From Foe to Food: Entomophagy and the adoption of edible insects

Laura Shine

A Thesis
In the Humanities Program

Presented in Partial Fulfillment of the Requirements
For the Degree of
Doctor of Philosophy at
Concordia University
Montreal, Quebec, Canada

September 2020

CONCORDIA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

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By: Laura Shine

Entitled: From Foe to Food: Entomophagy and the adoption of edible insects

and submitted in partial fulfillment of the requirements for the degree of

Doctor Of Philosophy (Humanities - Arts & Science)

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_____ Chair
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_____ External Examiner
Dr. Julie Lesnik

_____ External to Program
Dr. Geneviève Sicotte

_____ Examiner
Dr. Jordan Lebel

_____ Examiner
Dr. David Howes

_____ Thesis Co-Supervisor
Dr. Christine Jourdan

Approved by _____
Dr. Marcie Frank, Graduate Program Director

November 13, 2020

_____
Dr. Pascale Sicotte, Dean
Faculty of Arts and Science

ABSTRACT

From Foe to Food: Entomophagy and the adoption of edible insects

Laura Shine, Ph.D.
Concordia University, 2020

By 2050, the planet's population could reach 10 billion. To address potential food insecurity, *entomophagy* – eating insects – has been promoted as a promising alternative to livestock rearing. In many cultures of the world, small invertebrates are already an important part of the human diet. European, Canadian and American populations, however, generally express an extremely strong negative reaction to the idea of eating insects.

To overcome this, advocates have developed a rational-based argumentation hinging on insects' purported sustainability, nutritional profile, or potential role in assuring food security. Such approaches have achieved fairly limited success among the general public. Consequently, some proponents now focus chiefly on sensory appreciation to increase insects' appeal. Problematically, both strategies overlook the diversity of social and environmental pressures that contribute to driving food choice.

Using an interdisciplinary developmentalist theoretical framework that incorporates conceptual and methodological tools from Food Anthropology, Food Marketing, and Sensory Studies, I map out the emergent industry in Québec and analyze the different strategies mobilized to mitigate avoidance behaviour. Based on participant observation and interviews with producers, promoters, researchers and consumers, I investigate how culturally-constructed negative reactions to unusual foods can evolve and adapt. I first examine some of the cultural tropes that portray insects as dangerous, dirty and disgusting, and how this correlates with notions of risk in food consumption, disgust, and the perceived "alien-ness" of insects. I then critique some of the prevailing discourses around edible insect promotion, both from rational- and sensory-based perspectives, showing how both coalesce around the concept of acceptability. Finally, I analyze some of the current directions within the Québec edible insect industry and examine some of the prevalent challenges and opportunities within the field, before providing implementable takeaways for firms. I ensconce these localized findings within the larger cultural context of the development of entomophagy among European-derived populations with little or no recent history of consumption, shedding light on wider dynamics of food acceptance and reject, on matters of acceptability, and on the general mechanisms that allow these to evolve and adapt over time.

ACKOWLEDGEMENTS

Writing a thesis is a unique experience. It is at once a profound and gruelling personal journey and a road that cannot be successfully travelled alone.
The following thank-yous cannot do justice to all those who have helped me along the way, nor can it fairly acknowledge their invaluable contribution. My gratitude extends much further than a sheet of paper can attest.

Thank you to my advisors. Christine Jourdan, who provided ever-steady guidance and assistance, and offered me the invaluable and path-changing experience of teaching my own undergraduate class, as well as welcome mental respites through seed exchanges and a shared love of gardening; Jordan LeBel, who opened his door innumerable times, always gave without counting, and provided solace, encouragements, companionship, and expertise beyond any measure of expectations, a beacon in the darkness; and David Howes, who agreed to join the team along the way and add the present burden to an already brimming plate, offering many enlightening ideas and always suggesting creative ways forward. Thank you also to a previous advisor, Nathalie Cooke, who helped me find me feet as a PhD student and gracefully let me fly away as I changed research course.

Thank you also to the jury members, who have generously agreed to contribute their valuable insights and constructive critique to the present thesis, and to participate in the defense.

Thank you to all the participants who made this research possible; to all who welcomed me into their professional world, granted me interviews, chatted with me around skewers of grilled bugs, decided to take a leap forward and taste (or not). I am greatly indebted to you for the time, insights, and affects you shared with me. I hope the present work does justice to your ideas and contributions.

Thank you to the granting agencies that made this work possible and agreed to generously fund decidedly interdisciplinary research into a somewhat startling topic: the Fonds de recherche Société et Culture du Québec (FQRSC) and the Social Science and Humanities Research Council of Canada (SSHRC). Thank you also to the Luc Beauregard Centre of Excellence in Communications Research at Concordia University, who granted me a very generous fellowship to pursue this unconventional line of research. Thank you also to Concordia University for contributing to conference travel and research. Without all this support, the present thesis would not exist.

Thank you to the Humanities department at Concordia University and to all those who toil tirelessly to make it what it is – directors, staff, professors, students. You offer invaluable opportunities to conduct ground-breaking research among challenging circumstances; the creative, open-minded, and judgment-free critique of the work undertaken by students is a model of what academia should be.

On a more personal note, I am forever indebted to my family, Mom and Dad, who have supported me throughout all these years, encouraged me, believed in me even when I doubted

myself, and offered productive scepticism. Thank you for always teaching me about the importance of doing things well, and seeing them through to the end. You empowered me to choose my own path. You both have still to try a bug, though.
Thank you to Jules and Bea for the camaraderie, the sincere curiosity, the rich discussions and critique, about work but also about life in general.

Thank you to David. Everyday we are building a world anew. There are just no sufficiently powerful words. *Você sabe*.

Thank you to my very own little bugs, Alice and Finn, lights of my life, who are teaching me the meaning of infinite love.

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1. Introduction

I don't remember my first taste of an insect.

It might have been an ant, or perhaps a small moth fluttering around in the grass. It just might have happened during the enthusiastically indiscriminate tasting phase toddlers go through – a quick swipe of the hand, a bit of a squish, and down the hatch. If it was witnessed by an adult, it was almost certainly vehemently reproved, on the grounds that insects are dirty, dangerous, or just plain gross. It would take me a few years to learn what all of these concepts meant, but I certainly would. To me, too, bugs would become things you don't eat, things that stay outside of the house and of the body, things to swat away.

I do, however, remember the first time I knowingly sampled them as food, almost three decades later. A repeat trial, if you will. In the interim, I'd barely thought about bugs, if only to lament their presence when they were of the biting sort, or to break out in a sweat and a violent shake at the sight of a spider. I'd been academically immersed in questions of food preference and choice for a few years, involved in urban agriculture schemes, and part of food-salvaging operations in Montreal's public markets to provide for local food banks. I considered myself an open-minded eater, even an adventurous one; I relished finding out about new foods and fads, and especially introducing them to friends and family in thematic events where I would cook for a crowd. I had enjoyed sampling unfamiliar and unexpected foods all around Europe, North and Central America, Asia, and Africa. But until I met Josh Evans, then a researcher at the Nordic Food Lab in Copenhagen, I'd never thought to include insects within the realm of what I considered edible. Along with ten or so other participants from around the world, Josh and I were in Tours, France, for the 2014 Summer School program hosted by the *Institut Européen d'Histoire et des Cultures de l'Alimentation*. As he told us about his ground-breaking work on edible insects with the Lab, a research offshoot of the world-famous Danish restaurant Noma, he passed around a pipette of their latest concoction, a grasshopper *garum*, a fermented sauce in the manner of ancient Roman fish sauces, and inspired by contemporary versions found around South-East Asia. It smelled strong and briny, had a brownish tint, and tasted pungent and salty. It looked nothing like the insects it was made of. But there was something otherworldly about it, unfamiliar, and strangely appealing. It offered an open window into a whole new world of culinary possibilities.

The following week, back in Montréal, I read a journal article on the potential adoption of meat substitutes in Western societies (Verbeke 2015), a serendipitous inclusion by my advisor Jordan LeBel for his Marketing of Food class, for which I was a teaching assistant. Less than a month later, I attended an event at UQAM titled *Consuming Life*; one of the presenters was a co-founder of Aspire Food Group from McGill University, recipients of the million-dollar Hult prize the previous year, under the theme "The Global Food Crisis". Their solution? Developing insect farms to feed the world.

Was some sort of trend developing here? Were edible insects crawling into the spotlight? For a young researcher fascinated by emerging practices and outlandish foods, and with a keen interest in entering an embryonic field of food studies not yet fully invested or even mapped out, this seemed like a opportunity to seize.

Over the following few years, I would transition from initial eagerness and even advocacy for edible insects to doubts and reservations about them and the ways the market was evolving in the Western world, before finding a constructive and informed critical stance. I would sample dozens of species, some of which I'd barely ever heard of – the ubiquitous farmed crickets and mealworms, of course, but also ants of many shapes and colours, caterpillars, numerous species of grasshoppers, wasp and bee brood, beetle grubs, June bugs, Japanese beetles, dragonfly larvae, stinkbugs, and many others. I experienced a curious case of acquired distaste wherein, contrary to the usual notion that familiarity breeds acceptability and perhaps even liking, I started disliking crickets' sensory features the more I was exposed to them. Whereas I'd initially appreciated their chocolaty, earthy roasted flavour, I began to feel their presence, even in minute quantities in prepared products, as an affront to my taste buds, though I had no qualms with them on an ideational level. What's more, beyond mere distaste, I also personally experienced how my once voracious appetite for all things unknown and unfamiliar was dampened by one pregnancy and then another, feeling firsthand the development of a low level of the disgust my participants often expressed at the idea of eating bugs. Though I was perfectly cognizant of all the purported rational benefits associated to their consumption – a lower environmental footprint, a solid nutritional profile, and a potential to mitigate issues of food insecurity and protein shortage, all issues I care about deeply – I felt a queasiness creep into my body, a simmering corporeal uncertainty about my capacity to let the bugs cross the disgust threshold of my throat. Even when I stopped nursing, and between and after pregnancies, the uneasiness never subsided. This added a layer of complexity, but also of interest, to some of my ongoing research projects, where participants looked to me expectantly to lead the way in swallowing even the most off-putting, alien-like species. Though I was always able to pull it off, it opened a window of comprehension that I had not previously experienced, and an additional, highly embodied understanding of the inefficiency of rational appeals to overcome sensory- or affect-based food rejection.

1.1 Why insects? Some background context

By 2050, the planet's population is expected to reach almost 10 billion. Taking into consideration the current levels of malnutrition, experts suggest food production could need to increase by 70% to adequately meet demand (Caparros Megido et al. 2014). To address this, many advocacy groups, including most notably the Food and Agriculture Organization (FAO) of the United Nations, have promoted "entomophagy" – eating insects – as an environmentally sound alternative to conventional resource-intensive protein procurement methods such as cattle, pig and poultry rearing (Van Huis, Van Itterbeeck, et al. 2013). Many insects species are said to equal, and often surpass, the nutritional content, weight-for-weight, of conventional meats (Rumpold and Schlüter 2013); moreover, their ecological impact, both in terms of input and waste produced, is deemed minimal when compared to that of livestock or even poultry (Van Huis, Van Itterbeeck, et al. 2013; Ramos-Elorduy 1997). Entomophagy could also purportedly address contemporary concerns related to local consumption, water usage, sustainability, and animal welfare (Verbeke 2015).

In many cultures of the world, insects are already an important part of the human diet; more than 2000 species are regularly consumed by over 3000 ethnic groups in 113 countries (DeFoliart 1997; Jongema 2017; MacEvilly 2000; Mlcek et al. 2014). It is likely that bugs were widely consumed by our *Homo* ancestors, providing significant (though often overlooked) nutritional

benefits, especially for women, as Lesnik demonstrates (2018). European, Canadian and American populations, however, have for centuries – in many cases millennia – essentially excluded insects from their diets, probably in large part due to their smaller size and relatively low numbers in the temperate geographic areas situated in higher latitudes, where insect populations are less biodiverse and thus offer less options in terms of food procurement (Lesnik 2017). What's more, beyond mere dietary exclusion, European-derived cultures generally express an extremely strong negative reaction to the idea of eating insects and small land invertebrates; most would only consider them as a starvation food, an attitudinal "deviation" (Lesnik 2018: 138) that is unique historically and cross-culturally (DeFoliart 1999; Illgner and Nel 2000; Mlcek et al. 2014; Yen 2010). This deep-seated aversion to edible insects is still not sufficiently understood by those who wish to promote the practice – not only in the West, but also in cultures where entomophagy is culturally engrained but endangered, notably because of cultural pressures to adopt behaviours perceived as "westernized" (Yen 2010; Jun-Li Chan 2014; Looy, Dunkel, and Wood 2013).

European-derived cultures do, however, have a (little-known) history of insect consumption. Classical Greeks and Romans relished many species, including beetle larvae and cicadas, according to Pliny the Elder and Aristotle (Lockwood 2013). The Bible also discusses edible insects, delineating in Leviticus 11:20-23 which are clean and which are not, which lets suppose that at least some bugs were considered an acceptable foodstuff at the time. John the Baptist, for his part, is said to have consumed only locusts and wild honey (presumably containing a few bee brood too) during his preaching in the desert (Matthew 3:4). Cockchafer grubs were also eaten in parts of Europe until well into the 19th century (Mignon 2002). Today, only a few marginal remnants of such (voluntary) practices endure, as in the consumption of *Piophila casei* fly larvae in the Sardinian cheese *casu marzu* (as Evans et al. point out [2015], partakers often refuse to acknowledge they are eating insects, and categorically refuse to try other species), or the occasional indulging in periodical cicadas in the north-eastern United States (Baldinger 2013; Hamblin 2013). Given the flexibility of folk taxonomy, snail eating in traditional French cuisine could also be considered as a variant on entomophagy. The majority of other cultural benchmarks surrounding insect consumption, however, generally revolve around once-popular television series such as Fear Factor or Survivor, which have often showcased entomophagy feats in their roster of unthinkable challenges. While such dramatic *mises en scène* seem to disrupt cultural norms, they actually reinforce the proscription around eating insects through their animalistic and less-than-human portrayal of the behaviour (licking bugs off a windshield, consuming them alive, etc.), in contexts that bear no relation whatsoever to the ways in which insects are actually consumed as parts of local cuisines around the world. Viewers can imagine a taste of the obscene from the comfort of their own living rooms, strengthening the cultural taboo against entomophagy. Moreover, any number of Western children's songs and tales tell of the dangers and disgusts surrounding insect consumption (*There was an old woman who swallowed a fly…* along with its dramatic ending: *I guess she'll die*), setting the stage for rejection from a very young age. In such a context, it is not surprising that the refusal to taste insects should hinge on more than classical neophobia – the fear of unfamiliar substances in the context of food. Crafting a new narrative about edible insects is thus a challenging proposition. Yet since the publication in 2013 of the FAO's enthusiastic paper, the interest in entomophagy has grown substantially. In Europe and North America, dozens of businesses have launched insect-based products. Loblaws, owned by Canada's largest food retail group, showcased insects within its "Taste the New Next"

campaign to outline food trends for 2017, with massive-scale (printed) grasshoppers greeting Toronto metro commuters.

Screen capture from Facebook.com. The post mentions crickets, but these are actually grasshoppers. https://bit.ly/2XcjV3o. Accessed July 30, 2020.

The following year, powdered crickets found a place on its shelves, and under the company's private brand *President's Choice* no less. Many outlets of mainstream media have enthusiastically reported on this new movement, and articles on entomophagy have appeared in a variety of media ranging from local publications to global heavyweights such as Forbes, Time Magazine, or The Guardian (I have personally been solicited more than 20 times since I started researching the topic, for television, radio and print alike). A seminal TED talk from 2010 by Marcel Dicke, titled "Why Not Eat Insects", was rediscovered in the wake of growing interest, gathering over 1 608 000 views as of July 2020 (Dicke 2010). In such outlets and in their public appearances, most experts and enthusiasts emphasize the ethical and ecological advantages of entomophagy to nudge consumers into changing their attitude towards the practice (DeFoliart 1997; 1999b; Mignon 2002; J Mlcek et al. 2014; Yen 2009a; 2009b). These rational discourses are taken up by most media, keen to combine what seems like sound ideas with catchy puns and slapstick jokes, creating a sense of accord with readers along the lines of "they say you should, but really, isn't it gross?"

But the focus on environmental and health advantages, along with a "let's feed the world" tagline, runs the risk of reaching very limited target segments of the population. As evidenced by the participants in the first North American Edible Insects Coalition meeting in Detroit, in May 2016, industry leaders are mostly male, overwhelmingly white, highly educated, and most definitely not economically disenfranchised. Interestingly, an important gap becomes apparent between studies of insect production in traditional contexts and the actors leading the burgeoning

entomophagy movement in North America and Europe. The former are often disenfranchised or landless peasants, with women comprising a large part of the growers, usually in small-scale production facilities located within villages (Van Huis et al. 2013). In cases where insects are gathered rather than raised, it is often the work of women or children (Looy, Dunkel, and Wood 2013). Yet in non-traditional contexts, this demographic is radically reversed. Indeed, at 40 or more dollars a pound, crickets and mealworms remain a luxury staple, a surprising turnaround considering that they are considered a famine food by many Westerners. Consumers, for their part, are predominantly from what has come to be known as WEIRD (Western, Educated, Industrialized, Rich and Democratic) socio-economic backgrounds (Henrich, Heine, and Norenzayan 2010); they are the least price sensitive, and the most susceptible to being drawn in by the purported health benefits and environmental advantages of insects as food, but also comprise a very limited segment of the population, and not necessarily a statistically representative one.

But it is of course gross oversimplifying to believe that food choices are based on simple rational calculations, or on resource optimization, and that they thus can be influenced by a discourse based on such ideas. This neglects numerous issues, notably sensory appreciation, which is indisputably central to most food choices, especially in affluent societies. Because of this, a growing number of proponents are focussing chiefly on sensory appreciation to examine the potential acceptance of insect food products, yet they also tend to neglect the larger context within which food consumption and choice take place. It is hardly surprising, then, that neither the rational or sensory discourses have provided the anticipated results of a more widespread adoption, as they fail to take into account the diversity of social and environmental pressures that are exerted on the eater as she makes a choice. In fact, as Shelomi demonstrates (2015), efforts to popularize entomophagy have not had the expected success – the main approaches may entice a handful of enthusiasts, but they do not stand on sufficiently solid and holistic research to understand the deeper motivations at play in a majority of the population. In many ways, entomophagy proponents have failed to demonstrate how insects provide a relative advantage over existing options and how these advantages can be immediately observed, or how insects can be compatible with the values, experiences and needs of potential eaters. Lack of convenience and the difficulty of procuring insects, even for motivated consumers, have further hampered the development of the practice.

1.2 Research questions

In this context, I mapped out some of the new players in the emergent industry in Québec and analyzed the different strategies mobilized to mitigate avoidance behaviour and promote what is deemed an ethical, ecological and potentially even enjoyable alternative to conventional food practices (the methodology is detailed in the following section, namely Chapter 2). How are benefits promoted by advocates to induce behavioural change? Which types of discourses seem most convincing to move from calls to action, such as the FAO's, on the public policy level, to actual implementation on the ground? How are potential consumers responding, and is initial curiosity followed by adoption or at the very least a durable change in attitude and cultural beliefs? What are some of the issues the industry members face (whether internal weaknesses or

external threats, actual problems or public perception issues), and how are they responding and adapting?

In short, my research investigates how culturally-constructed negative reactions to unusual foods can evolve and be transformed, and through which types of influences, in order to adopt novel foods such as insects.

In line with such questions, I find that such partial stances as the promotion of either sensible or sensory benefits do not take into account the full spectrum of issues related to insect consumption, which are not limited to rational and demonstrated advantages or sensory appeal. They also include, among many others, cultural determinants of food choice and assessment of physical and symbolic risk, cultural appropriateness and appropriation, systemic discrimination and colonization dynamics (such as when entomophagous populations abandon the practice under the pressure of the disparaging Western gaze), nature conservation, preservation of traditional food cultures, food security, potential economic development, regulatory constraints, and supply chain issues associated to entomophagy (see for instance Halloran et al. 2015, Lensvelt and Steenbekkers 2014 and Looy, Dunkel, and Wood. 2013). The latter facets, however, are at least as important for a profound understanding of the dynamics at play, beyond the simple fast track to consumption and, to put it bluntly, sales.

My research thus approached the issue with a fieldwork focus on the dynamic Québec market, while ensconcing these findings within the larger cultural context of the development of entomophagy in what is generally referred to as the "Western" world, understood here as encompassing European-derived populations (both are used throughout the text, as is the case in the quasi-totality of relevant literature). Indeed, while much research has been conducted in the past few years on consumer perception and attitudes towards edible insects, and on larger related questions of novel food acceptance, most of this work has focused on specific sub-groups of European populations, especially in the Netherlands, where Wageningen University has been a trailblazer in entomophagy research (Wageningen University 2017). Thus my work regularly shifts from the more narrow focus on Québec actors to the larger picture of a developing market in Europe, with the inclusion of some examples from the United States, where the movement is also very active. It also discusses more long-standing practices around the world, in contexts where insect consumption is neither new or unfamiliar, but instead an important, and often relished, part of local diets. This multi-lens approach allows me to contextualize the localized movement within the larger backdrop of a complex practice, one that is at once deeply rooted in many cultural settings and emerging in parts of the world where it was practically unknown just a few years ago. Doing so also sheds light on wider dynamics of food acceptance and reject, on matters of acceptability, and on the general mechanisms that allow these to evolve and adapt over time.

1.3 Scope and organization

The structure of this dissertation follows a thematic organization scheme, wherein each chapter presents, analyzes and critiques one of the main recurrent tropes around entomophagy that surfaced during my fieldwork. It must be noted that, rather than including a bulk segment of literature review in this introductory section, I incorporate a thematically appropriate and more

specific overview within each chapter to highlight the areas already investigated and the particular gaps in research that I seek to address with my own findings.

Chapter 3, *Theoretical framework*, presents a theoretical backdrop for the consideration of edibility and examines its impact for the specific case of insects. In anthropology, whose conceptual and methodological tools I mostly draw on here, the notion of edibility has been broached, defined, and understood in varied ways by different schools of thought. After an overview of some of the main approaches, including functionalist and structuralist takes on the issue, I delineate the theoretical frame that informed my own research, namely developmentalism, a term that refers to an umbrella of frameworks studying food change within the larger circumstances and constraints of social change. The evolution and development of food practices are thus seen as resulting from, and in turn shaping, the socio-cultural and political-economic contexts in which they are anchored. It is a dynamic perspective appropriate for the study of marginal practices, emerging trends, and their progressive normalization, and thus one that allowed me to shed a relevant light on the emergence of entomophagy within a specific food culture such as Québec's, while encasing this study within the larger background of emergence in non-traditional cultural contexts throughout the Western world.
Because insects are not commonly considered an edible substance in Québec, where most of my fieldwork was conducted, nor in the Western world more generally, their portrayal as a potential food raises questions about how edibility is construed, and how its boundaries can shift over time. Food is, of course, both a necessity for survival and a cornerstone in human's sense of self and identity, a double function that can generate anxiety as eaters strive to determine what they can ingest and what they should reject, especially in situations of (over)abundance of choice. Thus insects, as they make their entrance on the food stage in non-traditional cultural contexts, often generate uncertainty and apprehensions, especially as they tend to defy classical categorization schemes that help eaters navigate the choppy waters of edibility assessment. I thus consider some of the more general ways in which categorization mechanisms can shape our acceptance – or rejection – of potential foods, before examining how affective modes of categorization can come into play in the specific case of insects and their perceived edibility.

