, are termites, crickets, caterpillars, and palm worms. Locusts too are much sought after, as they are in other parts of the world. In fact, it is commonly joked of locusts that its taxonomical name, *Gryllus*, is an invitation to cook and eat them.<sup>16</sup> All these insects have an established place in local West African food cultures. The origin of some ceremonies can even be linked to certain insects, particularly to the termites. Their giant nests, shaped like sugar loaves, were so numerous on the Banana islands and on the adjacent continent that Smeathman remarked it was ‘scarce possible to stand upon any open place, such as a rice plantation or other clear spot, where one of these buildings is not to be seen within fifty paces, and two or three are to be seen almost close to each other’. The French traveller Michel Adanson (1727-1806) also observed in Senegal that the ‘number, magnitude, and closeness’ of their nests ‘make them appear like the villages of the natives’.<sup>17</sup> Given their giant nests, and their self-organizing labour system, seemingly run by a group mind, it is not surprising that some commentators referred (and still refer) to termite ‘civilization’.<sup>18</sup>

Smeathman gives us a full description of how the winged termite is harvested and cooked. At swarming time, just as the rainy season begins, the natives skim the neighbouring water sources with their calabashes, gathering up as many drowned termites as possible. These are then placed in large kettles and ‘parched over a gentle fire, stirring them about as is usually done in roasting coffee. In that state, without sauce or any other dressing, they serve them’. Roasted like coffee beans, the termites create a ‘delicious’ meal which the Africans put into their mouths ‘by hands-full’, just as Westerners ‘do comfits’ [lollies]. Smeathman adds that he has eaten them dressed this way several times, believing them to be ‘delicate, nourishing, and wholesome’. He then adds, polemically, that ‘they are something sweeter, but not so fat and cloying as the caterpillar

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<sup>16</sup> For this joke see Holt, *Why not eat Insects*, p. 37.

<sup>17</sup> Smeathman, *Some Account of the Termites*, p. 147.

<sup>18</sup> See Wilson, E.O. in <<http://discovermagazine.com/2008/nov/12-wilson-says-ants-live-in-humanlike-civilizations/>>

or maggot of the *Palm-tree Snout-beetle* . . . which is served up at all the luxurious tables of West Indian epicures . . . as the greatest dainty of the Western world'.<sup>19</sup> By arguing for the superiority of the African termite to the West Indian caterpillar, Smeathman extolls the simplicity, naturalness (and healthiness) of traditional African entomophagy compared to that of the decadent, slave-owning white planters.

Smeathman grew a garden on the Banana islands for the provisioning of slave ships. The indigenous vegetables he grew offered one source of nourishment but it was insect food such as the termite with its 'very rich and delicious oil' that was 'most wholesome and nutritious', requiring 'no other preparation than roasting'. He was keen to get this message out for the many British 'adventurers to distant climes' who might be saved by wider knowledge of this resource. Sailors especially needed to know which insects were the best for eating. Smeathman told Drury that the best eating lay in the caterpillars of beetles that fed on decayed wood. During his African sojourn he had met

with many maritime people, who, by living on a scanty allowance of unripe fruits, crude roots, coarse seeds, nuts, and other trash, after a shipwreck, or in other cases of distress so frequent with people in the African trade, have made themselves exceeding sick, and much increased their hardships, which, by means of these Caterpillars only, might have been greatly alleviated.<sup>20</sup>

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<sup>19</sup> Smeathman, *Some Account of the Termites*, p. 168.

<sup>20</sup> Drury, *Illustrations of Natural History* vol 3, p. xvi.



The grub of the Goliath beetle, for instance, was regarded as an especially fine food morsel in Africa, as was the female cricket (*acheta membranacea*) which African children would dig out of the ground in the right season, when she was full of eggs. They would roast the whole animal but eat only the eggs, 'which are contained in one bag, and resemble part of the roe of a large fish, deeming it very delicate food'.<sup>21</sup>



Figure 3. *Goliathus*, drawn by Moses Harris in 1767, published Dru Drury, *Illustrations of Natural History* vol. 1 (London: Printed for the Author, 1770), Plate 31.

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<sup>21</sup> Drury, *Illustrations of Natural History* vol 3, p. xxi.