Chapter 4, *Insects are disturbing*, dives into some of the ideational mainstays that anchor many Westerners' perception of insects, both as potentially edible substances and more generally as beings that share our life spaces. The powerful influence of the "pest" trope that plagues the quasi-totality of the insect realm posits them as dangerous, dirty and disgusting things that are better kept far away from the areas we dwell in, especially ones devoted to food. I examine how the notion of risk informs prevailing attitudes towards including – or not – specific foods in our diets, including insects, and how the discrete variants of risk perception, evaluation, and avoidance evoked by participants in my research are anchored in specific cultural contexts. Physical, psychosomatic, and social and symbolic risks are then investigated through the study of a historic example, that of the fear and contamination narrative generated around the presence of the common housefly; of a universal emotion, disgust, and the ways in which it is manifested in relation to foods and to insects; and of the prevalence of an othering trope that portrays insects as the ultimate alien, mobilizing their foreignness to castigate and eliminate antagonistic human groups and foster social differentiation. As they have made their way into the collective psyche, such conceptualizations have significantly complicated – and in many cases compromised – the inclusion of insects within a socially sanctioned roster of foods in European-derived cultures.

Chapter 5, *Good for you, good for the planet*, examines the currently prevailing approaches to promoting insects as a food, namely through a focus on rational benefits to the eater or the planet. Though compelling evidence-based research on the actual environmental impact of industrial insect farming has yet to be conducted on a large scale, promising signs of their lower water, feed, and energy consumption and their reduced greenhouse gas emissions have prompted many advocates to uncritically endorse them as a quick-fix solution to our environmental woes. However, though insects may indeed prove much less polluting than cattle, for instance, such a discourse – which has found marked resonance among highly motivated, "eco-aware" participants in my research – is both limited in scope and still problematic from an across-the-industry credibility perspective. It can also, in some cases, weaken the focus on actual user benefits, which are much more likely to convince reluctant consumers to adopt insects as an "greener" food source. The second variant of the rational-based approach promotes insects as a healthful option, especially when compared to more conventional animal-based protein sources. With a stringent focus on specific nutrient content that is in line with the nutritionist paradigm, one that evaluates food quality with regards to discrete elements rather than as components of a more holistic interaction between eater and eaten, it is largely aimed at athletes and health-conscious consumers, running once again the risk of reaching very limited segments of the general population. Finally, the third aspect of the rational-benefit narrative relates to "feeding the world" in a context of population growth and looming food insecurity around the globe. According to this view, Western appreciation of insects as food, rather than their disparagement, could help safeguard culinary practices that include bugs as a nourishing and delicious part of traditional food systems, rather than sacrificing them to the sweeping allure of Westernized diets. In this regard, advocates call for a discursive and attitudinal shift in the promotion of insects as food, which sometimes induces problematic cross-cultural dynamics reminiscent of colonialism and white-saviour tropes. Though none of these cognitive-based approaches seem to induce the conclusive and widespread behavioural change advocates hope for, they are nonetheless endlessly and unapologetically mobilized to promote insect consumption. Their limited success has prompted a growing number of enthusiasts to focus instead on sensory, rather than ideational, benefits.

Chapter 6, *Insects are actually good*, thus studies some of these sensory-based avenues to stimulate trial and adoption of edible insects. In privileging the sensuous rather than the sensible, advocates such as researchers from the Copenhagen-based Nordic Food Lab focus on deliciousness to transform insects into alluring gastronomic delicacies. An overwhelming emphasis on sensory appeal, however, runs the risk of discounting the ideational barriers that modulate the perception of acceptability in food evaluation, and research demonstrates that even very positive hedonic experiences with insects can prove insufficient to induce actual adoption beyond simple trial. Based on an experimental creative workshop with participants, I examine some of their proposals to enhance perceived acceptability of insects as a food – for instance, including them in familiar preparations such as meatballs, focusing on appropriate contextual cues, or adding them to well-known fast-food restaurant menus. I also investigate an alternative approach to sensory properties, namely their negation through claims that insects are imperceptible and tasteless when integrated into ready-to-eat foods. The narratives outlined throughout this chapter demonstrate how rational and sensory approaches are irremediably intertwined, highlighting the need for a revision of promotional strategies that take into account the multifaceted nature of food choice and preference.

Finally, Chapter 7, *An industry on the move*, considers some of the current directions within the Québec edible insect industry, based on interviews with actors in the local market. I draw on the consumer decision journey model to examine some of the prevalent challenges and opportunities within the field, outlining three specific barriers businesses need to urgently address, namely inclusion in the consideration set, active rejection, and low availability. I also examine some of the pitfalls that jeopardize normalization, a crucial process in enhancing acceptance. Usability issues – the question of "what do I *do* with these things?" – present a serious threat to adoption, even for motivated users; firms urgently need to clarify how insects can be seamlessly included into familiar contexts and food practices. Notions of accessibility, availability, and affordability also factor strongly in consumer willingness to include bugs among their regular pantry staples. Finally, communication and nomenclature issues need to be addressed to avoid the shock-value, fun-food approach that can trap products in the one-off trial phase and impede more durable adoption. This last chapter is also meant to provide implementable takeaways for firms who are looking to move beyond the initial marketing tactics used across most of the industry, and to suggest avenues to enhance the appeal of other foods facing strong barriers to adoption.

Throughout the dissertation, I insist many times on issues of nomenclature and vocabulary use surrounding insects and their consumption, as well as the impact that discursive stances can exert on willingness to consume bugs. I wish to acknowledge here that I am myself guilty of reductionism in using terms such as "entomophagy" and "insect eating", which paint over a constellation of distinct practices with overly broad stokes. In a quest for simplification and clarity, I have adopted the European-derived perspective to delineate my object of study, as well as my participants' terminology choices. My goal is not to promote entomophagy, which might require a more detailed and differentiated linguistic approach to enhance normalization, as detailed in Chapter 7. But I still recognize that the use of such terms obfuscates the complexity of the multifaceted assemblage of practices that relate to eating of what we, in the reductive Western taxonomic tradition, call "insects".

Chapter 2. Methodological approaches

One of the fundamental difficulties in apprehending an emerging trend, such as the adoption (or rejection) of novel food practices, relates to its inherently unstable and ever-shifting nature, and its evolution at the very moment of study. Thus the examination and, more so the inscription in a fixed format such as a doctoral thesis, is by nature incomplete, fragmented, and of limited scope. This could, of course, be said of any research object, to a certain degree. But it is particularly salient in the case of contemporary enquiries on still-developing practices, with the attendant perils of declarative statements and crystal-ball predictions unmoored from a still-in-motion field and which often take on, with the passage of time, the sheen of either baseless assumptions or miraculously predictive prophecies.

As Nick Couldry pertinently asks, "how do we conceive of the order, or system, at work in today's world, and where do we need to be to grasp it better?" (Couldry 2003, 40–41). Though he is principally interested in ethnographical approaches to media and mediations, such questions are pertinent to the vast majority of contemporary cultural issues, and in particular those revolving around food practices. In an increasingly entangled world, it is becoming ever more difficult to understand movement from within the limited confines of a static position. Indeed, the simple question of changing food habits could suggest a relatively stable set of practices within a similarly stable environment, which would allow for replacement of some habits with others, whereas in reality food choice is both a dynamic and ever-evolving movement. In my own work, for instance, the very landscape of actors and stakeholders implicated in the development of entomophagy was in constant flux – producers launched businesses and shut them down a few months later, processors climbed up the supply chain to produce their own raw material, business partnerships broke down into separate entities or disintegrated; research and development endeavours were touch-and-go. At the consumer end, meanwhile, attitudes evolved quickly and dramatically. When I began studying the topic, people gaped as I told them about my research, looking at me as if *I* was the compound-eyed, antenna-clad aliens I was suggesting they could eat. Conversely, I was recently asked by a Radio-Canada producer from *Les Années-Lumière* to comment on the edibility potential of locusts that were swarming in East Africa, destroying crops along the way; astonishingly, when the radio show had covered the issue the precedent week, a number of listeners had called in to suggest that eating the offenders might prove to be a productive pest management tactic. In such a context-in-motion, and without the benefit of a historical perspective that could afford the delineation of a more-or-less fixed research object, I could only jump into the fray and attempt to sketch out a shifting field through participating in a number of its emerging features.

I started by immersing myself in all things insect, reading of course all of the relevant literature I could find, but also collecting hundreds of articles, shows, podcasts and videos, setting up automated alerts to notify me about any mainstream or specialized publications related to edible insects, joining eight Facebook special-interest groups from throughout the world, including two in Québec, "following" more than thirsty industry members on social media, and receiving dozens of messages from friends and family each time the topic hit the news. Thus I was kept in a constant state of buzz, a second-hand information backdrop for my data collection in the field. To conduct the fieldwork itself, I thus drew some initial inspiration from multi-site ethnography literature, mainly works by Marcus (1998; 1995), as well as subsequent works by Falzon and Hall

(2012) and Coleman and Von Hellermann (2013), in order to design a multiple-perspective, nonlinear data-gathering approach to provide a constellation of material and a sense of a movement still unfolding, rather than a fixed shot – a multi-*sight* approach, in a sense, though the phrase places undue focus on a single sense, whereas my research was fully embodied and multisensory (more on this later). It must also be noted here that I did not conduct classical ethnographic research *per se*, but rather a mosaic of fieldwork activities intended to map the movements of some insects from farm to fork, not as a single linear progression but rather as a set of paths across a multi-dimensional field, working my way from participant observation and interviews with producers and transformers, all the way to potential consumers (neophytes, regulars, and non-consumers alike). This method of "follow[ing] the thing", in Marcus' words', to allow "the sense of system to emerge ethnographically and speculatively by following paths of circulation" (1995, 107), helped mitigate some of the difficulties involved in mapping an emergent trend, a movement. Thus this multi-*sighted* research work accommodated a more rounded perspective on the issues at play. Following some insects from farm to fork allowed me to seize on revealing snapshots of the entire process without pretending to capture a definitive analysis of what would be a fixed and finite phenomenon, while imbricating it into a multilayered sociocultural contextualization. This methodological approach and the flexibility it both allowed and demanded were crucial in answering the research questions I formulated in the previous chapter, including how market actors are promoting their bug products, what are some of the issues they face, and how consumers are responding and adapting (or not) their attitudes. Moreover, it is in line with the developmental theoretical framework in food studies as detailed in the following chapter, in its interest for the entirety of the food phenomenon within the larger social context – a systems perspective that incorporates production, transformation, distribution and consumption, as well as sensory appreciation, culture-driven attitudes and social circumstances surrounding adoption and consumption.

The multifaceted nature of food practices in general, and the diversity of systems I examined in the specific case of entomophagy, called for a multi-discipline approach rather than a more narrow, strictly disciplinary method. In considering the question of integrative methodologies, I here draw on Julie Thompson Klein's (2019) study of multi-, inter-, and transdisciplinarity. Her fine-cut typology establishes multidisciplinarity as a "juxtaposition" (2019, 23) in which disciplines retain their full separate identities, rather than a disciplinary and epistemic integration. On the other end of the spectrum, transdisciplinarity aims for a "systematic integration of knowledge" (2019, 29) that can have transgressive, critical or even anti-disciplinary tangents which endeavour to reorganize the very structure of knowledge. Situated between these two poles - where exactly depends on methodological, philosophical, empirical and often institutional positionings – is interdisciplinarity, driven by ideas of disciplinary integration and collaboration. The scope of this integration depends on the number of different disciplinary fields involved, and in the compatibility of their relevant methodologies and epistemological underpinnings. My own work adopted a triple (sub)disciplinary lens, using theoretical and methodological frameworks from Food Anthropology, Food Marketing, and Sensory Studies (itself an interdisciplinary field). Because of this emphasis on sharing methods and tools, it can be understood as drawing from and building on methodological interdisciplinarity more specifically, which borrows and includes or integrates methods and concepts from different fields in order to "test a hypothesis, to answer a research question, or to help develop a theory" (Klein 2019, 24). The developmentalist theoretical framework detailed in the following chapter, meanwhile, accommodates (or perhaps even demands) a theoretical form of interdisciplinarity to better apprehend the intricacy and shifting

nature of an emerging phenomenon such as the entomophagy movement. As Klein underlines, "[i]nterdisciplinary activities interconnect in a shifting matrix with unpredictable synergistic relationships" (2004, 3) – a proposition that carries risks but also rewards, and one that is uniquely suited to studying complex problems.

My data-gathering constellation process thus included fieldwork in selected locales as well as interviews[1]. I began with informal surveys on the topic within Food Studies and other undergraduate classes, in the context of presentations I was asked to provide to students by professors in Sociology and Marketing (Concordia), Nutrition (McGill), Anthropology (Ottawa University) and Geography (Ottawa University). This allowed me to test some potential questions for later surveys and interviews, and to see which lines of inquiry could be further pursued. As part of my fieldwork, I then conducted semi-directed interviews with twenty-seven actual and potential stakeholders in the industry: three insect producers (two in Québec and one in Ottawa); four insect-food processors (two in Québec and two in France); eight entrepreneurs looking to integrate the market (five in Québec, two in Ottawa, and one in France), one researcher (in Copenhagen), one entomologist (in Québec) and ten potential consumers from the lay Québec public. Of these latter ten, three were men and seven were women; the youngest was in her mid-twenties and the eldest over 70. Four participants were recruited through an edible insect foraging workshop I participated in, which I detail in the following section. The others were selected from a pool of volunteers from a local community group on Facebook, which I am a member of, after they answered a series of preliminary questions to ensure a diversity of perspectives and to include current, potential and non-consumers. Participants who agreed to be identified in the thesis are referred to with their full names. Others are designated by their initials only. Interview duration lasted between forty-five minutes and an hour and thirty minutes, and were recorded with participant approval (the open-ended interview guide I used is included in appendixes). All interviews with consumers were conducted in the winter of 2019; interviews with industry members were conducted between 2016 and 2019, a long timeframe that allowed for the accommodation of fluctuation in the marketplace. It must be noted that although the vast majority of my participants were from Québec, I chose to incorporate seven nonlocal industry members to allow for a broader contextualization. Some of these participants were chosen because local equivalents were nonexistent (for instance, Canadian researcher Josh Evans, who was at the time based in Copenhagen's Nordic Food Lab, was accomplishing unique and seminal work; Ottawa-based producer Andrew Afelskie was the closest producer at a time when no one was operating in Québec). In other instances, nonlocal participants allowed me to integrate a productive comparative approach (for instance, between marketing strategies used by pioneers such as Jimini's, in France, and Québec forerunners Naäk, both operating in a cultural context where insects were generally considered inedible and revolting).

Apart from interviews, I engaged in selected fieldwork activities. I conducted four months of participant observation in an insect-production startup; visited a product research and development laboratory and a Michelin-starred restaurant; took part in a edible insects foraging workshop; organized insect-tasting events and a creative product-imagining workshop for the lay public; attended three outreach and trade events (two in Montreal and one in Detroit); and participated in the foundational meetings of both the North American Coalition for Insect Agriculture (NACIA, initially known as the North American Edible Insect Coalition [NAEIC]),

[1] Ethics compliance protocol #30009976 from Concordia University.

in 2016, and the Fédération des producteurs d'insectes comestibles du Québec (FPICQ), in 2018. These activities are detailed below and/or in the relevant chapters.

I started background research by visiting, in July and August 2015, selected settings in Denmark and France, where entomophagy was gaining some traction among non-traditional consumers. The five participants I interviewed at the Nordic Food Lab (Copenhagen, Denmark), Restaurant Aphrodite (Nice, France), and Jiminis (Paris, France) worked to transform attitudes towards insects, presenting them as either as luxurious, hedonistic products (the former two) or fun and social foods (the latter). I began with researchers at the Nordic Food Lab, a research and development offshoot of René Redzepi's restaurant Noma, which topped Restaurant magazine's *World's 50 Best* list four times. The institution had been serving insects as part of its complex and multiple-hundred euros tasting menu since 2012, spurring the discussion about what can be consumed, what are locally appropriate foods, and how gastronomic luxury can provide a sheen of acceptability to even the most unusual ingredients.

Conversely, when I spent a day cooking "on the line" with David Faure, of Restaurant Aphrodite in Nice, he credited his insect-based menu option with the loss of his Michelin star and claimed to have received death threats regarding his insect-based interpretation of *provençale* cuisine. His restaurant has since closed its doors. In such settings, entomophagy can take on the sheen of an exclusive and luxurious practice, but it can also raise considerable cultural backlash and public disparagement.

A refined cricket-based dessert created by David Faure. Photo by Laura Shine. Nice, August 11, 2015.

I also interviewed Bastien Rabastens, of French firm Jimini's, one of the first to transform and market insect products. The company's hip, young founders had adopted a "fun new product"

stance that posited insects as a sustainable alternative for already well-established social rituals such as *l'apéro*, pre-dinner drinks and snacks shared with friends. With their fresh package designs and trendy marketing tactics, they were hoping to drape the rational-benefits approach in a stylish and fashionable sheen.
I also spent four months doing participant observation as part of the cricket farm start-up GrowHop, in Ottawa, which had positioned itself as a potential large-scale supplier for Québec processors and consumers, due to the geographical proximity (no farms were operating in Québec at that time, although most of Canada's processing firms were located here). Founder Andrew Afelskie had obtained considerable funding (50 000$) from the Business Development Bank of Canada to open a breeding facility; I participated in launching a fundraising campaign, attended numerous public events at which he presented his project and interacted with potential customers, helped install the initial farm infrastructure and grow the first generations of microlivestock, and assisted him in developing recipes to promote his product. However, the business failed in spring of 2016, only a few months after it was launched, highlighting some of the difficulties plaguing the industry – in this case, not so much the lack of enthusiasm or of demand, but rather the challenges inherent to raising novel 'minilivestock' with little available expertise, and in legislative limbo.

In May 2016, I also attended the founding assembly of the North American Edible Insect Coalition in Detroit (which included many early stakeholders from Québec; it has now been renamed the North American Coalition for Insect Agriculture [NACIA]). The NAEIC's objectives were delineated at this meeting, as were the chief preoccupations of its members, through a set of collaborative workshops in which I took an active role. Legislative frameworks, consumer outreach and education, technical support and standard operating procedures, and market development were among the top stated priorities. This meeting took place at the first official Edible Insects conference in Detroit's Wayne State University. During this occasion, I presented my research and met the vast majority of actors (over 160 participants) in the North American (including Mexico) entomophagy community, in the business, non-profit and academic fields, as well as many from overseas, including Europe, Africa and South-East Asia. This event was widely considered to be one of the foundational milestones in the establishment of the North American industry. Conversely, the local equivalent, the FPICQ, whose foundational meeting I also attended, struggled to find its feet; as detailed in Chapter 5, it foundered after a short while without having accomplished any of the objectives outlined during the initial assembly, a case study in the difficulties involved in uniting disparate and sometimes competing stakeholders under a single umbrella.

Participants discussing central objectives at the NAEIC's founding roundtable. Photo by Laura Shine. Wayne State University, Detroit, May 28, 2016.

On the consumer side, I participated in and organized a number of public and private trade fairs, outreach events, and tastings, some of which included or were followed by semi-directed interviews with participants. Two events in particular allowed me to investigate the relationship between outreach activities and the potential subsequent evolution of affects both with insects themselves and especially with the idea of eating them, in line with the research avenues suggested by Shockley and Pitt (2014) and Looy, Dunkel, and Wood (2013). One was a creative, hands-on event I organized in Concordia's 4th Space gallery, inviting participants to use a variety of craft materials to design more acceptable or satisfying insect food products. The event allowed me to explore how conceptions of hedonistic and rational benefits were, in fact, deeply intertwined, and how notions of acceptability strongly factored into food choice (Chapter 6 includes an in-depth analysis of design results).

The other event was a wild harvesting workshop led by entomologist Étienne Normandin, one of the foremost figures in the budding Québec entomophagy community. The activity took place at Gourmet Sauvage, a family business located in St-Faustin, Québec, specialized in wild harvested products and foraging workshops. The 15-person entomophagy workshops, at least two per summer, had been consistently sold out since they were launched a few years prior, attesting to a sustained curiosity in not only eating insects but in eaters' broadening palates and their desire to inquire beyond the better-known farmed cricket products. During the full-day event, Étienne showed participants how to collect close to twenty edible species and prepared the harvest for sampling at the end of the day. I both participated in the harvesting and preparation and explained my work to attendees, also using the occasion to recruit four participants for later interviews.

Is it fieldwork activities such as the latter, which required enduring the brutal midday heat to gather grasshoppers in the field, sorting through fetid decaying muck to find writhing grubs, confronting angry hornets, and queasily nibbling on a fried dragonfly larvae – large, alien-like, with a hard shell and mushy insides – that disavow the concept of "multi-sighted" research, as I note above, and highlight my inevitable imbrication and implication in my object of study, one that could not be constructed or construed independently from my own embodied and multi-sensory experience. Far from allowing the investigator to adopt the (impossible) distanced observer perspective that has often been fantasized about in social science, my research required a sweat and grit involvement that implied physically ingesting the objects of my inquiry, digesting them and making them my actual *self*, generating appetite, hesitation, and disgust, sometimes in such close proximity that they seemed undissociable. I too, like many of my participants, experienced a changing spectrum of affects in relation to insects, and to eating them. This became especially salient as my own body changed through one pregnancy and then a second, fostering an unfamiliar restraint towards novel foods and a simmering disgust in the face of insects I had previously enjoyed without a second thought. The physically embodied nature of food research precludes the very idea of a detached observer, as illustrated in the curious and expecting stares of participants – and of facilitator Étienne – in the harvesting workshop, as I hesitated to sample the infamous dragonfly larvae. As they looked on, I knew I could not reject it as most of them had, somehow feeling I needed to tangibly engage to earn my badge of a *bona fide* researcher – a feeling no doubt shared by countless anthropologists faced with practices that physically repulsed them but which they felt they had to partake in to engender mutual trust.

The fieldwork and interviews I conducted thus deeply informed my reflection and analysis and allowed me to sketch a revealing portrait of an industry on the move, one that nonetheless remained imbricated in a complex and powerful cultural context that I also investigate in the following chapters.

Chapter 3. Theoretical framework

Étienne Normandin spent five years opening creaking drawers to reveal a rainbow of wings and shells, folding and unfolding minuscule legs, adjusting a lens, and compiling shots.

As coordinator of Université de Montréal's Ouellet-Robert entomological collection, Normandin had unfettered (and, of course, sanctioned) access to a trove of preserved specimens, thousands of which he patiently extirpated from their cases, removing pins and various attachments, sparingly rehumidifying the tiny corpses to allow for a modicum of movement, extending hair-thin legs and antennas and papery wings. He approached a mounted camera affixed with a macro lens, taking a series of pictures varying in fractions of millimeters in depth; each shot published in the resulting book is a composite of five photos on average, to provide maximum precision and depth of field. When *Les insectes du Québec et autres arthropodes terrestres* was finally published in June 2020, it was the most comprehensive and meticulously researched compendium on the province's arthropod fauna, with 2354 listed species and 3300 colour pictures, a true work of mastery and passion.