Although Smeathman does not make it a feature of his essay on the termites, there is a nice symmetry in the way he balances the ferocious destructiveness of the termite with its deliciousness to humans. In this way he touches upon one of Vincent Holt's principal arguments in favour of eating insects, and that is the assistance this would give to farmers and others whose livelihoods are regularly threatened by pest insects. Under the legal principle of *lex talionis* (just retribution), humans eat the pests that are causing them harm.<sup>22</sup> Smeathman does not invoke this law of 'the biter bit' but after describing in great detail the interior and exterior architecture of the termitary, he then explains how termites are amongst the 'most fierce and implacable' of the world's little animals, causing 'vast mischief' to human habitations. Native huts are systematically demolished by them, and they even devoured the pyramidal mahogany box which contained Smeathman's compound microscope. Since it was in storage for several months the termites had leisure, after gaining entry, to eat the microscope itself, except its glass and metal parts<sup>1</sup>.<sup>23</sup>

If Smeathman was Drury's most important collector in Africa, John William Lewin was his man on the spot in New South Wales. Drury was Lewin's most important patron and principal financial sponsor, providing him with financial support and all the collecting apparatus he needed, just as he had done for Smeathman.<sup>24</sup> Lewin set off in 1798, and in 1805 published *Prodromus Entomology. Or, a Natural History of the Lepidopterous Insects of New South Wales*. He too, while out collecting, noticed the natives' predilection for certain insects. On Plate 13 he illustrated the moth, *Bombyx Crytophasa*, in its various metamorphoses, from larva to pupa to moth.

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<sup>22</sup> Holt, *Why not eat Insects*, p. 57.

<sup>23</sup> Smeathman, *Some Account of the Termites*, p. 179.

<sup>24</sup> For Lewin, see Neville, Richard in *Mr .J W. Lewin: Painter and Naturalist* (NewSouth Publishing, 2012).



Figure 4. *Bombyx Crytophasa*, in *Prodromus Entomology. Or, a Natural History of the Lepidopterous Insects of New South Wales. Illustrated with Nineteen Plates.* By John William Lewin, A. L. S. First published in 1805, reissued in 1822, and now republished by Edition Renard, Melbourne, 2007, Plate 13.

Competing with the mantis, or walking leaf, which devours multitudes of *Bombyx* larvae in the daytime, the New South Wales native seeks ‘those wood-boring caterpillars as a delicious article of food, climbing high trees, and searching for them with great labour’.<sup>25</sup> Today every school child knows that Australia’s indigenous people eat witchetty grubs and Bogong (Bugong) moths, both of which are rich in calories, protein and fat. Furthermore, since the 1980s, interest in bush tucker has led to much wider knowledge of the numerous insects eaten by Aboriginals, including butterflies, grasshoppers, honey ants, cockroaches, cicadas, lerp-insects and honey-bees, especially the latter’s honey-bags. In fact, Australia is one of only twenty or so countries that boasts fifty or more known edible insects. Curiously, the winged termite so favoured in West Africa is much less favoured here, with indigenous people restricting themselves to eating pounded sections of the termite hills, *mupalangu*, used principally for medicinal purposes (especially fevers).<sup>26</sup>

The classic digest of anthropological accounts of Australian indigenous entomophagy can be found in F. S Bodenheimer’s *Insects as Human Food* (1951), a book which is profoundly colonialist in outlook (the author pronounces that the aborigines ‘have now disappeared’, or have become ‘civilized’) but which nevertheless gives a fascinating overview, not just of entomophagy around the world but of the insect totems, legends, and sacred ceremonies depicted in indigenous paintings and artefacts and recorded by anthropologists.<sup>27</sup> According to early field anthropologists in Australia such as Baldwin Spencer, the sacred ceremonies, known as *Intichiuma*, have as their object the increase of the animal or plant that gives its name to the

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<sup>25</sup> Lewin J.W. *Prodromus Entomology. Or, a Natural History of the Lepidopterous Insects of New South Wales. Illustrated with Nineteen Plates.* A. L. S. First published in 1805, reissued in 1822, and now republished by Edition Renard, Melbourne, 2007; this ref., p. 14.

<sup>26</sup> See Spencer, Baldwin. *The Native Tribes of the Northern Territory of Australia* London, 1914. p. 260.