But museum work was only part of the story. As an entomologist, Normandin is familiar with the painstaking minutiae of insect collections, but also with the fully embodied work of gathering species in the wild – dragging a heavy toolbox of nets, bottles and traps; braving the sweltering heat and humidity; lying face down on the dusty ground; standing amid bustling swarms that goad our deepest flight instincts and can inspire terror even in seasoned scientists (in *The Infested Mind*, entomologist Jeffrey Lockwood (2013) recounts the debilitating entomophobia he experienced for years after getting caught in a locust swarm while conducting fieldwork). As such, Normandin is intimate with the ambivalence of catching and killing – of stopping in its movement, its vivaciousness – the very beings he wishes to know, of extinguishing the very life he wants to understand. Among the last naturalists to still practice their craft as a largely post-mortem endeavour, entomologists who heed the call of research (rather than the more common one of extermination and pest control, with its less conflictual ambitions) are deeply familiar with the disquieting paradox of capturing life to study it, of loving and killing, of stopping in its tracks the very movement at stake. Yet they do, with an array of tools and techniques, of potions and pins, preserving behind glass the crawling, squirming beings that inhabit their minds and dreams. Their practice is a window, but it is also a mausoleum.

The following chapter can be understood as a sort of conceptual compendium, an overview of the theoretical pins and potions I packed into my own researcher's interdisciplinary toolbox, dragging it into both the field and the library to engage in the problematic endeavour of capturing (some of) the dynamics I wanted to assess and understand. Caught in a flurry of entomophagic activity – a swarm of sorts – I consistently reached for the concepts I detail here, striving to make sense of, or at least render a sense of, the movement through the analysis of some of its manifestations. Like the pins used to fasten tiny legs and bodies, some of these tools helped me immobilize particular instantiations and emergences, though their effect was temporary and the specimens were always set free; the fleeting stillness was needed for investigation, but the objects of inquiry were inherently part of a process in motion, not in themselves a self-contained product that could be studied independently from its context (does such a thing even exist?). Others concepts, in particular the theoretical framework of developmentalism, served as a lens to

examine the entomophagy phenomenon from both up close and farther out, providing a variety of snapshots and viewpoints which, once collated and composited, could offer a perspective both dense and complex. Taken together, the conceptual tools I describe here allowed me to transcribe my own situated experience in the world of entomophagy; not to permanently fasten anything, beguiling as it may be, behind framed glass, but rather to better examine it, allow it to shine, and again set it back into motion.

3.1 Can I eat this? Edibility, a baseline in flux

Throughout my study of entomophagy practices, in Québec and elsewhere in Western culture, the question of edibility remained a thrumming baseline, exemplified in the quasi-systematic saddling of the word *insects* with the moderating *edible*, in conferences, article titles, marketing tactics and industry jargon. In a mantra-like fashion, the repetition of *edible insects* serves to redress listeners' and readers' widespread perception of insects as *in*edible creatures, aiming to assuage fears about safety and induce a change in acceptance.

Yet despite its instinctive feel, edibility is a tricky term to define. When asking how, why and under what circumstances certain substances become acceptable foods or not – beyond the mere utilitarian baselines of nourishment and nontoxicity – the notion of edibility and of its determinants becomes a critical issue. How is edibility defined, and why? Are its parameters stable over time, and are they similar for all members of a group? Do they evolve, and if so, how? Why are only part of the potential foods – understood as nutritious, nontoxic items – in a given environment considered edible, while others are shunned? Setting the theoretical stage to answer such questions proved a necessary step in the research process before more specific instantiations of edibility assessment, such as that of insects, could be addressed.

As I will soon demonstrate, anthropology in particular has long grappled with this question and proposed a host of different approaches to considering how, what, and especially why human beings choose some foods over other potentially nourishing items. These broad-frame theoretical perspectives have aimed to apprehend and analyse this very question of edibility, one that is at the core of all human activity. Indeed, nourishment sits at the crossroads of physical, cultural and symbolic imperatives and defines large and vital parts of all social organisations. Torn between their need for diversified diets and their fear of adverse effects from ingested items, humans across all cultures have devised immensely intricate, far-reaching and constitutional sets of rules to establish and define edibility.

In order to better grasp some of the recurrent lay conceptions of edibility, I thus began by asking participants in my research to explain what edibility meant to them. Both Mylène Désilets (Interview 9) and Simon Martin (Interview 10), the most daring participants in my research, offered in return a question of their own: "has someone else eaten this before?". Such a concern plainly illustrates the social facet of edibility determination, a heuristic measure that uses one's group as a proxy for personal experience. Anjali Wildgen (Interview 1) and LN (Interview 5), on the other hand, defined an edible substance as one that is safe to ingest and causes no bodily harm, replacing physical risk at center of the omnivore's dilemma, a central notion I will define shortly. Marie-Hélène Lévesque (Interview 7) added a utilitarian twist, mentioning the importance of nutritional value in potential foods. Nontoxicity was thus judged insufficient, as

the aliment had to provide an added benefit to the eater. Few participants mentioned palatability, taste or other sensory characteristics (though LN did include "chewability"), and when these were evoked, they were usually seen as secondary criteria or even non-compulsory additions. Anna Krahotin (Interview 2), for instance, explained that edible substances were first and foremost nutritious; pleasure, both in sensory terms and commensality-based, were seen as added bonuses. Food thus "nourishes the body but, if you can choose, also the soul". As participants highlighted some of the common driving concerns in establishing edibility, it became evident that such an evaluation was based on functional, symbolic, social, cultural and hedonic stated criteria, but that not all of these were accorded the same importance.

Building on these intuitive leads, I here outline some of anthropology's foundational frameworks surrounding food choice in a historical perspective while including a viewpoint on their current relevance and applicability in the changing landscape of food habits, with a deeper focus on developmentalism, which informed my theoretical framework. I then examine related concepts that shed light on contemporary alimentary practices such as *gastro-anomie*, risk assessment, and categorization, additional tools I mobilized throughout my research process. Finally, drawing on wider, transdisciplinary approaches that include the role of affect in food choice, I delve into the specific question of insects as a potential food.

3.1.1 Anthropological perspectives on edibility and its determinants

Human beings must eat.
From this obvious yet crucial statement stem a number of related questions. What can and what should we eat? How can we choose safely? What if we run out? How should we eat it? With whom? What effects will this eating produce? Though humans are omnivores, they cannot, and do not, eat just anything; what specific groups consume is ever only a fraction of what is available in their environment, at least under ordinary circumstances. Thus all that can be eaten is not necessarily deemed edible, or acceptable as food. The classification schemes varies from one human group to the other, and include a variety of parameters.

> The reasons for categorizing some materials as not for eating or not 'food' can be economic, nutritional, medicinal, ideological or religious. In fact, in every culture, in every social group and in every different moment in time people can attribute such meaning to different substances. That which is food for some is for others not food. All this can be reduced to one fact, however, that food is that which people eat and non-food is that which people do not or should not eat (MacClancy, Henry, and Macbeth 2007, 43).

The production or procurement of food, its preparation, and its consumption are subjected to myriad guidelines and constraints that can be geographical, physical, social, cultural, economic or political in nature and fluctuate over time. Cuisine – the culturally constructed practices that surround the procurement, preparation and consumption of foodstuffs (Armelagos 2010) – can be understood as a matter of rules and classification, which obey a step-by-step logic (Fischler 1988). A first stage is to determine whether the object at hand can be safely consumed, a task which is accomplished, among omnivores such as humans, either by individual experience or cultural learning – or both. This is not, as Fischler points out, self-evident; though some items

may be consumable, even beneficial, from a nutritional point of view, they can be excluded *de facto* from this first categorization; he uses the case of insects to demonstrate this point, as well as Mary Douglas's example of the fox. While both are, from a physiological point of view, not harmful to human health, neither would be considered edible in most Western cultures.

If it passes the edibility test, a foodstuff must still be the object of social approval, that is not be recognized as taboo. Indeed, taboos are only relevant in the case of edible items, which then fail to be included in the comestible category (Douglas 2002). I would add to this idea that though many edible items are not tabooed, they may still be disregarded by the eater for a number of reasons, thus not incorporated into the diet; I will further examine this idea later on. Finally, if a food passes both of these initial assessments, it can be subjected to socially and culturally defined rules of propriety and context, including those pertaining to the eaters themselves (is this food appropriate for a certain age, sex, social rank and status, etc.?), to the social circumstances of the meal, to issues of chronology, to appropriateness for certain criteria of health, and to interrelations between the foods themselves. For instance, gummy candy is generally considered to be children's foodstuff, while coffee is usually consumed by adults. Alcohol, also reserved for consumers of a certain age, is acceptable in some circumstances and shunned in others – in cultures where consumption is accepted, a glass of wine is more suitable in the evening, with friends, than solo in the morning. Both of the latter substances are strongly correlated to a certain rite of passage; you can only consume them acceptably if you've reached a certain age, which varies from one cultural group to another. Many foods are thus submitted to specific rules of consumption that define and circumscribe their appropriateness.

Moreover, food and cuisine have meaning: through the complex sets of rules that govern edibility, people communicate with others, encoding messages about kinship and interpersonal relations, social class, special events, personal values and lifestyle, and many others. In doing so, they also establish the boundaries of their own identity and reaffirm their belonging to a group that shares similar constructs (Paddock 2015). Indeed,

> [b]y accepting certain items as 'food' and rejecting others, and also by culturally processing raw items and combining them in structured and patterned ways, human beings define what it means to be a particular kind of human being, one who belongs to a particular community or identifies with a particular social class or way of life (Messer 2007, 53).

Thus the study of foodways – the concept which encompasses the complex process of establishing edibility – has long been of interest for anthropologists keen to understand the dynamics of group formation and identity. More than just sustenance, food refracts and constructs complex meanings, and reveals the underlying schemes that help the eater make sense of the world. It is in this sense that Lévi-Strauss articulated his famous aphorism, claiming that foods must be "good to think" before they can be "good to eat" – affirming the primacy of symbolic structures in determining edibility over the nutritional benefits conferred by one food or another. While his view drew strong criticism, as I will show, it marked a turning point from nutritionally-informed and functional studies of human foodways, which emphasized the role of foods in maintaining social order and cohesion.

In order to better frame the notion of edibility, I will highlight some of the different parameters that are used to define and examine foodways. Starting with some of the fundamental constraints that govern our choice of foods, I then launch my inquiry into the diversity of theoretical approaches to food practices with a central concept borrowed from Claude Fischler. Though parts of his work have been filed under some of the strict categories I will outline in a moment, it seems to me that some of the frames of analysis he puts forward – namely that of the omnivore's paradox – are decisive bases to launch an investigation into foodways and the construction of edibility. In underlining the pervasive anxieties that underpin the act of eating, he opens the doors to many takes on why and how humans choose what to eat. I then move on to some of the theoretical approaches that have examined foodways. In this regard, however, a word of caution is provided by Jack Goody when he states that the labels used to identify such approaches "are all terms of art that are used to break up the continuities of theoretical and empirical enquiry in ways that are often more necessary as crutches for the commentator than as guides for the practitioner" (1982, 29). With this caveat in mind (though he himself admits the necessity of temporarily isolating distinct stages in this theoretical continuity, and proceeds to do so), I nevertheless borrow the tripartite division employed by authors such as Mennell, Murcott and Van Otterloo (1992) and, more recently, Beardsworth and Keil (2002), in their breakdown of the theoretical history of sociological and anthropological food studies. *Functionalism*, first in the chronological sequence, strives to underline the ways in which food production and exchange help form and enforce interpersonal bonds and ensure the continuity of the social group; as part of a holistic whole that is society, food serves both the individual's own needs and the society's more generally. In reaction to such analyses was developed the *structuralist* approach, which disregards food's functions to focus instead on the deeper structures of thought revealed through the study of cuisine. Opposition between conceptual entities, in either a binary or pluralistic fashion, articulates much of the search for such structures of meaning that inform humans' understanding of the world. I briefly define these approaches in the following sections, before laying the foundation for my theoretical framework through the *developmentalist* approach. The wide array of stances housed under this label seek to incorporate elements from previous schools of thought, though with a new focus on social change as a driving factor in the construction of foodways. In observing food choice through a historical lens (among others), they seek to uncover the driving forces that shape the evolution of food production, distribution and consumption, especially as the pace of change has accelerated over the last few decades. It is a theoretical stance appropriate for the analysis of changing foodways and evolving notions of edibility, and one that can accommodate the case study of a particular aliment such as, in this case, insects.

Moving on from anthropological frameworks, I then examine more transdisciplinary analytical avenues that shed a complementary light on the shifting nature of food acceptance and can illuminate specific aspects of evolving practices such as entomophagy. First is another concept of Fischler's, *gastro-anomie*, which emphasizes the disintegration of rule systems governing food intake in highly industrialized societies. In this regard, the onus of choice shifts in great part to the individual who faces, often alone, the multiplicity of options offered by the contemporary food system. Yet in this uncertain terrain, the omnivore's paradox remains, along with its inherent anxieties; in the case of insects, this means that individuals dispose of a greater leeway in choosing to sample them, but that they are left alone to face the risks – both physical and social – related to their consumption. Building on this idea, I then draw from Torbjörn Bildtgård's work on risk mitigation and trust-building in contemporary foodways to add another layer of

consideration to the analysis of contemporary notions of edibility, one that is particularly significant in a cultural context in which insects are deemed unsafe and unclean. Finally, I examine the role of categorization in food choice before drawing on affect theories to apprehend the specific case of insects and their potential edibility.

a. Setting the table

Two fundamental series of constraints underpin the establishment of edibility.
All human beings are confronted with hunger and the need to eat to sustain life. Though the specific needs may vary somewhat according to age, sex, occupation, and other factors, all human animals share a set of nutritional necessities – sufficient amounts of food in the right proportions, energy and basic nutrients such as protein, fats, simple and complex sugars, vitamins and minerals, etc. Moreover, they need to consume items which will not make them sick or endanger their life; thus foods are generally thought of as being non-toxic, at least in the short term (though some aberrations such as the potentially perilous consumption of fugu fish, the accumulation of toxins through repeat consumption of certain items, and the inherent health hazards in consuming many contemporary highly processed foods blur this definition). Though this may seem like an evidence, it is necessary to keep in mind to justify the extreme lengths to which human beings will go to feed themselves; though they may create elaborate schemes to determine the edibility of this or that foodstuff, the drive to eat is no flight of fancy, but a response to a basic and inescapable need. Moreover, as tightly bound as rule systems may be, humans regularly discard such systems in situations of dire need – as is apparent in instances of famine, siege, or extreme deprivation in which cases of eating pets, pests, leather, dirt, or even other human beings are reported, although such items are typically tabooed, or even considered inedible, when other foods are accessible. Thus biological determinants cannot be completely disregarded in the study of food habits and behaviours.

Also comprised in the physiological realm are notions of palatability and sensory pleasure. Though the need to eat is universal, not all aliments are equally enjoyable or easy to consume and digest. For instance, the palatability of meat and many starches was tremendously increased as fire was domesticated, and increasingly used to cook foods. In many cases, digestibility and nutritional value were also improved, leading to the now commonly accepted idea that learning to cook foods was a technological cornerstone in the development of humanity – both thanks to the biological advantages it afforded (larger brains, shorter digestive systems, etc.) and to the social life it fostered around the fire.

Sensual aspects of food consumption also play an important role in the perception of edibility. Though this observation is somewhat contested (see for instance Mennell et al. 1992), it seems most humans may be inclined to accept sweet, fatty, and protein-rich foods more readily – possibly because the sensory qualities of such items signal nutritional density – while bitter foods tend to encounter more resistance, as this often signals toxicity in wild species (Armelagos 2010). Such preferences are of course subject to conditioning from even the earliest stages of life, and can be transformed through habituation and repeat exposure. Yet it nonetheless seems that a majority of individuals share these initial tendencies, which no doubt influence the development of food consumption patterns throughout life.

A second set of constraints that underpin food choice is the simple availability of specific items, whether it be limited by geographical, social, economic or political factors (Mennell et al. 1992). Although a foodstuff may be edible in the absolute – in the sense that it can provide nutrition without detriment to health – there is little chance that it will be included in specific eating schemes if it is simply nonexistent in the environment or made inaccessible through economic or politico-legal restrictions. Again, this may seem like an evidence, but it is crucial to consider when examining how traditional rule systems – for instance, those defining kosher foods – are applied to foodstuffs that were non-existent or inaccessible when such systems were established. Yet even within the boundaries of accessible, palatable, non-toxic and nourishing foods, the diversity of food practices is staggering. Among all the edible foods present in their environment, humans choose a limited and *relatively* stable set of items to consume, disregarding or even tabooing others. They select foods deemed comestible among what Beardsworth and Keil call the "alimentary totality" of a society – "the whole range of aliments available during a particular time period" (2002: 67). As omnivores, humans can consume an extremely vast number of foods; yet they cannot rely solely on one type, both because they require a diversity of nutritional elements present in different foods, and because they are liable to develop 'palate fatigue' when a single food is consumed continuously (Armelagos 2010).

Omnivorousness presents a number of advantages – greater adaptability to a myriad environments than specialized eaters, the capacity to survive ecological shifts and population displacements – but also many challenges. Fischler succinctly presents these as the "omnivore's paradox" (Fischler 1988, 2001), drawing from Paul Rozin's seminal work on rats (1976). Contrarily to monarch butterflies or koalas, for instance, humans are incapable of obtaining all necessary nutrients from a single source. Therefore variety is not only a possibility, but an obligation – a reality that can foster *neophilia*, the desire and compulsion to seek out new foods. Yet an opposing force structures our quest for food, as any unknown substance is liable to cause damage. Consequently, humans are also *neophobic* – weary of new foods and conservative in their eating habits. At the tension between these two poles lies the omnivore's paradox, which Fischler calls a double bind (used in English in the original French version of the text), an oscillation between security and variety which generates a fundamental anxiety in human beings. At the heart of this anxiety is the act of incorporation – the displacement of an element past the ultimate frontier between the external world and one's own body, not so much the mouth (a sort of antechamber from which it's not too late to turn back [Fischler 1998]) as the throat and the entrance of the oesophagus. As an item is incorporated, it becomes part of who we are, both literally, as its nutrients are transferred for use in the human body, and symbolically, as humans tend to associate parameters of their identity, both as individuals and as groups, to the foods they consume as the "non-self" becomes "self". Thus the risks of incorporation are simultaneously vital and "imaginary" (Fischler 2001, 66). But the act also implies a form of hope, as it allows the eater to reinforce a preferred or even an aspired sense of identity.

To mitigate the risks, humans – like other omnivores such as rats (Fischler 2001: 64-5) – rely both on individual experimentation with new foods and, to a greater extent, on learned behaviour and shared knowledge. Indeed, human groups have developed vast and complex cultural systems that define acceptable foods and help navigate the uncertainties related to unknown aliments. Through cuisine, which Fischler defines as a "body of practices, representations, rules and norms relying on a set of classifications" (my translation, 2001: 65), these strive to alleviate the

omnivore's paradox. In this sense, the incorporation is double: it relates both to the food being ingested, and to the incorporation of the eaters themselves into a culinary system and into the group that practices it (Fischler 1998).

Food is hence crucial to the construction of the individual's sense of self, but is also used as a social marker to delineate one's social identity (De Garine 2001). It can signal, among other things and depending on one's school of thought, adaptive responses to ecological pressures (Harris 1998; Ross et al. 1978), collective structures of representation, hierarchy, social structure, organization and differentiation, and divisions of power (Paddock 2015). Foodways can also serve as a locus of differentiation from others through group cohesion (MacClancy, Henry, and Macbeth 2007). Thus, as Fischler outlines (1988), there are at least two axes that underpin the human relationship to food. A first axis links the biological (or nutritional) to the cultural (or symbolic), to which Fischler associates behaviour and practice respectively. A second axis is established between the individual and the collective, signalling that food systems are neither entirely defined by group imperatives, nor by individual endeavour. Neither are they entirely preordained by design or culturally constructed (a nature/culture divide which Fischler, for one, seeks to overcome); they are, instead, produced by the interaction of many concurrent dynamics. Yet precisely how and why the rule systems governing edibility are developed and put into practice has been ardently debated through the history of anthropology in its marked interest for food practices.

b. The functionalist approach to edibility

Many of the pioneer anthropologists who studied foodways, Bronislaw Manilowski and his student Audrey Richards among the most influential, adhered to a functionalist perspective, considering food practices as a part of an organized whole that is society, somewhat like a living organism comprising a number of functional and interdependent systems. In Beardsworth and Keil's terms, "society is seen in holistic terms and as having emergent properties which spring from the complex interrelationships and interdependency of its component parts" (2002: 58). Society is thus understood as encompassing smaller functioning entities that serve its members in different ways but also maintain the society's cohesiveness and ensure its survival over time. All such entities are linked, yet each can be studied in depth to understand its internal logics and its place within the whole system. Edibility, then, is understood from a practical perspective: foods are deemed acceptable because of their nutritional and social value, for the nourishment they provide individuals and the cohesive roles they endorse in a given society – as exchange items between members or as signifiers of kinship or gender relations, for instance.

Over the course of the twentieth century, functionalist theories have come under strong fire for their ineffectiveness in accommodating situations of social change and conflict, due to their strong emphasis on stability and continuity. Moreover, their focus on foods and foodways has mostly meant a neglect of cuisine as such, as Fischler signals (2001). Though stringent functionalism has consequently fallen by the wayside, some elements do remain a crucial part of contemporary anthropological studies of food. This is especially the case, as Mennell and his co-authors point out (1992), through the frequent recourse to nutritional science to explain survey and questionnaire results, with the attached implicit ethnocentrism.

c. The structuralist approach to edibility

In discounting the somewhat utilitarian aspects of food to consider the symbolic function of cuisine, structuralist theories strive to uncover deeper, underlying social structure revealed by food patterns. Moving away from a certain essentialism – the consideration that "what makes a item of food acceptable is some quality inherent in the thing itself" (Douglas 1978, 59, quoted in Mennell et al. 1992, 9) – structuralists clearly established that 'taste' was the product of social and cultural learning. Building on linguistics theory, the structuralist behemoth Claude Lévi-Strauss aspired to decipher the "language" of cuisine to gain access to underlying structures that dictate social life in particular societies, but also to decrypt some fundamental structures of human thought which, while the exact content of such structures would vary across societies, aspired to a certain universality in their general configurations (Lévi-Strauss 1964, 1965). As such, he explained that foods are first and foremost 'good to think', insisting on their symbolic importance for social groups rather than their nutritional contribution to human biology. Drawing on foundational oppositions between nature/culture and elaborated/unelaborated, he devised a 'culinary triangle' in whose corners he placed the conceptual categories of the raw, the cooked, and the rotten, as well as accompanying cooking methods, namely roasting, smoking and boiling. Though he hoped this system to be universally applicable, subsequent structuralists would concentrate on variability rather than universality, focussing instead on understanding the specific principles and categorization schemes relevant to a particular society.

Mary Douglas, for instance, sought to understand how specific food patterns could be used to communicate messages about social events, relationships, and boundaries. Again working through contrasts between conceptual categories, though insisting on their relative cultural value rather than the absolute dichotomies favoured by Lévi-Strauss, she explained that no food unit or event signifies on its own, but instead must be understood within the greater intricate scheme in which it is embedded.

Roland Barthes also firmly drew on structuralist theories in developing his analysis of foodstuffs as elements of information or *signs*, noting how ingredients such as sugar for instance are "not only an ingredient, but an 'attitude', which is linked to uses, to 'protocols', which are not only alimentary", and that the taste for such ingredients is embedded in the "collective imagination" (Barthes 1961, 978–79).

In this perspective, edibility thus rests on symbolic, rather than material, valuation, and food choices act as often unwitting revelations of the deep structures that organize social life.

Like functionalism, structuralism has been powerfully criticized, and in many aspects, rebuffed outright. Though it mostly avoids the pitfalls of ethnocentrism that afflict many functionalist works, it "moves so far to the pole of extreme cultural relativism that it overlooks any possibility of explaining differing food habits – particularly their origins – in terms of purpose, function or utility" (Mennell et al. 1992, 8). In other words, the severe opposition to prior theoretical approaches prevented most classic structuralists from seeing beyond the deep structure to also consider the purposes pertaining to food choice and consumption. Moreover, as Goody shows, the strong (and to him, blinding) belief in underlying unconscious structures that govern everyday action leads to the occultation of the "relation between production, consumption and the social-economic order" (1982, 28) and the attempt to define biological factors such as hunger and the need for nourishment (food as being 'good to eat' *as well as* 'good to think', as I will show

shortly) out of the analysis. It also causes fervent adepts to disregard the importance of external factors such as climate and geography. Finally, structuralism's focus on fundamental structures has prevented the development of a convincing analysis of social change in the realm of food, which theorists such as Fischler try to tackle, combining the analysis of deep-seated structures such as the omnivore's paradox with an emphasis on rapid change and destructuration of food habit among members of industrialized societies (2001).

d. The developmental approach to edibility

In reaction to what could be termed the relative *stativity* of prior approaches, more recent authors have developed what Mennell and his co-authors house under the 'developmentalist' label, an array of theoretical stances that actively engage with the shifting nature of food practices. While the aforementioned theories might have held water for a while in more traditional and enclosed cultural contexts, where practices were heavily influenced by custom, they have consistently failed to explain the rapid and often dramatic fluctuations that can be observed in contemporary foodways and the apparent dissolution of normative systems pertaining to edibility. In their insistence that contemporary food practices must be examined in a historical light, developmentalists have thus by definition placed a greater emphasis on social change, rather than stasis. While they do not refute the symbolic power of food and cuisine or their impact on shaping and maintaining social structure, they generally do contest the binary opposition between nature and culture, preferring to demonstrate how both forces shape human food practices through dynamic interaction and tension. Edibility, in this case, is understood as a changing conceptualization, one that adapts over time in reaction to social context and that shapes it in turn.

Several main strains can be delineated within the broad spectrum of developmental theories. Building on Norbert Elias's work on 'culinary culture' and 'process sociology', Stephen Mennell investigated the shift from external to internal or self-constraint systems which shape food practices, showing that once food security became less of an issue for the ruling classes, external restrictions pertaining to availability made way for the more genteel and self-enforced, individual control on food intake, and distinction through more delicate and complex food practices, a process he termed the "Civilizing of Appetite" (1987). While recognizing the material importance of food choice – the need to ensure adequate nourishment and food security – he emphasized the adapting and evolving nature of rules and regulations surrounding edibility in response to "civilizing" pressures.

Jack Goody, for his part, showed in *Cooking, Cuisine and Class* (1982) how traditional and foreign food practices intermingled in northern Ghana. In distinguishing 'Eurasian' and 'African' foodways, he stressed that such denominations connoted more than simple geographic boundaries, and depended on "the wider socio-economic situations that mark those continents" (1982, 38). In adopting some Eurasian practices, foodstuffs and technologies, Ghanaians thus responded to large-scale pressures exerted by colonialism and its consequences, but also by increasing globalization. Perceptions of edibility, then, were shaped by both home-grown cultural imperatives and imported norms and ideas that permeated the local context over time.

In his landmark study of the history of sugar, Sidney Mintz demonstrated the profound social changes inflicted through the transformation in distribution patterns of a single ingredient, which from an exceptional and distinctive item of conspicuous consumption has become a ubiquitous staple whose invasiveness can only be controlled and staunched by those with sufficient cultural and economic capital to do so. Using as a telling case study the dramatic spread of sugar, he highlighted the far-reaching shifting dynamics of power at play when food practices cross boundaries:

> As the changes took place, the foods acquired new meanings, but those meanings – what the food meant to people, and what people signalled by consuming them – were associated with social differences of all sorts, including those of age, gender, class and occupation. They were also related to the will and intent of the nation's rules, and to the economic, social and political destiny of the nation itself (1985, 151).

In what would come to be known as world-systems theory, Mintz argues that the meaning of food practices arises from cultural applications, and is not simply meant to be deciphered as though it contained the keys to understanding deep-seated structures. Thus sugar, for instance, becomes inseparable from the actual historical and cultural dynamics that bind "ruler and ruled, exploiter and exploited, trader and supplier" (Anderson 2014, 241). The changing notions around the acceptability of a food and its perceived edibility – whether it be absolute (is this food edible?) or circumstantial (when, how, by whom can it be consumed?) – cannot be unbound from the infinitely complex cultural and social dynamics in which such notions are embedded, and which they contribute to transform in turn.

Many recent authors adopt a biocultural perspective in analysing food practices. Such a stance involves adopting a holistic point of view that "focuses on the coevolution of cultural and biological features" (Armelagos 2010, 161) and encompasses production, distribution, and consumption in a single process. It "pay[s] close attention to human biology, to culture, and to political economy, all at once – recognizing that all are necessary and important determinants of food systems" (Anderson 2014, 4). Thus food choice and the establishment of edibility are here understood as communicating messages about group solidarity, socially constructed regimes such as gender, class, and others, personal virtues and preoccupations, social distinction and differentiation, or special occasions. While the influence of normative systems on practice is uneven, this does not mean that foodways are improvised and exist as in a void; for their communicative function to operate, they must relate to shared sets of guidelines in a predictable and comprehensible way. Yet Anderson also argues that most change in foodways throughout history has likely occurred not because of taste imperatives, but rather of political-economic or environmental pressures, resituating changing notions around edibility as part of wider social and cultural systems that influence them and are transformed by them in turn.

In the case of edible insects, it was crucial to adopt from the very beginning a developmentalist stance that could take into account the multifaceted and ever-evolving dynamics at play both in the more restricted cultural setting I mainly focused on (Québec) and the wider context I occasionally draw from in the present dissertation. Indeed, examining the perceived edibility of insects, and its changing nature, required taking a step back to understand the local manifestations of a developing practice as situated emergences of a broader movement in the

Western world more generally, one that also drew on traditional practices from the Global South while striving to influence them (Chapter 5) and responded to contemporary pressures including but not limited to mitigating global warming and responding to perceived nutritional and fitness imperatives (Chapter 5) or fulfilling sensory aspirations (Chapter 6). Moreover, it seemed impossible to study the current phenomena independently from the culturally embedded perception of insects themselves, not only deemed inedible but even disgusting and potentially hazardous (Chapter 4). Finally, it was essential to examine the emerging edible insect industry in relation to the social valuation of the entrepreneurial spirit, for instance (Chapter 7), or to the differential power dynamics that shape factors such as access to capital and to means of production (Chapter 5). The developmentalist approach thus afforded the possibility of situating edible insects and their perceived edibility in the evolving cultural and historical context in which they were enmeshed, as manifestations of the imbrication of nutritional needs, cultural knowledge and rules, and individual intention and agency (Anderson 2014).

3.1.2 On contemporary anxieties: trust and tension on the menu

Within the overarching theoretical framework of developmentalism, I mobilized a number of concepts throughout my research process which I felt needed to be defined as they run like filigree throughout the present work and inform much of my analysis. Building on Fischler's omnivore's paradox, defined above in the section titled *Setting the table*, I briefly discuss the issue of trust in the contemporary food system as a driving factor in the perception of edibility. In subsequent sections, I examine categorization as a structuring force in the establishment of edibility before addressing affective approaches to the issue.

In his study of contemporary practices, Fischler contends that foodways in small, remote locales or in relatively isolated societies visited by early anthropologists might have responded strongly to rule systems that shaped and organized them, because the latitude eaters had was, *in fine*, relatively limited, subjected as it was to the seasonal, economic, customary, religious, social and chronological imperatives that structured the concept of edibility (2001). In contrast, urban dwellers over the last decades have found themselves faced with a disintegration of the traditional systems that dictated foodways:

> Modern foodways and the food service industry offer a variety of services and products that allow one to consume alone or with others, at any time of the day, outside of social constraints and that of etiquette, and to say it plainly, often away from the table (Fischler 2001, 213).

Yet the apparent freedom that accompanies the rise of individualism more generally also means that the imperative of choice is ever more important, as it looms over every single feeding activity and rests in large part on the shoulders of the individual eater. The coherent set of rules described by many of the landmark works of food anthropology are gradually replaced by the growing cacophony of clashing discourses, as Hugh Gusterson for instance demonstrates in the case of increasingly prevalent genetically modified foods (2005), while Anderson illustrates the many shortcomings of ubiquitous healthy eating campaigns (2014). Drawing on the etymology of gastronomy (with *nomos* referring to rules and laws) and on Durkheim's concept of *anomie*, Fischler thus proposes that while traditional societies may have been indeed gastronomical,

today's foodways are instead the product of a *gastro-anomie* (2001, 213) that softens or dissolves rule systems altogether. The alleged disappearance of the family meal, the grazing phenomenon that entices eaters to consume small portions throughout the day or the flexibility of meal times and composition are some examples that signal this relaxation of norms. The encroachment by material and time constraints goes hand-in-hand with the slackening of rules which, as Fischler reminds us, serve not only to control, but also to protect foodways. In such a context, the establishment of edibility can become a heavy burden, since many external norms that had previously help eaters navigate the wide array of potential foods have given way to individual assessments.

However, the modern incarnation of the omnivore's paradox may be slightly diluted, as evidenced by the recuperation of the concept by popular author Michael Pollan to describe the choice between different supermarket items. While Pollan expresses "distress" (2006, 135) in having to choose between the competing discourses printed on ultrapasteurized or regular organic milk cartons, Armelagos deplores that Pollan "trivializes the omnivore's dilemma, which is generally a choice of what is and what is not edible when the selection of one item over another can have deadly consequences" (2010, 162). Yet the (temporary) removal of life-or-death concerns should not overshadow the very real threats, and fears, inherent in our contemporary food system.

On the one hand, the overabundance of variety and the ubiquitousness of foods present serious challenges for the neophilic creatures that humans are, playing an important role in the dramatic upsurge in obesity and food-related diseases (Armelagos 2010). On the other, as contemporary food procurement chains increasingly lengthen, we are drawn further and further away from knowing the place our food came from and who produced it – and even, in the case of highly processed convenience items, what they actually contain (Bildtgård 2008; Jourdan and Hobbis 2013). Attempts to rationalize and improve the efficiency of production processes as well as the individualization of eating patterns also contribute to a general alienation from our foods. While technological and scientific advances have made many foodstuffs safer to consume, the risk of harbouring serious pathogens still looms, and the distribution of potentially contaminated food reaches far larger areas and populations, as the massive-scale food scares that continue to plague our food system on a recurrent basis demonstrate. To name only a few revealing examples, the spread of bovine spongiform encephalopathy (BSE, or "mad cow disease") caused the eradication of millions of cattle in Europe around the turn of the century (Center for Disease Control 2007); in Canada, XL Foods' *E. coli*- contaminated beef scandal in 2012 led to the largest meat recall in the country's history (The Canadian Press 2015; Canadian Food Inspection Agency 2013); in 2018, romaine lettuce was taken off North American supermarket shelves for months while officials struggled to determine the origin of yet another *E. coli* outbreak in an industrial-scale, convoluted distribution system (Center for Disease Control 2019).

In this sense, "trust in food" nowadays actually means "trust in the systems that produce food, both in a symbolic sense (such as taxonomies of the eatable and forms of knowledge about proper food preparation) and in a material sense (growing, refining, preparing, etc.)" (Bildtgård 2008, 104). Since increasing control over the entire system is rendered impossible, new pathways for trust need to be developed to assuage the daily anxieties related to incorporation and reduce the complexity of information that assails eaters as they face problematic dilemmas. Such trust is essential to upholding the far-reaching structures that provide the vast majority of foods we

consume today, but it remains highly vulnerable in the face of food scares and mass recalls (Jourdan and Hobbis 2013). It must be noted here that Bildtgård does not discuss *trust* as being different from *confidence*, a distinction made by other authors such as Luhmann (2001), wherein trust is understood as a more agentive attitude than confidence, a largely reflexive or habitual response to situations in which no evident alternative is apparent. For instance, we are confident that the city bus will not crash, or that government regulatory agencies adequately monitor our food system. Trust, on the other hand, is more actively negotiated, but the line between both remains permeable (Jourdan and Hobbis 2013). Deciding that a novel substance is comestible – insects, for instance – can thus force one to slide from confidence into trust, a shift that participants in my research negotiated with varying attitudes such as institutional and regulatory confidence (is this food accepted by the Canadian Food Inspection Agency?), cultural sensitivity towards bugs (insects are dangerous or disgusting), peer observation (are others around me eating this or shunning it?), discourses of authority (I heard a nutritionist talk about it in on the news) or individual risk management (I'll try a tiny bite and see how I feel). In Chapter 4, I examine the ramifications of each of these assessments in greater detail.

3.1.3 Categorization: a key issue in edibility

The ways in which humans create, uphold and modify the categories that help make sense of the world have long been a central interest in many disciplines, ranging from philosophy to cognitive sciences. Categories can be defined as a "set of entities or examples in experience that are selected by a concept", such a concept referring to the "specific information established in working memory that is used to represent a category" (Chrysikou 2006, 935). Categories can vary in nature, use, and function. Some are taxonomic, deriving from personal experience and cultural learning, such as "furniture" or "food" (2006). Others are goal-based, and can be either well-established through previous experience, or *ad hoc*, created in response to a situated variable or need (Barsalou 1983).

The prevailing view, and that which is most often expressed in lay discourse, has often been that categories are established according to a set of essential characteristics shared by all their members. In this view, they are understood to be "logical, clearly bounded entities, whose membership is defined by an item's possession of a simple set of criterial features, in which all instances possessing the criterial attributes have a full and equal degree of membership" (Rosch 1975, 193). However, starting with Rosch and Mervis's studies of "family resemblances" (1975), categories have been shown to be much fuzzier. This is, first, because categories possess graded structures in which some of their members are judged to be "better" – more *prototypical* – exemplars of a category, while others are seen as less representative. Prototypes tend to aggregate the most attributes associated with the category, while other members may share only some attributes with some members. There are thus no such thing as formal, necessary and sufficient sets of criterial features that define all members (Rosch and Mervis 1975; Rosch 1975; Contreras Kallens, Dale, and Smaldino 2018). The second cause of fuzziness is the ambiguity of the boundaries that separate contrasting categories. These borders are nor as watertight or as immutable as we might expect (Rosch 1978), and members can move in and out of contrasting categories based on context and circumstance. For instance, are spiders or fish pets, or non-pets (Contreras Kallens, Dale, and Smaldino 2018)?

Categorizing action happens on many levels. A core cognitive skill, categorization is a feature of both human and non-human minds. However, among humans, its processes are particularly prone to being transmitted and shared, giving rise to cultural forms of categorization. As such, the overwhelming majority of categories are learned rather than innate, and language plays a crucial and structuring role therein (Contreras Kallens, Dale, and Smaldino 2018).

While such cultural forms have been extensively investigated, others, such as individual or institutional systems for categorization, are also prevalent, though they have been less studied. Such systems build on cultural classification systems to achieve personal or institutional group goals, and they can also influence culturally defined categories in return (the Linnean taxonomy or the Dewey classification system, for instance, have filtered into mainstream cultural schemes). They have been rendered more visible with the increasing use of technology as an organizing tool (for instance, with the growing popularity of “tagging”, “pinning”, or "bookmarking” web-based applications that allow users to create idiosyncratic categories), highlighting the dynamic and adaptable nature of categorization mechanisms (Glushko et al. 2008). Indeed, flexibility is a defining feature of categories, and the attendant creativity this allows is a building block of cultural evolution (Contreras Kallens, Dale, and Smaldino 2018; Barsalou 1983; Chaigneau, Barsalou, and Zamani 2009).

This very flexibility can hinge on situational variables. For instance, *ad hoc* categorization can help achieve specific goals (Barsalou 1983; Chaigneau, Barsalou, and Zamani 2009; Glushko et al. 2008; Chrysikou 2006). In such cases, categories are created and adapted on a temporary need basis, and are often highly specialized, not committed to memory, and not culturally shared, as in the case of “things to take on a camping trip” (Barsalou 1983, 211). Relatedly, situational information has a marked effect on the effectiveness and precision of categorization. The context and setting in which categorization happens thus exert an important influence on the establishment of categories and the inclusion or exclusion of members (Chaigneau, Barsalou, and Zamani 2009).

When establishing boundaries between what is edible and what is not, category membership becomes a paramount feature. Members of select categories are deemed acceptable, while those outside those confines, or part of other disreputable categories, are shunned. How such categories are established, delineated, maintained and transformed over time thus becomes of crucial interest for understanding the dynamics of food acceptance and determination of edibility.

Research on consumers’ categorization of plant-based foods, for instance, has shown that the graded structure of the “vegetable” category, i.e. the varying degrees to which members are perceived to be more or less typical of the category, has important implications for expected liking (Cliceri et al. 2019). Among respondents less familiar with the vegetable category overall, the less typical of the category a plant-based dish was judged to be, the higher the expected liking. In other words, people who prepared and/or consumed less vegetables less frequently expected to prefer dishes that strayed from the more typical plant-based dishes such as salads and boiled vegetables. The authors explained this finding by highlighting the negative hedonic values associated to vegetables and plant-based dishes by consumers less familiar with them, who were more likely to consider them “bitter and bland”(Cliceri et al. 2019, 144). Consequently, the less typical proposed dishes were seen to be, the less negatively they were perceived. This lead the authors to conclude that focussing on the hedonic values of plant-based dishes could be a more

fruitful pathway to greater acceptance, rather than the more frequent rational discourse emphasizing healthfulness and specific daily servings.
This latter work, however, strays (as its authors themselves note) from seminal findings by Barsalou about typicality, *familiarity*, and *frequency of instantiation*. While *familiarity* is more of an absolute feature – how often a certain item has been encountered in general, notwithstanding particular category membership – *frequency of instantiation* is category-dependent and refers to how often a particular member has been encountered as part of a specific category (Barsalou 1985). Their influence on perceived category typicality differs, with frequency of instantiation being generally much more strongly correlated with perceived typicality. For instance, water might be more familiar overall than brioche for consumers, as more would have encountered the former in a variety of contexts. However, brioche is likely to be considered a more representative member of the category "breads" than water, having been experienced more frequently as a type of bread, or possessing more of its associated features.

Because the vegetable study used only dishes that were already highly familiar to its respondents and accepted (to varying degrees) as members of the studied category, the impact of the overall familiarity criteria could not be adequately evaluated by Cliceri and his co-authors. For highly unfamiliar ingredients, however, such findings could have a major impact. The inclusion of novel items within a certain category, but also their perceived typicality, could have crucial repercussions on consumers' willingness to consume them, depending on the hedonic values associated to the category. In the case of insects, this suggests that the category of inclusion should be carefully chosen, a proposition I address in more detail in subsequent chapters.

Categories, both taxonomic and goal-based, can be established using an almost infinite number of concepts. In the case of edibility, for instance, this can include any number of criteria used to evaluate and think about edibility, consciously or not.

In their seminal study on food rejection, Paul Rozin and April Fallon investigated three central factors driving the dismissal of items as inedible non-foods, namely "distaste: rejection primarily because of taste, smell, or texture; (2) danger: rejection primarily because of fear of bodily harm; and (3) disgust: a strong affect-laden rejection based primarily on the idea of what something is or knowledge of its origin" (1980, 193). I will dive into these further in the following chapter, because their importance in the case of edible insects cannot be overstated. Physical characteristics and effects, however, cannot be separated from cognitive and cultural influences on categorization in the realm of edibility. In this regard, a multitude of factors have been explored and their effects on classification schemes evaluated. These include, among many others, religious prescriptions (Meshel 2008), occasion and social context (Sato et al. 2019), knowledge of peers' preferences (DeJesus, Shutts, and Kinzler 2018), perceived capacity for suffering (Bratanova, Loughnan, and Bastian 2011) or even cuteness of potentially edible animals (Zickfeld, Kunst, and Hohle 2018), and, of course, both hedonic and utilitarian preferences (for instance, taste and healthfulness) (Ghosh Chowdhury, Murshed, and Khare 2018). Beyond the notion of edibility, but eminently applicable to its study, Niedenthal and her co-authors investigate how emotional response can forge category establishment (Niedenthal, Halberstadt, and Innes-Ker 1999). When faced with an unknown or novel item, people can construct categories based on emotional response caused by items they judge to be similar. This allows them to "understand the meaning of an object in light of their own personal learning histories and goals, and to imagine the consequences of their reactions to the object" (Niedenthal, Halberstadt,

and Innes-Ker 1999, 338). When investigating perceived edibility of a novel food, the emotional and affective responses to similar items can thus be considered a critical factor. In the case of entomophagy, it is highly likely that the prevailing emotional response will influence categorization and detract from the perceived edibility of proposed insects. The following chapter investigates some of the most prevalent emotional and affective reactions to bugs.

Moreover, in the case of insects, the importance of choosing the right categories within which to promote membership to encourage consumption is once again of paramount importance. Cultural differences in categorization, as well as non-strategic choices of categories, can strongly impede acceptance among unfamiliar consumers, and even among enthusiasts, as I show in Chapter 6.

3.1.4 Affective approaches to edibility

As the various takes on edibility suggest, eating is a unique mode of doing, of engaging relationally. The intricate social and cultural ramifications of edibility, powerful though they may be, cannot overshadow the profoundly corporeal reality of the act of food consumption. The fundamentally physical dimension of eating – the term 'incorporation' reflects this well, with its etymological origins meaning "into the body" in Latin – lies at the heart of many of the anxieties and deliberations that the defining of edibility entails. If I absorb this plant/liquid/steak/bug, what will happen to me? Do I become what I eat? The answers to such questions, however, can never remain entirely in the realm of the physical or nutritional side of understanding; they cannot be untangled from metaphorical and symbolic representations of what it means to ingest, and to become (*with*) what one is ingesting. Who is the agent here? The eater? The food? The nutrients? Who is, in the sense of agency, "responsible" for whatever transformation occurs? Where does our capacity to control start and end, and what are the effects of this control?

When the eater consumes a food, she absorbs foods, nutrients, molecules; these are transformed into the eater herself, remade into blood cells, fat, tissues. Yet it isn't as simple as it may seem. Some nutrients are absorbed, others bind with some molecules but not all, and others yet pass straight through. In their work on omega-3 fatty acids and their purported effects on eaters' mood, Sebastian Abrahamsson and his co-authors reflect on the idea of (re)distributed agency within the act of food consumption:

> For instance, if you were to eat food containing omega-3, this particular fatty acid might enter your bloodstream, if your bowels indeed accepted it. In the process of chewing, digesting and absorbing, the omega-3 loses its entanglement with fish (or walnuts!) and becomes a part of you. But if subsequently your mood were indeed to improve, to what or whom might you give credit? To you, yourself, as you were the actor eating? Or to the omega-3, as its metabolic products found a way of binding to some crucial receptor? But maybe in the latter case you are still the relevant actor after all, since the omega-3 that you ate has become a part of 'you'. Which suggests that, all in all, omega-3, absorbed and transformed into a part of a human body, is a very peculiar example of *nonhuman agency*. For as a mode of doing *eating* crucially includes transforming: food into eater and eater into a well-fed rather than an undernourished creature. But as it is through eating

> and feeding that diverse beings or substances fuse, in the end you never quite know *who has done it*. (Abrahamsson et al. 2015, 14)

This significantly complicates the relationship between food and a sense of identity. Indeed, we cannot untangle the intricate enmeshments of corporeal and symbolic becomings when we choose to eat a certain substance, especially one that is unusual or unknown. What it is, exactly, that defines the feeling of becoming what one eats? Of integrating parts to the whole?
In the case of items generally recognized as culturally appropriate, the question is less daunting. But more challenging potential foods pose a greater physical and symbolic risk as we are, in more ways than one, *affected* by what we eat.