<sup>27</sup> Bodenheimer, F.S. *Insects as Human Food: A Chapter of the Ecology of Man*, Dr. W. Junk, Publishers: The Hague, 1951. References are to p. 70 and p. 82.

totem.<sup>28</sup> The centrality and value of entomography and ethno-entomological knowledge more generally in the ceremonial and ritual life of aboriginals is well documented, with anthropologists noting the customary tasting and comparison of flavours as well as observation of the positive nutritional benefits.

A worldwide movement with slogans such as ‘Edible insects’ and ‘Insects as Food and Feed’ is now underway, stretching from Africa to Europe to South East Asia. The Laboratory of Entomology at Wageningen University (WU) in the Netherlands has just this year founded a new scholarly journal, *Journal of Insects as Food and Feed*, covering a wide range of topics, from the harvesting of edible insects in the wild through to their industrial scale production. WU’s *Food Insects Newsletter* [<http://www.foodinsectsnewsletter.org>] was established a few years ago, its mission the provision of useful information on the value of insects as food for humans as well as for other animals. WU also runs regular workshops on the eating, production, and processing of insects, with pitches to investors, restaurateurs, and entrepreneurs to get involved in the future of this new gastronomy. A key part of achieving WU’s goal revolves around overcoming consumer disgust, so food safety, including the detection, identification and mitigation of microbial and chemical contaminants, looms large on their agenda. Protocols for quality control as well as for processing need to be developed, alongside addressing other new research challenges such as marketing, regulation, and legislation. In Oxford, similar scholarly work is going forward, with an interdisciplinary workshop on ‘Insects as Food and Feed’ scheduled for late 2015. This workshop crosses scientific papers on mass-rearing and the digestibility and nutritional composition of insects with work on entomophagy’s cultural and social dimensions.

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<sup>28</sup> See Spencer, Baldwin and Gillen, F.J., *The Native Tribes of North Central Australia* London, 1899. p. 167.

In 1970 an International Centre of Insect Physiology and Ecology (ICIPE) was established in Kenya's capital, Nairobi. In addition to leading Africa-wide research on controlling disease-bearing insects and thus improving the livelihoods of African communities, ICIPE's mission is to respond innovatively to emerging developmental challenges—principally to increase agricultural production for a population suffering from poverty, poor nutrition, and shrinking land and water resources. The drawing up of a proper institutional framework to oversee and document edible insects is one of the central planks of ICIPE's endeavours. While insect species such as lake flies, termites, black ants, crickets and grasshoppers have always been part of the Kenyan diet, there is a need for greater understanding of what these insects can contribute to nutrition and food security. Moreover, there is concern that these insects be harvested sustainably so that both habitat and species are protected and preserved.<sup>29</sup> ICIPE also has a new journal, the *Journal of Tropical Insect Science*, in which an increasingly high proportion of the articles published are on the topic of edible insects. Furthermore, through a collaboration with WU in the Netherlands, ICIPE is exploring the commercial potential of insects as affordable, high-quality feed. Since feed forms such a high-cost part of animal husbandry, the use of insects such as the black soldier fly, *Hermetia illucens*, as a safe, cost-effective, and 'greener' protein source for Kenya's poultry, pig, and fish industries is currently being explored.

Insects belong to the most diverse groups of animals on the planet, including more than a million described species. From an evolutionary and ecological perspective they are probably the most successful animals on the planet, a truly dominant life form. Not only are they highly adaptive and prodigiously prolific, they are also (unlike human animals) highly resistant to radiation. Urban myth tells us that the cockroach will win World War III. Nevertheless, despite their classification as 'animals', insects do not fit comfortably within the rapidly expanding interdisciplinary field of Human-Animal Studies, probably because of their exclusion from legal protection. Today's Animal Welfare Acts protect amphibians, birds, cephalopods, crustaceans, fish, non-human mammals and reptiles, but not ants, bees, beetles, butterflies, mantids, spiders

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<sup>29</sup> ICIPE Annual Report, 2014 (compiled May 2015), online at <http://www.icipe.org/index.php/news/953-icipe-annual-report-2014.html>.

or stick insects. It may well be the case, though, that a new era of the insect is about to dawn, with their potential as both ‘food and feed’ reconfirming their indispensable role in the web of life that sustains all living things.

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