In "Eating (with) Insects: Insect Gastronomies and Upside-Down Ethics" (2013), Stephen Loo and Undine Sellbach investigate some of the varied affects that are mobilized when we are confronted with insects. As they point out, the little critters are *with us* in many ways, both literally (swarming around us, inviting themselves to the dinner table) and figuratively (in idioms and popular sayings). However, much like they are pushed back from our food environments, they are

> strikingly absent from most academic and popular discussions about the formation of community relations. […] While the instincts of some larger animals have become emblematic of the 'origins' of human social relations in base biological drives – nurture, attack, competition, fear, etc. – the human instincts we tend to align most closely with insects – butterflies in the stomach, bees knees, crawling of the skin – have no fixed teleology and mobilize our bodies and imagination in unpredictable ways. (Loo and Sellbach 2013, 12)

They propose diving into the mysterious world of bugs, unsure if increased familiarity with the foreign creatures is liable to make us more, or less, likely to eat them. At the core of this lies the problem of how to make the repulsive palatable: could increased familiarity with and a redefining of affects elicited by abhorrent animals bring about a greater desire to eat them, or would this closeness instead have the reverse effect, inciting the feeling that we consuming are a pet or, worse, as Elspeth Probyn observes about kangaroo, "eating the friend ever true" (2011, 36)? Yet, if "[e]dibility is inversely related to humanity" (Sahlins 2010, 175), then shouldn't insects, the aliens *par excellence*, figure at the top of every menu? The very question pertains to how we can manage to consume the other. What type of affects, what type of rapport must we develop (or abolish) in order to perform that all-destructive act? At what precise point in our constellation of interactions with the world do we place the animals we eat? Because ingestion means incorporation, which in turn signifies a certain becoming, since our foods literally form the matter of our own bodies, eating – especially othered creatures such as insects – is fraught with risks, both physical and symbolic.

In 1885, Vincent M. Holt, a precursor of current entomophagy debates, published a small book titled "Why Not Eat Insects?" to investigate the gastronomic and ethical advantages of consuming bugs (1967). He notably suggests consuming agricultural pests as a form of retaliation for the destruction they wreak on our crops - a *lex talionis*, in other words. As Loo and Sellbach note, this is a problematic proposition as it

> entails a willingness to imagine humans, insects and their natural predators as part of an expanded community of eaters. By bringing insects to the table as food, Holt smuggles them into the polis, treating them as co-citizens of sorts, with interests, instincts and agencies that we must somehow settle with our own (2013, 15).

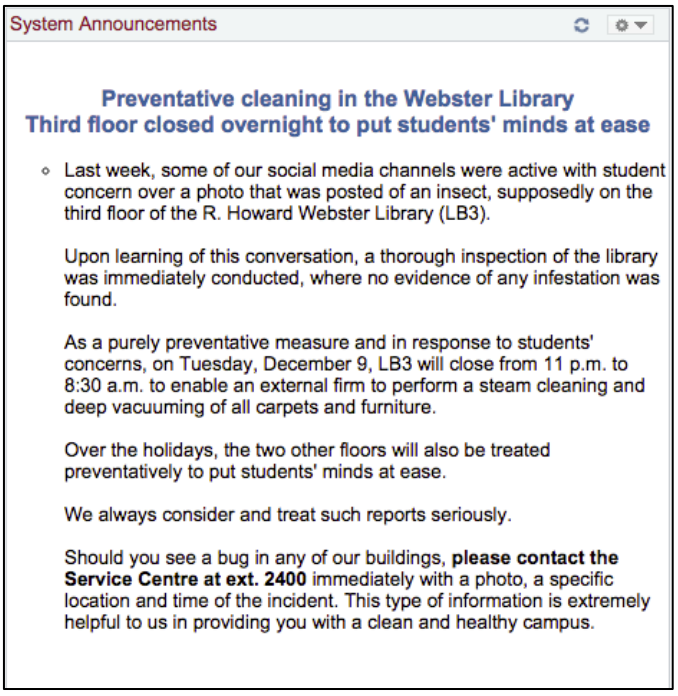
It simultaneously thrusts insects into a shared realm of ethics and moral obligations that eaters must then contend with. Yet such a displacement is not easy to achieve: "[t]iny, multitudinous, with little recognizable emotion or individual consciousness, they do not easily register as objects of moral obligation or as agents of ethical change" (2013, 13). In any case, this is a double-edged sword. Could granting potential foods agency and interests outside of our own truly make them more enticing to eat? Indeed, there is a fine line between kin and non-kin animals when it comes to edibility (Sahlins 2010) – a space that the contemporary food industry strives to broaden to ensure continued acceptance of animals as food, which, if we remain inside the realm of ethics, tacitly implies denying them such independence of mind and a capacity for suffering. In order for us to eat them, they must be distanced enough so that they are not confused with our own flesh and blood, but also, in a sense, close enough so that they are not repulsively alien. In the latter case, of course, the anxiety is that by consuming such repulsive aliens, we risk becoming somewhat like them, and in our turn be transformed into disgusting beings. And, always close in the case of insects, lurks the though that we, in turn, will be consumed by them once we are underground – a continued threat to our corporeal wholeness and to our sense of identity that hints at deep-down fears of unsuspecting cannibalism. For Loo and Sellbach, our refusal to consume insects thus hinges on Kristeva's concept of *abjection*, a "fear of contagion that breaks down identity" (2013, 18). The feeling of abjection entails a mix of fascination and disgust. It is felt towards anything that threatens our proper body, whether individual or social, and menaces our sense of human exclusiveness and the social cohesion enabled by shared taboos and dietary regulations. What does this say, then, about the Western eater who dares tuck into a plate of grubs? She becomes, in a sense, less than human – incorporating the very threats that jeopardize her own, and her peers', sense of self and identity. Thus, it is not only the disgusting that possesses powers of contagion, but also she who consumes it.

So how, in such conditions, can an unthinkable food become acceptable? I propose *affective categorization* as a driving factor in Western consumers' decision to try or avoid edible insects. In the following chapter, I investigate some of the structuring affects and emotions related to insects in our environment and on our plates. Disgust, riskiness, and feelings of otherness or alien-ness are frequently associated to bugs, whether intended for consumption or not, and can serve as compelling anchors to establish categorizations that define edibility. Far from being apprehended in isolation, insects are indeed enmeshed in a tangle of cultural, symbolic and affective associations that complicate their inclusion into the realm of the comestible.

Chapter 4. Insects are disturbing

Picture the scene. You've found the perfect spot for your picnic; the sunlight is dappled through the trees, the grass is thick and cozy, the ground is flat enough. It's a lovely day, and you're hungry – that basket in your hand holds the promise of many delicacies carefully prepared. Your friends are right behind, lugging a chilled bottle of rosé wine. You set down your blanket, open the basket, take out the cutlery, the salads and sandwiches. It's an idyllic scene.
Then they arrive. The first buzz draws your attention, aggressive, high-pitched. While you turn your head, a flash of yellow and black dive-bombs onto the slice of cured ham on your fork. Almost immediately, a second wasp makes a plunge into your glass. Suddenly, they're all around, bringing with them the annoyance of the noisy swarm, the distracting presence, the threat of the sting. And what about the ants? While you were worrying about flying things, crawling things crept into your basket and helped themselves to the plum cake. A winding line of them has made their way into the jam and stayed stuck there, while another carries away crumbs in a zigzagging fashion. And let's not even mention the mosquito that settled on your eardrum while another aimed for your eyelid, or the flies that just won't leave your peaches alone. Your peaceful picnic has turned into an insect nightmare. They're on you, invading your space and your skin, sullying your food, dirtying your stuff, upsetting your senses, driving you mad.
You've been disturbed.

To most of us, insects are, first and foremost, nuisances. At the very moment I am writing these lines, two flies keep bumping into my window, trying to get out, diverting my attention with their plump bombinations and *thhhunk-thhhunk-thhhunks*. Insects invade the spaces we consider our own. They pop up in unlikely locations. They bite, sting, irritate our skins. They invade and penetrate our physical defenses. They eat our crops, sully our water, chew on our walls. They far outnumber us, and they're just so *bizarre* – so many legs, eyes, colours, shapes, metamorphoses. They bring about a horde of imprecise threats and risks: pain, disease, material destruction, allergic reactions, contagion – stings, bites, and infections that some speculate might even make us 'biologically predisposed' to fear them (Berenbaum 2008). We've been urged to keep them out of our gardens, our homes, and most of all our kitchens, and offered a host of products of varying toxicity to help us do just that.


System Announcements

Preventative cleaning in the Webster Library
Third floor closed overnight to put students' minds at ease

- Last week, some of our social media channels were active with student concern over a photo that was posted of an insect, supposedly on the third floor of the R. Howard Webster Library (LB3).

  Upon learning of this conversation, a thorough inspection of the library was immediately conducted, where no evidence of any infestation was found.

  As a purely preventative measure and in response to students' concerns, on Tuesday, December 9, LB3 will close from 11 p.m. to 8:30 a.m. to enable an external firm to perform a steam cleaning and deep vacuuming of all carpets and furniture.

  Over the holidays, the two other floors will also be treated preventatively to put students' minds at ease.

  We always consider and treat such reports seriously.

  Should you see a bug in any of our buildings, **please contact the Service Centre at ext. 2400** immediately with a photo, a specific location and time of the incident. This type of information is extremely helpful to us in providing you with a clean and healthy campus.

A notification published on Concordia University's MyConcordia student web portal on November 12, 2014.

No wonder it's such a leap, for so many of us in the Western world, to flip the lens and look at these pests as potential foods. In this chapter, I investigate the prevailing variants of this "keep out the pests" discourse, namely that insects – *especially* as food – are risky, dirty, disgusting, and just so profoundly odd creatures. Each of these topics is anchored in empirical examples, stemming from interviews, events, discussions or observations as part of my fieldwork, and I widen the lens to examine these instances as part and parcel of a specific cultural context. I begin with a discussion of risk perception and its implications for entomophagy, highlighting the multifaceted ways in which lay consumers assess risk and its acceptability in the realm of food. I then conduct a critical examination of some of the specific perceived risks expressed by participants, namely physical, psychosomatic, and social and symbolic risks, and their potential impacts on the willingness to accept insects as food. Each of these risks is investigated in more detail in the following sections. The first looks at a specific historical example, that of the common housefly, to showcase how a narrative of fear and disease-spreading was successfully disseminated across the North American psyche. The second examines a prevailing emotion, disgust, and its psychosomatic effects, that are an inescapable feature of entomophagy discussions in Western contexts. Finally, the third section discusses insects as the quintessential *other*, and the lengths to which they have been mobilized over time to foster social differentiation and emphasize otherness, with potentially severe repercussions on those who are associated with them (or, for that matter, eat them).

4.1 Risky business

Perception, evaluation, communication and assessment of risk are central to the adoption of novel foods, in large part due to lack of familiarity. Neophobia, a driving factor in the omnivore's paradox (Fischler 2001), induces a thorough risk evaluation to establish edibility when unfamiliar substances are presented as a potential food. Anxiety and fear are ever present in matters of ingestion; only their expressions vary from one social context to another (Fischler 2001). Because feeding oneself is such an intimate, transformative and constitutive act, it requires an unusually high and constant level of examination and evaluation of potential foods, especially unfamiliar ones.

Risk has always been present in food choice, though its shape and content has evolved. In more privileged parts of the world, including large swaths of Western societies, fears of scarcity and malnutrition have been largely displaced by health concerns, contamination scares and obfuscation scandals in the ever-more disseminated, industrial food system that has largely replaced localized, small-scale provisioning structures with a larger emphasis on interpersonal trust (Ferrières 2002; Raude 2012; Levenstein 2012). Food has never been more regulated, policed, and subjected to institutional scrutiny and transnational trading policies. Yet these various control measures, and their varied levels of effectiveness, have not entirely succeeded in securing consumer trust (Kjaernes, Harvey, and Warde 2007) or even, for that matter, confidence (as defined in the previous chapter; see (Luhmann 2001)).

Risk is perceived differently by experts – scientists, regulatory officials, risk analysts, food producers, government bodies, and so on – and the lay public, illuminating the difficulty of establishing dialogue around issues of trust, risk, and consumption (Douglas 2013). Although as a whole, food procurement in Western countries is safer than it has ever been, mass-scale food scares over the last few decades have fuelled fear and perception of heightened risk among consumers, though statistical analysis demonstrates the relatively low probability of harm (Almas 1999). Bildtgård, among others, suggests that cognitive categories of dangerousness and trustworthiness in food may nowadays be based more on *perceived* risk than actual demonstrable threat (2016), which does not mean that the effects of such an evaluation should be discounted in examining notions of edibility. A "clash of rationalities" (Poulain 2005, 82) ensues. To proponents of the *irrationality thesis*, this highlights the conflict between subjective (personal) and technical (institutional or scientific) evaluation of risk in the food sector (Raude 2012), a discrepancy they claim can be remediated by information provision and consumer enlightenment, wherein "distrust is to be avoided through administrative and technological means, with a particular focus on (one-way) information programmes" (Kjaernes 2006, 918). The subtext behind this *knowledge deficit model* (Nestle 2003; Hansen et al. 2003), of course, is that 'objective' risk factors are erroneously interpreted by laypeople because of irrationality or even ignorance.

Social scientists generally view this approach as problematic, however, as they insist that consumer's risk assessments are founded in more than just absolute considerations of safety and hygiene – that the issue is "not just a lack of knowledge or understanding, but also a lack of consensus about aims and values" (Hansen et al. 2003, 120). What's more, risk, just like safety, is an inherently subjective and relative concept: just how risky is too risky? And to whom? A food may pose no threat to one consumer and gravely endanger another; it may be safe in small doses

but not in larger ones. And hardly a day goes by without a food previously considered safe being declared a public health hazard. In such a context, "we can define a safe food as one that does not exceed an *acceptable* level of risk" (Nestle 2003, 16), with such acceptability being an intrinsically subjective and fluctuating notion. This is especially the case, as Mary Douglas points out, when "the idea of risk is transcribed simply as unacceptable danger" (2013, 39), wherein both are often considered interchangeable in public discourse; if risk is systematically equated with danger, it is stripped of its probabilistic dimension, and any amount of risk henceforth becomes intolerable.

Experts' quantitative – or science-based – analysis of risk probability is thus often pitted against laypeople's qualitative – or value-based – evaluations (Nestle 2003). Without discounting scientific discourses, the latter also incorporate much more varied and complex registers in a multi-dimensional analysis and nuanced assessment. These can include the type of possible consequences, the context in which they could occur, the sort of people that might be affected, whether the hazards are man-made or natural, the predictability and preventability of outcomes, how equitably such outcomes are distributed, the perceived trustworthiness of various actors all along the food chain, and their degree of control over a situation (Kjaernes 2006; Nestle 2003; Slovic 2016; 1987; Hansen et al. 2003). Another fundamental difference relates to the understanding of the risk/benefit relationship. Laypeople generally consider the two to be interdependent and can tolerate a limited degree of risk if the benefits are sufficiently alluring – as long as they accrue to the risk taker herself, rather than to others (Hansen et al. 2003).

Thus how risk is perceived and evaluated also depends on social factors. For instance, researchers first dubbed the "White Male Effect" findings that, as a rule, white males were likely to rate risk levels lower and to engage in riskier behaviours than their nonmale or nonwhite counterparts (Flynn, Slovic, and Mertz 1994; Satterfield, Mertz, and Slovic 2004). Incidentally, the white male demographic is also that which is most often outlined as potential early adopter of edible insects (see for instance Dobermann, Swift, and Field 2017; Verbeke 2015).

At the Eating Insects Detroit trade fair, positions of power and authority in the industry were overwhelming held by white, affluent males. The vast majority of attendees were also white. Photos by Laura Shine. Detroit, May 27, 2016.

Subsequent research demonstrated that it is not so much the whiteness or maleness factors that impact risk evaluation (Palmer 2003), but instead the respondent's socio-economic position, their sense of control over external situations, their vulnerability, and their confidence that they would be able to mitigate any negative impacts of a behaviour (Finucane et al. 2000). Based on research conducted in Sweden, to attempt to control for the gender inequality factor, Olofsson and Rashid thus suggest that a "Social Inequality Effect" would better describe the phenomenon (2011). Far from being the irrational consumers often depicted by risk evaluation experts, "[p]eople make clear, predictable, and understandable distinctions between risks they knowingly accept and those they do not" (Nestle 2003, 21). Why these risks are deemed acceptable or not simply takes into considerations a greater variety of factors than purely scientific evaluations do.

Unlike the food expert (which Poulain [2005] questionably conflates with the food business, presumably because of the discourse of knowledge that emerges from it) or other institutional agents that base risk evaluation on rational and statistical calculations, the layperson thus assesses an extremely wide variety of factors in determining potential risks, some of which pose no

imminent health or sanitation threat, but are instead situated on a social level, as we've just seen, or a symbolic one. For instance, consuming a food judged disgusting by one's peers can expose the eater to scorn and reject, in accordance with the laws of contagion explored by Rozin and Fallon in the realm of food (1987), which suggest that the consumer of a disgusting item becomes somewhat disgusting herself. As Poulain aptly points out (2016), the horsemeat scandal that shook Europe in 2013, when it was shown that lasagne purported to contain beef was actually made with equine meat, illuminated the discrepancy between perceived physical and symbolic risk. Though horsemeat is functionally similar to beef – both are red meats, with similar cuts and sensory properties, similar preparations methods, and overall comparable nutritional profiles – their symbolic values are altogether different, as is their rate of inclusion within the edible category. While eating horse is perfectly acceptable from a nutritional point of view, and is in fact a relatively common practice in some food cultures, including in France, the scandal was fuelled by a sense of dupery, wherein a food animal was fraudulently replaced by what many consider more a pet than a source of nutrients. A crisis of consumer confidence ensued, with significant commercial, political, and institutional repercussions, but not for reasons of actual sanitary risk.

Insects, because of their strong cultural ties to filth, decay and disease, as I will soon show, are particularly subject to being viewed as risky, on both physical and symbolic levels. Starbucks was the object of a call to boycott in 2012 when it surfaced that it used a natural food dye made from scale insects to colour some of its products pink or red, most notably its Strawberries & Crème Frappucino. Cochineal dye, made from crushed *Dactylopius coccus*, has been widely used in the food and cosmetics industry for centuries (Kaste 2003); it poses little sanitary risk and is often chosen as a more natural alternative than the common petroleum-based Red Dye #40. But its use angered and distressed North American consumers, who felt deceived by the famed coffee behemoth and tricked into sipping "bug juice". Looking to quell patrons' anger, the chain announced a few weeks after the news broke that is would replace the controversial ingredient with lycopene, a tomato-based dye (Fulton 2012).

Throughout my own fieldwork, research, interviews, and discussions with potential consumers and actors in the entomophagy movement, a variety of concerns regarding the risks associated to insect consumption emerged. The more recurrent ones highlighted the variegated nature of risk evaluation among lay consumers. They included, first, **health-related or physiological risks**, which were seen to threaten consumers' corporeal integrity and wellbeing. Through a cultural history lens, I examine in the following section the case of the common housefly, long portrayed as a disease vector and which, because of its ubiquity and general belonging to the loose category of bugs, shaped many of our perceptions about household insects in general. I also look into the role of institutional regulation and its potential impact on risk mitigation and acceptance. **Economic risk** relates to the fear of wasting precious food dollars on a product that might disappoint, and is closely tied to price and comparables. I examine this specific risk in Chapter 7. **Psychosomatic risks**, on the other hand, encompass physical reactions triggered by emotional and psychological responses, most notably disgust. I delve below into the cornerstone approaches that have informed the understanding of disgust and its importance in food choice and rejection. Finally, **social risk** relates to one's place in the social realm, and how our food choices play into our sense of belonging, identity, and our perception of otherness. The pervasive alien-ness of insects, and their historically divisive use against othered groups, plays a role in fears about their

incorporation and how it might affect our sense of self. I examine such instances in the final section of this chapter.

4.2 Dirt, disease, and institutional regulation

One of the most frequent apprehensions mentioned by participants, when probed about their potential desire to sample edible insects, pertained to their fears about the purely physical repercussions of such a consumption. These perceived health-related or physiological risks were linked to corporeal or physical integrity and wellbeing, including fears of poisoning, allergies, sicknesses, zoonotic diseases, indigestibility, or what I might call 'mechanical' issues, such as the frequently expressed apprehensions about legs stuck between one's teeth or being unable to crunch through hard chitinous shells. For instance, LN (Interview 5), who was uninterested in trying insects, worried about the type of foods she ate and how this might affect her body. She also wondered about cleanliness, and how one might go about washing them appropriately to prevent contamination. In a related vein, Anna Krahotin (Interview 2) signalled that many insects were, to her, disease vectors, particularly mosquitoes; she also recalled hearing, as a child, terrifying stories about insects crawling into ears and infesting brains, explaining her general dread of bugs and her refusal to consider them edible. Even among enthusiasts, the consumption of some insects are felt to be low-risk, while eating others seem more perilous. All of the interviewees who had participated in the wild harvesting activity at Gourmet Sauvage were regular or occasional consumers. However, they restricted their intake to insects commercially grown for human consumption, not for lack of interest in eating wild species, but instead for reasons of convenience and perceived safety, courtesy of the regulatory apparatus involved in commercial distribution. They all mentioned risk alleviation as a motivation to attend the workshop. Their insufficient knowledge about insects in general fostered fears of picking a toxic species or of incorrectly preparing or transforming wild specimens, a common fear with many wild foods. All the participants stated that they were relieved to learn that the risk level involved in collecting wild insects was very low in Quebec. The entomologist's expertise and explanations allowed enthusiasts to let go of some severe apprehensions. Even though these participants did not perceive strong psychosomatic, social or economic risks, they still worried about the potential physical harm that they might incur when they ventured outside of the supermarket into the little-charted territory of harvesting wild species. The workshop had therefore provided a sense of "appeasement", Isabelle Morin (Interview 3) said, as it highlighted the safety and variety of available insects and the many ways in which they could be prepared. Almost all local wild bugs were perfectly harmless, she and her partner Martin Chayer (Interview 8) recalled the facilitator saying, except brightly coloured ones, which was felt as a relief in their curious yet cautious approach to eating them. Many of these participants stated a low level of familiarity with and general knowledge of insects, which enhanced their uneasiness when choosing wild ones to consume. Simon Martin (Interview 10) professed a different affect towards insects, having collected, examined and cherished them as a child, growing up on a farm. Mylène Désilets (Interview 9) also gathered water insects to help her teacher mother feed a class pet frog. Neither of them, however, felt they could confidently identify a large spectrum of wild insects, especially as a potential food. Though both of them had an exceptionally high neophilic profile, they both explained that the workshop alleviated perceived risk and emboldened them to venture beyond the supermarket aisle and into the fields.

Such perceived hazards to health and safety are most closely related to scientific evaluations of risk, and can be partially mitigated by rational approaches, statistical analysis, and institutional reassurance through regulation of provenance. Indeed, the question of provisioning systematically emerges in tasting events, wherein attendees question the source of insects offered to them and are relieved to know they have been raised, processed and distributed through official and approved channels within Canada. For instance, José Audet (Interview 4) mentioned he would prefer to consume insects raised specifically for human consumption in conditions approved by relevant authorities such as the Canadian Food Inspection Agency. Simon Martin (Interview 10), for his part, estimated that such insects would be "cleaner", thus less likely to cause health-related harm.

After examining below the case of the common housefly, a potent example of the cultural context in which fears about hygiene and sanitation have been anchored in the past decades in North America, I thus detail the approaches favoured by governing bodies in Canada in assessing and regulating the edible insect industry.

4.2.1 The case of the common housefly

Much of our antipathy towards insects can be attributed to persistent ideas of dirtiness and illness associated to them. While some bugs are, of course, disease vectors, decay dwellers, and filth carriers, they constitute a miniscule part of the insect realm. But the pervasive disgust they inspire, combined with our paltry knowledge of insect species and inability to differentiate a cricket from a cockroach – in other words, our inability to appropriately categorize – contribute to tainting all bugs with the stain of dirt.

Around the beginning of the 20th century, L.O. Howard, a U.S. government scientist, launched a crusade to vilify the common housefly, accused of transmitting a bewildering array of diseases. Perhaps more than any other insect, the fly started to embody the foreign other stealthily entering homes and hearths, unwanted and unwelcome, bringing in outside dangers and threats to families' well-being. Rechristening it the "typhoid fly", Howard urged schoolteachers to lead their students in mass killings (Sleigh 2006). "Swat the Fly" campaigns swept over the entire United States. The bugs were variously accused of carrying not only typhoid but also cholera, tuberculosis, anthrax, diphtheria, ophtalmia, smallpox, polio, staphylococcus infection, swine fever, tropical sore, the eggs of parasitic worms, gastroenteritis, spiral meningitis, infantile paralysis, and even cancer (Levenstein 2012). A pamphlet distributed to Ohio schoolchildren warned that flies were "the most deadly enemy of man. They kill more people than all the lions, tigers, snakes, and even wars" (Levenstein 2012, 11).

As Naomi Rogers demonstrates, the stigmatization of flies – and of domestic insects more generally – dovetailed nicely with contemporary issues of public health and sanitation, and newfound faith in public education campaigns (1989). The fly became a teaching tool to demonstrate the functioning of bacteriology and epidemiology, and a concrete focal point to enforce abstract principles of germ theory. Though the fly had previously been seen in a rather positive light, as a human companion and friendly, even useful, part of the natural world, by the

second decade of the 20th century the sentiment was evolving. Inspired by the demonstrated capacity of mosquitoes to transmit disease, scientists and the medical establishment drew on less conclusive experiments to vilify the fly and encourage its elimination by housewives and schoolchildren, enrolling the latter in contests rewarding the largest number of swatted flies. A fly-free household became a paragon of proper housekeeping, as the insect "was contrasted with middle-class values of thrift, sobriety, and cleanliness" (Rogers 1989, 611). It also conveniently shifted the burden of responsibility on individual (especially maternal) carelessness, rather than examining the systemic sanitation issues that undermined public health in the first place.

Source : National Archives Catalog, Item 516140. https://catalog.archives.gov/id/516140

Not far behind the seemingly noble objective of sanitizing homes and protecting children's health lay the more self-motivated goal of promoting entomological science and its place among funding-worthy research. The construction of a negative image of insects, due to purported health hazards and their undeniable economic impact on agricultural productivity, was central to arguments for backing investigations into pest control. Although some scientists were weary of the widespread and institutionalized "propagandistic exaggeration", the machine was too far launched to be easily slowed, and much of the fear and disgust it provoked endure to this day.

Housefly hatred also engendered a fruitful industry of killing, trapping, and exclusionary devices aimed at keeping bugs out of homes. Flypaper, fly swatters, and screens were devised to keep bugs away from food. Industrial food processors capitalized on this fear in especially fruitful ways. They advertised their production, processing, and packaging methods as being fly-free and much more hygienic than traditional, home-made products. The mechanization was seen as a sanitary boon, reducing the need for presumably contaminated human intervention. Thus it drew both on the contemporary insect obsession and the new understanding of germ science to promote its wares, with resounding success (H. Levenstein 2012).

4.2.2 Regulatory safeguarding

The food industry itself has long been entwined with the widespread public perception of insects as food pests. This materializes not only through the landscape of crop destruction, perhaps a less familiar scenario to most citizens now widely removed from agricultural production, but especially as unwelcome guests in the foods people consume in their homes. Anyone who has regularly washed summer lettuces or shucked ears of corn is familiar with the sight of creepy crawlies hidden between the tightly wound leaves or squirming beneath the tassels. Depending on one's sensitivity, this might lead to more attentive washing, the discarding of the affected leaf, or, sometimes, the entire head. Pantry invaders such as meal moths or larder beetles often require drastic cleaning sprees and the discarding of large quantities of soiled foods. And cockroaches, of course, are the bane of millions of kitchen dwellers worldwide – crunchy, exponentially multiplying hordes that appear seemingly out of nowhere and look like they could resist even a nuclear extermination procedure (turns out, they probably wouldn't, though others, such as ants or even fruit flies, might fare a bit better (Stanton 2019)).

Accordingly, regulatory agencies tasked with safeguarding the safety and hygiene of our food supply have thus far focused on the notion of contamination (Verbeke 2015), striving to exclude insects from our plates, and from the entire system more generally, with varying degrees of success. South of the border, the US Food and Drug Administration (FDA) regulations specify the precise maximum number of insect fragments actually *allowed* in a host various foods, ranging from peanut butter (30 fragments per 100g) to ground thyme (925 fragments per 10g) (US Food and Drug Administration 2018). This demonstrates the sheer impossibility of completely excluding insects from the processes of growing, processing and packaging most foods. The reaction on audience members' faces when entomophagy promoters underline the existence of these guidelines, however, suggest that most consumers are both blissfully unaware of this fact and highly troubled by the realization that they have, in fact, been consuming insects all along, unbeknownst to them. It also highlights the extent to which insects and safe, clean food

have been portrayed as mutually exclusive, one of the major hurdles in shifting perception of bugs as a acceptable food themselves.

Closer to home, until 2018, the only mention of insects, in any form, on the Canadian Food Inspection Agency (CFIA)'s and on the Ministère des Pêcheries, de l'Agriculture et de l'Alimentation du Québec (MAPAQ)'s websites related to their undesirable presence in the food system. These agencies, tasked with managing, inspecting, regulating, and otherwise overseeing the safety of our food provisioning systems, on the federal and provincial levels respectively, focused exclusively on the exclusion of insects from the field or farm to the table. In a personal email, a CFIA agent explained to me that any insect product destined for human consumption had to abide by the existing rules and laws that regulate any food product sold in Canada, which included obligations around safety and hygiene, as well as guidelines for packaging and labelling. In the case of insects, this meant that their presence had to be clearly identified on the package (Canadian Food Inspection Agency 2019).

Only as recently as 2018 were edible insects the object of specific publications regarding their production, transformation, sale, and consumption. In October, the CFIA published the results of its inquiry on the presence of microbacterial pathogens in commonly available edible insect products sold in a variety of distribution channels throughout the country, online and in brick-and-mortar stores. Its report began with the reminder that insects are safely and widely enjoyed in Africa, Asia and Latin America, and that the growing interest in Europe and North America has led to a host of products being offered to Canadian consumers, both in whole dried form and in processed, ready-to-eat goods. However, it noted,

> [l]ittle scientific information is available regarding the control of microbiological pathogens during the rearing and processing of edible insects. Nevertheless, edible insects produced for human consumption and available to Canadian consumers must meet the same safety and hygiene standards as other foods available in Canada (Canadian Food Inspection Agency 2018).

The Agency further reported that its experts found no evidence of contamination by salmonella or e. coli pathogens in the samples it collected. It concluded that "therefore it appears that the edible insects have been produced under sanitary conditions" (2018), but stressed the need for a wider study, a closer look at stakeholders' practices throughout the industry and, overall, further research into a growing trend.

The MAPAQ, on the other hand, did not respond to the multiple information or interview requests I submitted. Producers I interviewed, however, signalled that the regulatory body was working on specific regulations to guide producers and standardize the industry as a whole. Jérôme Fortin-Légaré, from the production and processing firm Neoxis, mentioned that the Ministère was "enthusiastic and engaged", and that a multidisciplinary team was working with industry stakeholders to develop guidelines based on best practices (Interview 13). He also emphasized the importance, from an industry standpoint, of presenting a "united front" to efficiently and consistently deal with government agencies and their requirements, rather than a disparate collection of actors with sometimes competing interests. This preoccupation led him to found the Fédération des Producteurs d'Insectes Comestibles du Québec (FPICQ), an industry-based coalition that aimed to involve all of the province's producers (for additional details, see Chapter 7).

Both of these agencies' attitudes are coherent with the notion of expert risk assessment and management, with a specific focus on safety throughout the food chain and participation of stakeholders in minimizing and scientifically managing risk factors. As such, their activities and engagement can help assuage some of the physical and health-related perceived risks expressed by potential consumers. But as I have demonstrated, a more complex matrix, including more subjective and/or qualitative risk evaluations, usually comes into play in the lay assessment of novel food products.

4.3 Foundational perspectives on disgust

It's a recurrent feature in the entomophagy world: when the discussion revolves around edible insects, one of the most commonly mobilized affects relates to disgust and its consequences. Whether in special events, conferences, or tastings, as well as during interviews and other types of fieldwork, I've seen it expressed explicitly – through exclamations or specific vocabulary – or indirectly – through typical facial expressions, bodily reactions such as a shudder, sharp breath, recoil, or imitation of vomiting. Such reactions suggest that potential tasters consider the risks of experiencing the psychosomatic outcomes of disgust. Though such effects are markedly physical – grimacing, nausea, potentially even vomiting – the underlying causes are psychologically grounded. In this section, I examine in more detail this fundamental emotion for the study of edible insects. Its crucial importance in understanding the reluctance and hesitations around the trial and adoption of unfamiliar foods, and insects in particular, cannot be overstated.

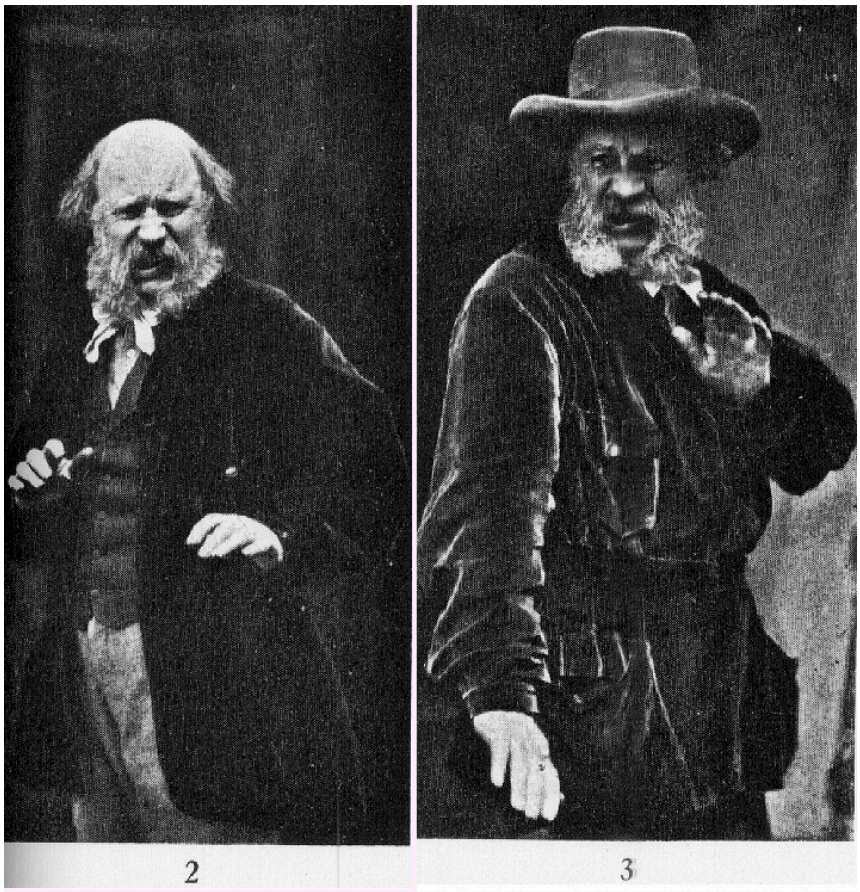
Disgust is certainly the most commonly expressed emotion among those unfamiliar with edible bugs. This is articulated through the various verbal expressions participants used when asked to think about consuming an insect, such as Anna Krahotin's "gross" and "yuck" (Interview 2), or Marie-Hélène Lévesque's "really disgusting" (Interview 7). It can also take the form of physical expressions such as LN's expressed "squeamishness" (Interview 5), or Lévesque's visible shudder, agape mouth, and "feeling of horror" at the though of exploding, juicy bugs. This is coherent with current research that demonstrates that "consumers' willingness to try unfamiliar or novel foods are [sic] influenced by beliefs about their 'disgusting' properties and the reactions evoked by the thought of consuming them", a type of emotional response categorization that is "especially relevant in the case of insects" (Verbeke 2015, 154). What's more, insects in general are one of the notable elicitors highlighted by some researchers studying why animal-based foods generate higher levels of disgust. Insects are thus doubly offensive, as a contaminating agent in foods and, even more, as a food themselves (Martins and Pliner 2006).

As I will demonstrate shortly, the varied expressions surrounding disgust-related perceived risks include the fear of vomiting the repulsive food or of suffering from nausea, of being considered disgusting oneself, and, on a less conscious but nonetheless powerful level, of becoming more *other* through incorporation of such an alien-like item. The perceived risks tied to ingestion of a disgusting substance are thus of a physical, social, and symbolic nature.

4.3.1 The many meanings of disgust

Is disgust "[r]evulsion at the prospect of (oral) incorporation of an offensive object [these being] contaminants; that is, if they even briefly contact an acceptable food, they tend to render that food unacceptable" (Rozin and Fallon 1987, 23)? Or is it instead "a complex sentiment that can be lexically marked in English by expressions declaring things or actions to be repulsive, revolting, or giving rise to reactions described as revulsion and abhorrence as well as disgust" (Miller 1997, 2)? The study of disgust can and has taken on many forms, which focus alternatively on more individual or social, more corporeal or moral aspects of this complex emotion. Paul Rozin and William Miller have contributed what are perhaps the two foundational approaches to studying disgust, albeit in very different ways. Here I examine these two fundamental studies and contribute a critical analysis that underlines its relevance for the study of entomophagy acceptance.

Authors agree that disgust is, in a sense, a basic emotion common to most likely all cultures, though its elicitors are heterogeneous and can vary dramatically. Rozin and Fallon outline that disgust is accompanied by a specific facial expression (closed nostrils, a gape, a curling of the upper lip); a related action aimed at removing oneself from the elicitor; a particular physiological effect – nausea –; and a distinct feeling, namely revulsion (Rozin and Fallon 1987, 23). The images below were included in Charles Darwin's *The Expression of the Emotions in Man and Animals* to illustrate disgust (1872, 255); they exemplify the unambiguous facial expression examined by Rozin and his colleagues, as well as the physical recoil that aims to distance the observer from the disgusting item and keep its polluting influence at bay. I will return to Darwin's study in greater detail shortly.



Disgust as illustrated in Darwin's study of emotions. Source: https://brocku.ca/MeadProject/Darwin/Darwin_1872_11.html

Screenshots : physical expressions of disgust in insect-eating experiments on a TV show (BBC Radio 1 2019)

In their discussions and experiments on the topic, Rozin and Fallon – like Darwin, as we will soon see – adopt a more restrictive view of disgust, one that specifically attaches it to the notion of oral incorporation, thus reducing its sensory scope. This may be related to their partiality to the etymology of the English term – from the Middle French *desgoust*, itself originating in the Latin *des* (opposite) and *gustare* (taste), a meaning also conveyed in the Modern French term *dégoût*. However, they fail to note that other languages have very different terms to designate the same emotion, and that the emphasis on taste thus may be culture-centric. Miller suggest that the German *Ekel*, for example, is not specifically correlated to taste, which might have accordingly influenced the work of another great scholar of disgust, Freud, who understood it to be as tied to the anal and genital zones as to the mouth (1997).

For their part, Haidt, Rozin, McCauley and Imada assert disgust's strong roots in human evolution, even timidly supposing that it might have advanced through natural selection, granting those with greater sensitivity to food selection and disease avoidance an evolutionary advantage.

However, its absence in very young children and nonhuman species, they acknowledge, weakens this supposition and weighs in favour of a more social role: "what may have evolved to help our omnivorous species figure out what to *eat* in the physical world, now helps our social species figure out what to *do* in the cultural world" (Haidt et al. 1997, 108). Although the stark division between the two purported states is doubtful at best, the statement highlights the entangled nature of disgust and its obscure pedigree. Moreover, the extremely wide variety of disgust elicitors across cultures suggest that, though the emotion seems universal, the ways in which cultures shape its outlines are certainly not.

In their analysis of food rejection, Rozin and Fallon take care to distinguish various reasons motivating refusal, namely distaste (motivated mostly by sensory factors), danger (motivated by anticipated harm), inappropriateness (motivated by ideational factors that classify the item as a non-food), and finally disgust, which includes a mix of ideational factors about the inappropriateness of the item and a presumption of negative sensory appreciation (Rozin and Fallon 1987, 24). Though many disgusting items are also considered dangerous at the outset, it seems they possess something *more* that just the potential to inflict harm (as the authors discover in their experiments, most eaters would still refuse a sterilized cockroach). There is a quality of offensiveness that goes beyond bad taste or fear of harm, and disgust is "triggered off not primarily by the sensory properties of an object, but by ideational concerns about what it is, or where it has been" (Haidt et al. 1997, 109).

As psychologists, Rozin and his colleagues are particularly interested in disgust's relation to the formation – and endangerment – of the sense of self. In this regard, incorporation through the mouth is to them particularly relevant, as the organ is considered to be the last gateway before final and almost irreversible assimilation. Interestingly, as far as bodily fluids – an element of core disgust – go, we are generally only disgusted once they have left our body: we have no qualms with swallowing our own spit, or chewed food, while it is still in our mouth, but would not drink it out of glass or a bowl of soup (Rozin and Fallon 1987, 26). At the core of disgust is thus the notion that offensive items could enter our selves through a breach in our outer defenses, the most obvious breach being of course the mouth (whose function *is* precisely incorporation). Such a violation is problematic because of the diffuse, but pervasive, feeling that we *are what we eat*, a belief that traverses the ages and retains strength in the idea that our bodies are composed of the very things that we consume, hence that we take on some their characteristics. The eater of disgusting objects thus becomes, in a way, disgusting.

Objects in themselves may not be disgusting (they require a subject offended by them), yet some are more prone to triggering disgust cross-culturally. Although there are no proven methods that can be used to predict which items are considered disgusting in distinct culture, there are some guidelines that allow Rozin and his colleagues to establish broad generalizations. Animal products, first of all, are the most important elicitors. Included in this category are body waste products, most of which are related to core disgusts (faeces, vomit, pus, mucus, etc.). This can be compounded by interpersonal issues, as "[t]he prospect of consuming things contacted by people who are disliked or viewed as unsavory often elicits disgust" (Rozin and Fallon 1987, 27). This contextual aspect hinges on properties of contamination possessed by disgusting items, which I will return to later on. Characteristics such as animalness, susceptibility to spoilage and decay, excessive distancing from humans, incongruity within a classification scheme, and any connexion with faeces are some of the features explored as crucial elicitors of disgust. Haidt and his co-

authors add sexual deviance, body-envelope violations, poor hygiene and contact with death to the list of elicitors, hinting at some moral strands of disgust as well. Reminders of our animal nature, which are typically controlled trough rigid cultural norms, can elicit disgust when they are not managed properly, as they undermine our hopes of approaching purity (Haidt et al. 1997, 113). Insects, of course, check most of these boxes, whether in and of themselves or, to an even greater degree, when considered as a food.

One central characteristic of disgust is its power of psychological contamination. This includes two laws of sympathetic magic defined by anthropologists Marcel Mauss and James Frazer, namely *contagion* ('once in contact, always in contact') and *similarity* ('like produces like') (Rozin and Fallon 1987, 30). In the realm of disgust, Rozin and his colleagues demonstrate through a series of inventive and, at times, comical experiments that rational thinking fails to counter the effect of psychological contamination. Among many examples, subjects refused to consume soup stirred with a brand-new fly swatter, or preferred chocolate fudge shaped as a muffin to that shaped as dog faeces. Even though in all cases contamination was impossible, the mere thought association made these items undesirable. Personal contamination can operate in much the same way, as a disliked person can render a food unpalatable – though the opposite can also hold true.

As Rozin and Fallon examine the ontology of disgust, they come to the conclusion that the emotion is not innate – though we are born with the capacity for it – but rather acquired over time through enculturation. Indeed, very young children show no signs of being disgusted by excrements, for instance, nor by other items that frequently elicit disgust among adults, but acquire this disposition during their first years, closely followed by sensitivity to contamination ((Rozin and Fallon 1987, 34–35); for a more detailed analysis of the process of disgust acquisition, see 35-38). While some humans marry their cousins, other are revolted by the idea. Some let children defecate in public areas. Some consume fermented cheeses, other fermented legumes; some yet are disgusted by both. Others even eat bugs. The capacity to be disgusted is a trait shared by all humans (and, almost certainly, by humans only (Miller 1997)). But though we are born with the potential, it is only actualized through enculturation.

Interestingly, Haidt and his co-authors also examine the extension of disgust to socio-moral issues. With cross-cultural interviews (all of students living or studying in the United States, however, which minimizes the reach and applicability of their study), they establish that "[t]he English language is not unique in linking core disgust, animal reminder disgust, and socio-moral disgust together under one word, and linking all these issues to nausea and revulsion" (Haidt et al. 1997, 118). Through the etymological study of the term miasma, dating back to Greek Antiquity, they underline that physical and socio-moral violations were clearly linked in their common defilement of the boundaries of humanity.

This last facet of disgust hints at a wider conception of the emotion, one that encompasses more than boundaries of the self and includes social and ethical preoccupations. In *The Anatomy of Disgust*, William Miller explores the myriad features of this far-reaching emotion originating in the fetid "life soup" (1997, 21), contending that it plays a crucial role in maintaining social hierarchy and distinctions between the pure and the impure, the proper and the vulgar. Indeed, though it is certainly a visceral emotion, disgust is not only shaped by culture, as Rozin and his colleagues demonstrate, but it forcefully reshapes culture in its turn.

Miller opens his first chapter, titled "Darwin's Disgust", with a quote from Darwin himself, which I include because it encapsulates many of the ideas discussed here around the concept of disgust:

> In Tierra del Fuego a native touched with his finger some cold preserved meat which I was eating at our bivouac, and plainly showed utter disgust at its softness; whilst I felt utter disgust at my food being touched by a naked savage, though his hands did not appear dirty. A smear of soup on a man's beard looks disgusting, though there is of course nothing disgusting in the soup itself. I presume that this follows from the strong association in our minds between the sight of food, however circumstanced, and the idea of eating it (Darwin 1872, 257).

The articulation of the argument around two edibles demonstrates the crucial position of taste as the fundamental sense of disgust – a supposition that is, as mentioned, etymologically supported. Yet Miller does underline that this may be an English particularism, as noted above with the German example. To him, disgust also mobilizes all other senses, particularly touch and smell; but "[a]bove all, it is a moral and social sentiment. Its plays a motivating and confirming role in moral judgment in a particular way that has little if any connection with ideas of oral incorporation" (1997, 2). There is a perception of danger at play here, as disgusting items (objects, ideas, behaviours…) are thought to *contaminate and infect* those who come in contact with them. They elicit feelings of uneasiness, in some cases of nausea, even of "the panic, of varying intensity, that attends the awareness of being *defiled*" (1997, 2) (emphasis mine). There is thus a notion of purity, of honour, to be tainted and sullied; a menace to our sense of distinction, to our reputation even perhaps. Disgust also highlights dichotomies throughout the sensory realm. As he studies more closely Darwin's meat touched by a disgust-inducing "savage", Miller extracts oppositional sensorial categories of cold and hot, soft and firm, as well as more conceptual couplings such as raw and cooked, dirty and clean, naked and clothed, Tierra del Fuego and England, and them and us. So politics are at play too, as are notions of social *bienséance* and, concomitantly, of varying degrees of humanness.

What is it that makes us recoil from disgusting objects? What characteristics make us fear for our well-being and our sense of self? Though Mary Douglas may scratch the surface with her notions of things being out of place, there is something more at play. Soup in a man's beard, an example used by Darwin and examined by Miller, shows not so much an interplay between two items that should never have met as the contamination of the eater "by a character defect, a moral failure in keeping himself presentable in accordance with the righteously presented demand that he maintain his public purity and cleanliness of person" (Miller 1997, 4). Here, we are again faced with the notion of purity, one could say of virtue, and of public purity no less. If one ate alone, I would add, soup might fall in the beard without much consequence; it is its exhibition to others that makes it unbearable to them, and humiliating to the beard wearer, *if* he is at all socialized (in a society where such a display is judged unacceptable, as goes without saying). Indeed, shrugging it off would be even worse, as it would demonstrate a willing breach by the eater of the common rules of living together and a disregard for the possible moral pollution of others through his repulsive ways. Disgust thus possesses a binding ability as well as a dislocating one.

Though Miller quotes Darwin no further, a later passage of the same study of emotions bears particular interest for the study of insects:

> It is remarkable how readily and instantly retching or actual vomiting is induced in some persons by the mere idea of having partaken of any unusual food, as of an animal which is not commonly eaten; although there is nothing in such food to cause the stomach to reject it. When vomiting results, as a reflex action, from some real cause – as from too rich food, or tainted meat, or from an emetic – it does not ensue immediately, but generally after a considerable interval of time. Therefore, to account for retching or vomiting being so quickly and easily excited by a mere idea, the suspicion arises that our progenitors must formerly have had the power (like that possessed by ruminants and some other animals) of voluntarily rejecting food which disagreed with them, or which they thought would disagree with them; and now, though this power has been lost, as far as the will is concerned, it is called into involuntary action, through the force of a formerly well-established habit, whenever the mind revolts at the idea of having partaken of any kind of food, or at anything disgusting (Darwin 1872: 258).

This analysis could indeed have been written in response to a contemporary proposal to consume insect foods. To most Western eaters, bugs are certainly an "unusual food, as of an animal which is not commonly eaten". They are consumed with relish by billions around the globe, and we can safely say that nothing in their particular nature causes rejection by the body. Yet entomophagy proponents, when they discuss their practice, are consistently confronted with affirmations from listeners that eating insects would make them throw up, that the "mere idea" makes them want to retch. Many of my respondents made similar affirmations, as previously outlined. A similar effect can be observed when audiences are told that, due to the impossibility of entirely removing insects from the food production stream, they have in fact been consuming bug parts unknowingly. That revelation usually provokes visible feelings of unease and even sickness across the room. While Darwin's suggestion that this reaction derives from our "progenitors" testifies to his perhaps overbearing preoccupation with evolutionary transmission, the notion that disgust stems not from actual danger but from imagination of what *might* disagree with us shows just how strongly the emotion is anchored in cognitively-driven apprehensions. It is, indeed, the mind that revolts and engages the body in its refusal, rather than the other way around.

Other senses than taste play a key role in disgust, especially touch and smell. In the first case, there exists an abundance of lexically marked characteristics to indicate repulsiveness, some ofwhich are organized in pairs (squishy vs. firm, moist vs. dry, etc.) while others stand on their own (oily, filmy, gooey, etc.). Throughout years of research on insects, I've been asked countless times about their texture and mouthfeel. Curious – or disgusted – interlocutors tend to fall neatly into two categories: those who fear the crunch, and those who are revolted by the softness, reflecting the oppositional pairs outlined by Miller.

The former tend to fear appendages most: the overall crunchiness is not so much a factor as the predicted toughness and resistance of the shell, and the difficulty of chewing and swallowing more chitinous insects such as crickets or grasshoppers, especially their legs and wings. The barrier is thus of a more mechanical nature. Having "legs stuck between my teeth" is a recurrent fear. Simon Martin (Interview 10), otherwise an highly neophilic participant, still expressed unease at the thought of some insects' "hardness" and the presence of legs. He felt more inclined to adopt what he called "tender" insects such as larvae – but only if they were cooked. The use of

the word “tender” is worth a side note here, as it is a positively connoted adjective that usually refers to a desired mouthfeel of meats. Its use in an entomophagic context – rather than, for instance, squishy or soft – points to both the participant’s experience and interest in edible insects and to the commonality of a trope that posits insects as a meat substitute. In fact, though they share few sensorial similarities with steaks or chops, being overwhelmingly sold dried and roasted or powdered, bugs have been heavily portrayed as replacements for animal meats (Shelomi 2015), based on the functional benefits of protein rather than actual sensory features. The unusual choice of “tender”, however, hints at little-explored shared characteristics that could enhance this comparison.

A larger number of eaters and participants fear the excessive softness, almost gelatinousness, of grubs and other shell-free insects – what enthusiasts might refer to instead as “creaminess” (Tan et al. 2015, 82), or, as noted above, tenderness, both characteristics positively associated to foodstuffs in the Western hemisphere. Even Mylène Désilets (Interview 9), by far the most neophilic participant I interviewed, was weary of a “juicy explosion” in raw grubs, though once cooked they seemed more palatable to her.

But among those who profess a strong initial disgust towards the very idea of entomophagy, both ends of the textural spectrum are often equally repulsive. Marie-Hélène Levesque (Interview 7) expressed “horror” at the thought of an insect’s insides “spurting” out of a crunchier shell, bridging in one fell swoop the two main textural qualms. LN, who similarly rejected any thought of consuming bugs, might have considered an “extremely processed” form under dire circumstances, one that was “not crunchy, not wormy” (Interview 5). But the combination of both can be daunting even for those well acquainted with edible insects. At the wild harvesting event directed by Étienne Normandin, we collected alien-like dragonfly larvae at the bottom of a shallow pond, covered in slimy mud and smelling of decayed aquatic plants. Once cooked, Étienne passed them around, lauding their “crunchy shell” and “creamy insides”. I was barely able to finish half of mine, and many of the enthusiasts I later interviewed admitted they’d also had major issues with this tasting, with Simon Martin (Interview 10) for instance referring to it as a “particularly challenging” experience. The sensory context of the harvesting and the textural amalgamation of squishy and chewy united to render these insects barely palatable to a crowd of otherwise enthusiastic eaters.

Though Miller does timidly acknowledge there may be cultural variations (justifying his focus on such textural attributes by saying that disgust elicitors exhibit some “tendencies and probabilities” (1997, 39)), I would argue that emphasis on the cultural context is crucial, as sensory features do not elicit disgust in a homogenous fashion across cultures. Moreover, such a homogeneity would hint at some essentialism of disgusting things, a notion to which we can oppose any number of counter-examples. Yet as a whole, Miller contends that disgusting items are treated as such because they are in opposition to the *pure*; though we may stress, yet again, the variability of this concept across cultures, the general antagonism likely holds water (or slime, as Miller might add).

On a side note, I would also contend that this focus on binary oppositions demonstrates not so much the unavoidability of “certain mental concepts, which can exist only as oppositions and contrasts” (1997, 63), but instead the pervasiveness of a Western thought structure that has endeavoured to organize the world as a set of opposing binaries, discounting the flowing

tendency of relationality. The very example of insects, as I will further investigate later, illustrates this well, though it goes beyond the tactile realm. Though the majority of respondents I interviewed first claimed to find insects disgusting, more often than not, after a closer look, at least a few escaped their scorn: things like bees, butterflies or dragonflies, for instance. Even hated insects such as mosquitoes, blackflies or wasps, are generally not thought of as disgusting, merely (highly) annoying. In many cases, it is also a question of quantity and context, rather than inherent characteristics of the bugs themselves, that trigger disgust. Seeing one ant in the grass is not so challenging; finding a swarming nest under a flagstone or, even worse, inside a bedroom wall, is another matter altogether. Thus there is something to be said for the consideration of disgust as a feeling that is modulated along a spectrum, rather than one that emerges in response to fixed oppositional boundaries. Deroy and her co-authors also examine the differentiated affects attached to distinct species within the insect realm through their critique of Paul Rozin's much-cited experiment with cockroaches. To demonstrate the contamination powers of disgust-eliciting items, the psychologist famously dipped sterilized cockroaches in glasses of juice, only to observe a marked decrease in reported appeal of the juice among subjects, even once the insect was removed (Rozin, Millman and Nemeroff 1986). However, Deroy, Reade, and Spence hypothesize that a different conclusion might have been reached with other species of insects, such as bees, midges or ants, that are perhaps less strongly correlated with feelings of disgust. Building on the idea that negative representations are linked to certain types of insects rather than to all of them, they advocate a better understanding of folks categories of insects and the spectrum of affective reactions attached to them. For instance, experiments using bugs associated to items of core disgust such as feces and corpses are bound to incite disgust themselves because of this very link, rather that an inherent feature of the insects. Moreover, many insects are not in themselves as disgusting as a cockroach or maggot might be; butterflies, ants or bees only nauseate when they are associated to taste, not to the other senses – though I would argue that a swarm of bees or ants, or sight of their eggs and larvae, may also elicit feelings of revulsion.

Both Rozin's and Miller's accounts of disgust examine thought-provoking, and in many cases complementary, facets of disgust. Rozin and his colleagues focus much more on notions of taste and oral incorporation, as well as on disgust's role in upholding the fragile borders of the self. Much like Miller – at times, even more so – they emphasize the cultural construction and variability of disgusts, stressing that though humans possess the capacity to be disgusted, what specifically counts as disgusting must be inculcated. Their account, however, overlooks the social and moral dimensions of disgust. Miller, however, fully incorporates these features in his analysis. This inclusion illuminates the narrowness of Rozin's taste-centered conceptualization; indeed, smell and touch also play a crucial role, as can sight and even sound, in the elicitation of disgust. Moreover, Miller draws on a number of cultural landmarks – Swift's poetry, Shakespeare's King Lear, and so on – to build his analysis, which enriches it considerably; indeed, in their principal focus on the individual, whether at the physiological or the psychological levels, Rozin and his colleagues neglect the incredible richness of cultural associations to revulsion. Of course, close kin are paramount in teaching young children about repulsive items, but this is not enough to explain the infinite complexity and variability of such an emotion. The inclusion of cultural objects such as works of art and literature, as well as disciplinary fields such as history and philosophy, thus constitutes a necessary addition to this study that has been almost completely overlooked by the psychologists. This is coherent with Miller's idea that disgust is not only created by culture, but that it creates culture in turn – in both

the narrow and broad meanings of the word. Even within the realm of food, which Rozin and his co-authors choose to privilege, it can provide a compelling narrative of why certain items are considered revolting – their representation in cultural media often connotes undertones of inappropriateness, of repulsiveness, of less-than-humanness. Here again the socially intricate nature of disgust remains paramount, as it does not develop in a closed shell or even a family cocoon, but instead takes on its full potency once it is projected into the outside world, with all attending risks to the individual's sense of self, yes, but also sense of belonging, place within the group, and rightfulness of a claim to the full status of humanity. As I demonstrate in the next section, the social dimensions of disgust have far-reaching consequences when considering insects, as their pervasive *otherness* forcefully shapes our attitudes towards them.

4.4 Insects, the ultimate other?

Because what we eat is so closely tied to our sense of who we are, as Chapter 3 demonstrates, incorporating a substance considered disgusting, foreign, or strange by peers carries the risk that such properties will be symbolically transferred to the eater herself. Among potential insect consumers, this leads to another frequently expressed apprehension: one that can be defined as social risk, implying a threat to one's reputation, power, and/or status – a stigmatization of sorts (Slovic 2016), an *othering*.

Insects, in a sense, are themselves a quintessential *other* of the animal realm. They are even "doubly other – other than humans and other than the animals that we eat as well"(Loo and Sellbach 2013, 13). Succinctly put,

> [i]nsects are all wrong. There is a good case for regarding them as zoology's Other, the definitive organism of *différance* [the Derridian concept that simultaneously incorporates to differ and to defer]. We humans have skeletons; they keep their hard parts on the outside and their squishy bits in the middle. We humans celebrate intelligence as our defining feature; they form almost equally complex societies by instinct. No wonder we are disgusted and fascinated when we find them in the kitchen. (Sleigh 2006, 281).

Insects, because they are considered non-foods, contaminating substances, and alien creatures, as I will show shortly, are particularly prone to eliciting fears about social stigmatization. Traditional popular portrayals of entomophagy, some of which I will examine, also tend to reinforce this perception of risk through vivid imagery and evocative media grammar.

In keeping with this idea of foreignness and stigmatization, this section also explores some of the ways in which, throughout history, insects have served cross-culturally as a marker of social otherness and a dehumanizing metaphor, significantly complicating our relationship to them both as legitimate agents in our environment and as potential foods.

4.4.1 Sly, slithery, and strange

To most Westerners, insects are a paragon of the unknown. Who, among us, can list even a handful of species? Biologists have singled out and identified about a million of them so far. Yet most of us are hard-pressed to name more than a dozen, let alone tell them apart, and it is highly likely that lay enumerations will include non-insect "bug" creatures such as spiders, worms, or snails. What's more, it is estimated that at least 4,5 million more species have yet to be discovered, meaning that insects as a whole are so profoundly foreign to us that over 80% of them do not even have a (scientific) name yet (Stork 2018).

This foreignness is compounded by seemingly unbridgeable differences between insects and the human world. Stephen Kellert (1995) outlines some of the particularly striking dimensions that stoke suspicion, when not outright fear. On a physical level, the shapes and appearances of invertebrates seem alien-like, "monstrous" to many, both in their variety and their dissimilarity to us. Their ethology also feels alienating. Insects seem like they are everywhere, all the time: simultaneously impossible to get rid of, perpetually adaptive (and likely to survive us), and persistently impermeable to human volitions of control, their "radical autonomy" a challenge for many. What's more, their sheer numbers and astonishing multiplication capacity can appear to jeopardize "human concern for identity and selfhood". And finally, recurrent cultural and discursive associations between insects and madness or lack of feelings contributes to this feeling of estrangement (Kellert 1995, 57–58). On all these levels, their perceived foreignness often fosters a feeling of risk to the self, to one's humanity. Eating them thus becomes an blatantly perilous proposition, from a social acceptance vantage point.

Many participants in my research mentioned this preoccupation when asked about insect consumption. Isabelle Morin (Interview 3) and Martin Chayer (Interview 8), regular consumers who attended the wild harvesting workshop at Gourmet Sauvage, claimed they were always eager to introduce friends and family to their unusual diet. This endeavour was usually met with scorn, disgust, or mockery among adults, while children were more eager to sample. Isabelle, a schoolteacher, had successfully presented bugs as snacks to her pupils. Her proposal of an insect dish to a teachers' potluck was, however, greeted with utmost revulsion. Nonetheless, she and her husband trusted the future potential of bugs, and in the "next generations'" unfettered adoption. Their dedication in the face of peer rejection was motivated by strong beliefs in the environmental sustainability of bugs, wherein a desired smaller energy and water footprint compensated for some of the social risks involved in sharing their unpopular practice.
Their participation in the wild harvesting workshop was inspired by a desire to join a more homophilous community, one that didn't frown upon their dietary choice but instead embraced it. "Who *else* eats this stuff?" Isabelle said she wanted to know when she signed up. They were eager to meet other enthusiasts, to share their interest with them rather than to be constantly on the 'proselytization' end of things. The group effect worked its magic: it emboldened them to try new species, including ones they'd found intimidating during the harvesting activity. It also helped them shed some of the social stigma they had felt beforehand.

Such a social stigma is bolstered both by the othering of insects themselves and by the othering of those who consume them. Indeed, insect eaters are often seen as ''primitive, barbaric, or

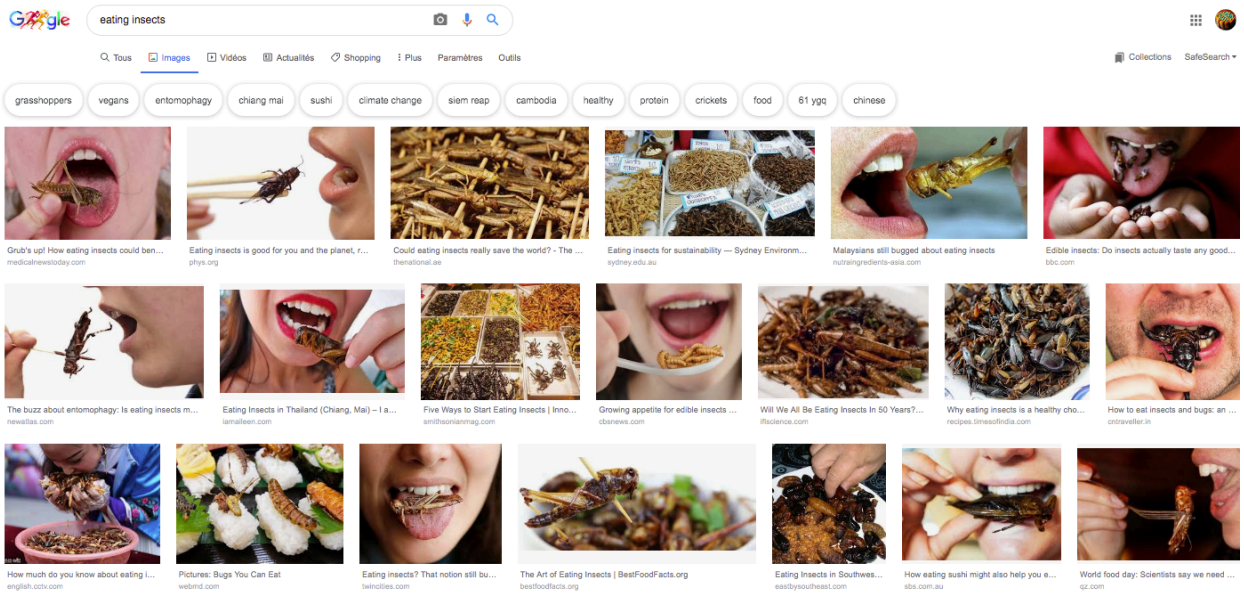
desperate'' (Forsyth 1994, 63). Challengingly, then, "to embrace even the idea of entomophagy is to embrace in our bodies, as well as our minds and souls, the full humanity of those of other classes, races, and cultures" and of insect eaters in general (Looy, Dunkel, and Wood 2013, 135).

Portrayals of entomophagy in popular media, however, tend to do the opposite. Depictions of traditional entomophagy often feature black or brown people dropping raw, still alive, and unprocessed bugs into their mouths, straight in the bush.

A Peruvian field guide eating live termites, image exactly as posted on TripAdvisor by Llaquipallay Lodge and Expeditions. https://bit.ly/2OOOVlj

In the above photo, the only marker of the Peruvian field guide's identity is his non-white ethnicity; all other signs are otherwise obscured by the cropping, making him unrelatable. What's more, the raw and live consumption, rather than a more complex, refined culinary preparation, mark this food intake as less humane and less human. The othering thus operates on a variety of levels.

A general visual search for "eating insects" on Google Images similarly depicts anonymous, and unidentifiable, people putting whole, unprepared bugs in their mouths – an additional affront to viewers unaccustomed to seeing entire bodies on the plates, rather than cutlets or skinless, boneless breasts (Lesnik 2018). The large focus on the sole act of incorporation, rather than the eater's humanity or relatability or the rich and varied ways in which culinary cultures from around the world have included bugs, bolsters the feeling of otherness and revulsion rather than similarity. This fosters dissociation instead of closeness or mutual understanding. Thus a frequent argument mobilized by entomophagy advocates – that insects are eaten around the world by some 2 billion human beings – runs the risk of butting against food preferences' fundamental relativity: sure, others might eat them, but why would I?



Google Images search results for "eating insects". Source : tiny.cc/tqhbaz. Accessed Sept. 26, 2019.

Another type of dissociation hinges on showcasing revolting or unthinkable practices and forms of consumption. Once wildly popular shows such as Fear Factor and Survivor are one of the most pervasive and entrenched cultural benchmarks in the realm of entomophagy, as I have been reminded by participants in almost every public outreach event I attended. Such television programs often featured insect-eating among their roster of nauseating challenges, inextricably linked to brute survival or crude shock value that banked on viewers' expected revulsion. Dramatic and disturbing *mises en scène*, such as consuming bugs with especially horrifying connotations such as cockroaches, licking critters from a windshield rather than off a plate with cutlery, eating them raw and squirming, or pooling in a blood-like liquid that drips from contestants' mouths, portrayed the practice of eating insects as a profoundly less-than-human one, at the opposite of the spectrum from normality and social acceptability.

Screenshots from various Fear Factor episodes. https://www.youtube.com/watch?v=i0l0Ol9IXR8 and https://www.youtube.com/watch?v=aw_bmpgfZK4

Much of entomophagy's media presence today still shows remnants (albeit watered-down) of this media grammar, even as it portrays eating insects in a more positive light. "A idea that has legs" (Longley 2016), "Pasta bugonaise"(BBC Radio 1 2019), "Bug Appétit!" (Taylor 2019), "Cricket farmer hopes business will start hopping" (CTV News 2016), "Don't Bug Out—the Market for Edible Insects Is Jumping" (Stampler 2019): the ubiquitous wordplays, jokes and general banter prevent entomophagy from crossing the 'crazy fun food' threshold into serious business. Such jokey discourse initially seems like it uses mockery to endear its audience, but the cumulative effect of this can-you-believe-it attitude fosters distanciation instead. The shock value of whole bugs on the tongue and as-graphic-as-possible accompanying images also impede the normalization process – a clear reminder that such comportments fall clearly outside of acceptable social norms, and deserve to be treated more like a freak show than a *bona fide* food practice.

It thus comes as no surprise, with such culturally entrenched imagery and grammar being conveyed though popular media, that diners who include insects as a regular part of their North American diet run the risk of social marginalization or, at the very least, of disdain and ridicule.

4.4.2 A recurrent trope

In a much darker vein, the recurrent and cross-cultural instrumentalization of insect metaphors has long served the goal of collective aggression. Because the comparison between bugs and humans hinges on differences that are so extreme, it fosters a total cognitive distancing from the oppressed, which can then invite the habitual action towards bugs: extermination. It functions as an operational metaphor that bridges the distance from thought to action while discounting moral qualms, while its clarity and unequivocal nature help convert expressed hatred into effective violence (Hollingsworth 2006). Time and again, insects' foreignness has been put to chilling use in the form of dehumanizing metaphors, mobilized to deny enemies their humanity in the purpose

of mass conflict and eradication. Dehumanization disengages moral self-sanctions and allows aggressors to inflict violence without regards to the usual interpersonal restraints (Haslam 2006). It does not entail removing human identity entirely, but instead negates the human characteristics that summon respect, empathy and a sense of shared dignity. A such, it often leads to treatments – stigmatization, humiliation, torture – even more cruel than those reserved to the animals used as comparatives (Davis 2015).

Comparison to lice is a particularly recurrent theme, one that was used by Colonel John M. Chivington as early as 1864 when he exhorted his troops to eradicate a Cheyenne tribe, including women and children: "We must kill them big and little… Nits make lice." (Hollingsworth 2006, 263). Lice, of course, was also a driving metaphor used to stigmatize and dehumanize Jews under the Nazi regime, and Hitler often framed the Holocaust in terms of extermination. In his Kharkow speech on April 24, 1923, Himmler reminded his SS audience that "Antisemitism is exactly the same as delousing. Getting rid of lice is not a question of ideology. It is a matter of cleanliness" (Davis 2015, 16; Raffles 2007; 2010). Lice is a particularly compound trope, in that it simultaneously signals non-humanness, parasitism, blood-sucking, invasiveness, ubiquity, disease transmission, filth, and lack of self-care. It epitomizes "the shadowy figure of the parasite, a figure that infests the individual body, the population, and of course, the body politic, that does so in both obvious and unexpected ways, and that invites innovative interventions and controls" (Raffles 2010, 145). It is simultaneously commonplace and highly evocative, its effectiveness indisputable.

This operational metaphor was taken to its literal extremes during the Holocaust. In Auschwitz, prisoners were told they would undergo delousing procedures and massed into "showers" where they were murdered with Zyklon B, a hydrogen cyanide insecticide used for delousing buildings and clothes (Raffles 2010; 2007). The metaphoric dehumanization translates, in this case, into an inhumanly atrocious and cruel material reality, pushing the insect allegory to the absolute boundaries of racial hatred.

Cockroaches constitute another recurrent trope. During the Rwandan genocide, it was progressively but systematically introduced through radio shows to isolate and stigmatize Tutsis and steel Hutu listeners to their massacre (Jorgensen 2016). More recently, as Jeffrey Lockwood reveals, a commenter identified as "William" declared in 2004 on Rush Limbaugh's Campfire website that "It should be legal to shoot [Mexicans] on-site. They breed their filthy race like the cockroaches that they are" (Lockwood 2013) (the post was since removed).

Far from the being the preserve of genocide enablers and self-appointed militiamen, the metaphor finds its way into all manners of institutional structures. When politicians such as David Cameron or Donald Trump refer to "swarms" of migrants, they engage in a similar process (Elgot and Taylor 2015). In 2011, human-rights lawyer Jennifer Robinson also revealed that "bugsplat" was "the official term used by US authorities when humans are killed by drone missiles" (Robinson 2011), highlighting the abstracted and dehumanized nature of the small, scuttling figures seen on drone operators' grainy screens halfway around the world. *Bugsplat* was also the name of modeling software used by the CIA and the US Defense Department to minimize collateral damage of these same drone strikes (Schwartz 2013). In response to this, an artist collective organized the installation of a massive-scale portrait of a child in the Khyber Pukhtoonkhwa region of Pakistan. The objective was to rehumanize victims by presenting a human face rather than an insect-like appearance: "when viewed by a drone camera, what an operator sees on his

screen is not an anonymous dot on the landscape, but an innocent child victim's face" ("#NotABugSplat" 2014).

Source: notabugsplat.com

Though not all examples are as extreme as the preceding ones, they highlight just how far the cognitive disconnection can be pushed through the use of insect metaphors. The processes that contribute to othering insect eaters mobilize a variety of culturally entrenched ideas and impressions about bugs themselves, which hinge on their fundamental differences with human beings. It is thus unsurprising that potential eaters consider the social implications and risks of such a choice, one that might identify them as profoundly different human beings that shun culturally recognized food practices and embrace ones that fall outside accepted norms.

Chapter 5. Good for you, good for the planet

Eat bugs, save the world.

The statement is not a satirical oversimplification, but instead a catchy slogan that has been used as a headline in innumerable news pieces around the planet. From the BBC and the Guardian to the Washington Post and the Atlantic, reputable media outlets have eagerly and unquestioningly framed insects as the "Last Great Hope to Save the Planet" (D. Martin 2014), a quick-fix solution to many of the environmental, wellbeing, and demographic woes that usually plague their pages and broadcasts.

But as the previous chapters amply demonstrate, edible insects are a hard sell for Western audiences, in large because of cultural associations that have tarnished their image and turned them into nuisances to be swatted away from the dinner table. Whether bugs are perceived as inedible, inappropriate, dangerous, dirty, or overwhelmingly strange, negative attitudes towards them impede their consideration as a prospective food. Building on this, advocates have largely focused on rational or utilitarian approaches to transform such attitudes, reasoning that if cognitive representations of insects prevent us from eating them, then changing these representations and focusing on the cognitive aspects should help us change our minds. Yet as I will demonstrate, such rational discourses not only often stand on shaky scientific grounds, but they also display a rather poor track record on modifying actual behaviours, in the edible insect world or otherwise. Because rational benefits are often harder to perceive and their effects more remote from consumers' daily lives, they are often taken into account but not fully or coherently acted upon. Nonetheless, their marketing appeal never seems to wane, and they feature prominently in the quasi-totality of behavioural modification endeavours, from smoking cessation and healthy eating campaigns to "green" consumption crusades.

The rational approach typically featured in discourses promoting entomophagy is articulated along three main axes: a manageable environmental footprint, a strong nutritional profile, and a potential solution to looming global famine, with the first two being the most prevalent arguments mobilized by enthusiasts, "entopreneurs" (the catchy portmanteau for entomophagy entrepreneurs), and researchers alike.

Ever since the publication of the landmark 2013 report by the United Nations Food and Agriculture Organisation (Van Huis, Van Itterbeeck, et al. 2013), which advocated for bugs to feed a growing population with a decreased environmental footprint, proponents have steadfastly – and often uncritically – embraced the sustainability argument. This analysis is largely based on preliminary data which suggests that, mainly because of their advantageous "feed conversion ratio" (which refers, in animal husbandry, to the relative efficiency with which organisms convert feed input into desirable outputs such as meat or milk), insects compare favourably to other types of livestock, especially cattle. The amount of required water is also said to be drastically inferior, as is the necessary space to grow them appropriately, hinting at the possibility of establishing highly localized supply chains with production facilities located in urban or peri-urban areas. Though actual, proven figures are still few and far between, as I will show shortly, the good-for-the-planet argument has thus become a crucial axle of the cognitive-justification strategy to promote insect consumption.

A second part of this rational approach relates to more personal benefits, with a particular emphasis on nutrition. Because of bugs' high protein content, advocates have been surfing on the high-protein diet wave to position insects as a more sustainable, highly digestible alternative to a roster of protein sources including but not limited to meat, whey powder, and soy supplements. Their varied nutritional profiles also present some interesting vitamin and mineral benefits to those eager to boost their intake of specific micronutrients. Such an approach, however, runs the risk of limited appeal outside of specific segments with a keen interest in nutrition if other crucial factors such as cultural appropriateness or sensory appeal as a driving motivation in food choices are not seriously taken into consideration.

Finally, a third, though less often mobilized, aspect of this cognitive triptych calls for an empathetic outlook on marginalized or food-insecure populations around the globe, with arguments centered around feeding a growing population and addressing a looming protein-deficiency crisis in industrializing countries. Another side of this arguments looks to the effects, beneficial or detrimental, of Western attitudes towards insects. Because of cultural dominance and the spread of industrialized agriculture, our refusal to embrace them is said to threaten this precious food source for those who traditionally consume it. Thus a change in attitudes is demanded to prevent the decline of the practice around the globe.

As I demonstrate in this chapter, though preliminary results seem promising, research as it stands does not (yet?) support the widely broadcast idea of insects as a panacea for environmental, health, or demographic issues. Moreover, the use of cognitive arguments as a single-handed strategy to promote edible bugs runs the risk of reaching very limited consumer segments or, even worse, of slowing or impeding wider-scale acceptance among the general population (Berger et al. 2018). Problematically, what characterises the three types of discourses outlined above is the distance between actual behaviour and purported benefits, whether that distance is temporal, sensorial, or geographical. Environmental effects are large-scale, often remote, and distant in time; health outcomes of specific dietary choices are hard to sense and even more to pinpoint on a single food or nutrient; and notions of increased food security are simultaneously inaccessible and unverifiable for the typical eater. In such a top-down approach, where cognitive-oriented arguments are used to influence and induce consumption, the intangibility of benefits can hamper behavioural change. In a word, rational appeals just do not seem to work all that well; yet despite their shortcomings, they are consistently and emphatically embraced in discourses promoting insects as a potential food.

It must be noted that, because the actual facts and figures of environmental or nutritional claims lie outside of my research scope, I focus largely on the way arguments revolving around them are mobilized, rather than on the credibility of various numbers. What I engage in here is not a demonstration of how true or false each specific claim is, but rather an examination and deconstruction of the ways in which they circulate, evolve, and are instrumentalized in specialized and lay discourses around the practice of entomophagy. Readers interested in the most recent figures are invited to consult the appropriate sources listed in this chapter and in the bibliography.

5.1 Saving food, water, space and greenhouse gases

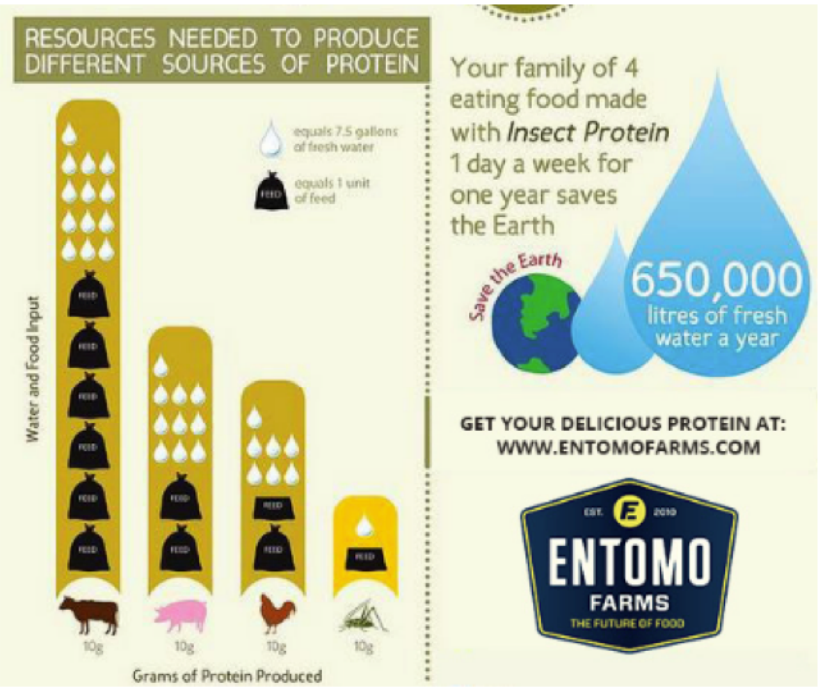
Entomo Farms Facebook post, April 22, 2019. https://bit.ly/39l2a6G

With a 70% increase in food production needed to feed a world population of almost 10 billion in 2050 if food waste is not drastically reduced (United Nations Department of Economic and Social Affairs 2019), apprehensions about famine, protein shortage, escalating health costs, environmental impacts of agriculture and farming, and threats related to global warming have been growing exponentially. The need to reduce red meat consumption has become a central trope, pinning livestock production as the cause of myriad health afflictions, a major source of greenhouse gases, a massive waste of precious feed and water, and an all-around resource guzzler. Fingers are pointed, blame is assessed. The race is on to find the best meat substitute, with some contenders striving to reproduce the sensory qualities of beef patties while others focus on sustainability or health benefits of alternatives. Commercial interest has ramped up as

start-ups are backed, with great publicity, by venture capitalists and public figures alike (Forgrieve 2019). For instance, Beyond Meat, which makes beef-like plant-based burgers, saw its share prices rocket 163% on the firm's first day of trading and spike to more than 730% a few months later (Reinicke 2019); lab-grown meat enterprises have racked up millions from high-profile backers such as Bill Gates and Richard Branson (CB Insights 2019). The enthusiasm for meat replacement products that claim to pack a more sustainable punch just keeps growing.

In this context, edible insects are finding a promising niche. As large swaths of consumers are interested in adopting "greener" habits and making more sustainable choices, including in the area of food, insect advocates have wholeheartedly jumped on the bandwagon to claim just how much more eco-friendly an insect-based (or, for the more realistic, an insect-comprising) diet could be (Gamborg, Röcklinsberg, and Gjerris 2018). The main arguments center around their capacity to be reared on organic side streams such as food waste; the more limited land necessary both to raise them and provide necessary feed input; the relatively low water requirements for raising and processing, compared to other animals; the low emissions of substances such as ammonia or of greenhouse gases such as methane; and the high efficiency of their feed conversion ratio (how much body mass they can gain for each kilo of feed). Indeed, because insects are cold-blooded, they do not need to expand energy to stabilize their body temperature, thus converting a larger amount of calories into body mass. Moreover, most or all of their body parts are edible, generating little to no waste, compared to about 55% of edible matter for chicken and pork, and 40% for beef (Van Huis, Van Itterbeeck, et al. 2013).

For highly motivated and engaged consumers who place sustainability among their main drivers of food choice, insects can seem like a promising avenue. Some of my participants signalled that, rather than the usual risks related to this unfamiliar food – such as toxicity, disgust, or digestibility issues, for instance – hazards to them lay not so much in consuming bugs, but in pursuing the more typical meat- and processed food-heavy diets. Isabelle Morin (Interview 3) and Martin Chayer (Interview 8) have embraced insects as part of a move to consume less meat, more local products, and ones with a smaller environmental footprint. Their worries are related to direct or internal issues – the impacts of red meat on individual health, the cost of meat, the knowledge about where their food comes from, and their children's lack of openness to plant-based protein such as legumes – but especially indirect or external ones – environmental impact, the "future world" their children will inhabit, and local small-scale economic sustainability. To them, potential perils lay not in consuming the bugs, but in *not* consuming them to replace more conventional sources of animal protein . The general awareness of a lower environmental impact was thus present in their discourse, though exact facts and figures were not, an absence that may be attributable as much to the complexity of sustainability evaluations as to the inconsistency of numbers and claims that circulate in the industry.



Note the broad-sweep tagline : « The Future of Food ». Entomo Farms n.d. https://entomofarms.com/future-of-food/#12reasons. Accessed July 30, 2020.

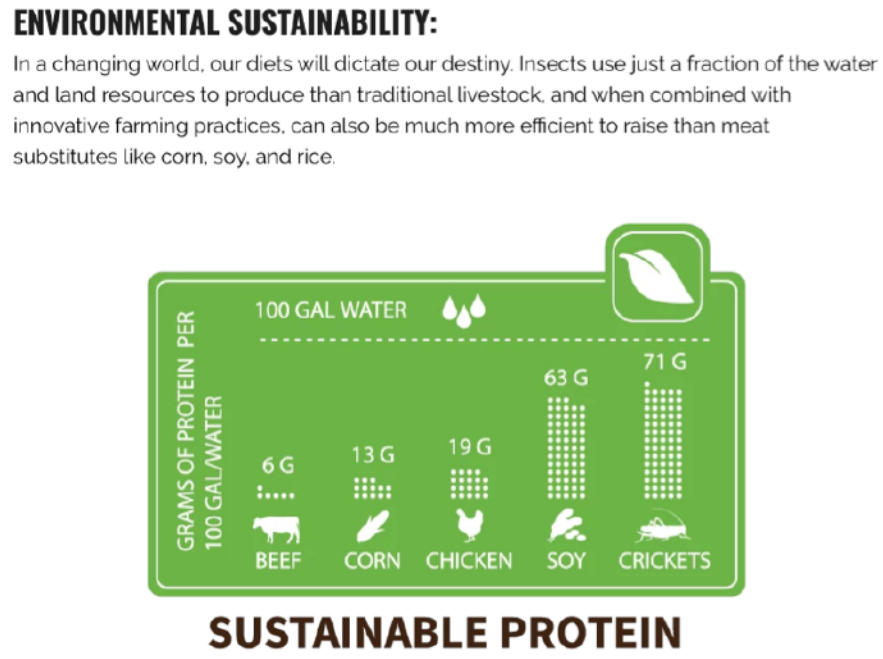
Durables

Les insectes Micronutris ont rejoint les fourchettes durables, aux côtés des fruits de saison, des poissons de ligne ou des fromages artisanaux. En plus de leur croustillant, ils offrent des bénéfices environnementaux remarquables.

Un insecte comestible Micronutris pour l'équivalent de bœuf c'est :

7x	50x	100x
moins de végétaux	moins d'eau	moins de gaz à effet de serre

Micronutris n.d. https://www.micronutris.com/fr/nos-insectes. Accessed July 30, 2020.



Chapul 2019. https://chapul.com/pages/why-eat-crickets. Accessed July 30, 2020.

Näak 2019. https://naakbar.com/fr/pages/why-cricket-protein-powder. Accessed July 30, 2020.

A quick look at some of the environmental claims made by various companies reveals how widely divergent facts and figures are. For instance, the comparison between crickets and beef production in terms of water usage, one of the numerous variables utilized to calculate environmental costs, boasts ratios of 1:13 (Entomo Farms n.d.), 1:50 (Micronutris n.d.), 1:11,8 (Chapul 2019), and a whopping 1:2000 (Näak 2019) (Entomo and Chapul compare per gram of

protein; the others don't mention the comparison units). None of these infographic renderings cite a source. Such problematic disparities undoubtedly undermine the industry's credibility and distort public perception in an area already subjected to much dispute, confusion, and controversy. As such, consistency and standardization of facts and figures were central pursuits in the creation of both the North American Coalition for Insect Agriculture (formerly the North American Edible Insects Coalition, at the time of founding in 2016) (NACIA 2019) and the Fédération des Producteurs d'Insectes Comestibles du Québec (Interview 13).

Consequently, some actors in the market are starting to slowly distance themselves from what they perceive as a misleading "save the planet" rhetoric, though they still cling to sustainability promises to convince potential consumers to give their products a try. Jérôme Fortin-Légaré, co-founder of Neoxis, an insect farm south-west of Québec city, told me that the driving idea behind the business was to complement and diversify the existing protein offer with a new more sustainable, environmentally-friendly product (Interview 13). Not unlike most producers, he claimed that environmental impact awareness lay at the heart of Neoxis' entire production and processing activities, explaining for instance that while some other companies chose to use "harsh chemicals" or energy-intensive methods, Neoxis always looked for the most "natural" methods available, convinced that the sustainability assertion should take into account the entire cycle of the insect product. While he hadn't yet compiled analytical data about his own production – a life cycle analysis was planned for "sometime soon" – he said it was easy to empirically observe that bugs required little water, feed and space compared to the other types of livestock that dotted the surrounding landscape in the agricultural region of Saint-Flavien, southwest of Quebec city, where Neoxis grew its mealworms .
This being said, though he considered sustainability a driving concern, Fortin-Légaré scoffed when I asked about the 'save the planet' discourse that often frames edible insect conversations. He steered clear from claims that bugs are the solution to our environmental woes, or that they should replace meat entirely. In fact, he noted, many of the sustainability claims the industry makes seemed blown way out of proportion, and it was still too early to know whether preliminary data from small farms could translate to industrial processes (Interview 13). He's not wrong: various researchers have suggested that many of these assertions stand on shaky grounds, held up by optimism and speculation rather than actual science (Halloran et al. 2016; 2018; Berger et al. 2018; Lundy and Parrella 2015). In fact, he saw the lack of research and development as one of the industry's biggest challenges in moving forward. In terms of environmental impact, a lot of work still needed to be done before life cycles were properly assessed to provide reliable numbers on which marketing claims could be accurately founded.

Such inaccuracies are in large part due to the artisanal nature of much of an industry still in its infancy. Though preliminary data on small-scale farms seems promising, it is still too early to accurately evaluate how such gains would translate as the industry matures and scales up, gaining in efficiency and standardization but potentially losing, as most industrial production has, the capacity to balance out externalities as they accumulate (Berggren, Jansson, and Low 2019). In livestock production for instance, manure is a classical example: in small quantities, it can be used to fertilize holistically-managed farmsteads; in industrial magnitudes, it accumulates into toxic cesspools that periodically leak nutrients, toxins, and pathogens that contaminate water sources and the general environment (Van Huis, Van Itterbeeck, et al. 2013). In the case of insects, many advocates vaunt their relatively indiscriminate appetite as a promising avenue to manage and upcycle food waste and other organic surplus (Hénault-Éthier et al. 2017). In

practice, however, once farms scale up, reliability of supply and standardization of the end product become driving concerns, both for the stability of the business and for legal purposes, since each batch needs to be traceable and identical to previous ones for reasons of food safety and regulation (Van Huis, Van Itterbeeck, et al. 2013; Johnston 2017). Thus the variable nature of input from waste streams becomes a liability, and foods such as grains or chicken pellets are substituted, drastically weakening sustainability claims (Berggren, Jansson, and Low 2019; Lundy and Parrella 2015; Dobermann, Swift, and Field 2017). Even without the recourse to fully industrialized processes, increasing demand can lead to a tipping point in resource management; in many locales where insects are relished and traditionally harvested in the wild or grown in semi-managed conditions, overexploitation and environmental changes are threatening their very existence, and by extension the survival of an entire biodiversity that relies on their availability, including humans (Van Huis and Oonincx 2017).

Moreover, the complexity and diversity of factors that need to be taken into account to properly assess a food's environmental footprint means that holistic life-cycle analyses (LCAs) need to be conducted on every product, and in locally relevant conditions. For instance, examining the rare existing studies on edible bugs' sustainability and impact, Halloran and her co-authors call for a

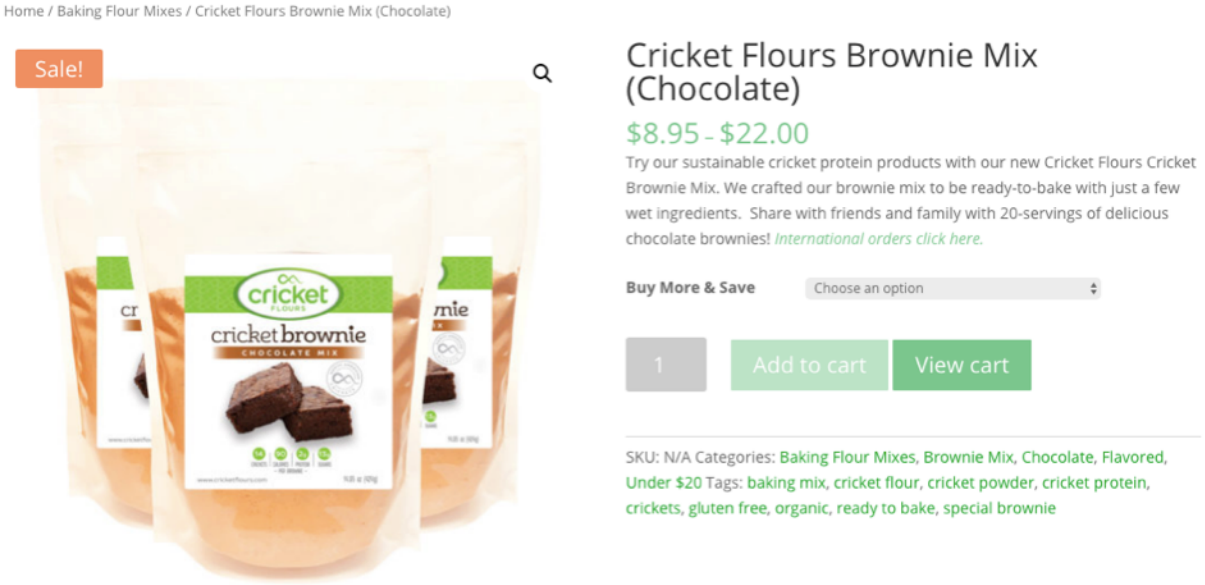
> (1) clear definition of the insect species and life stages included in the LCA, (2) use of at least two of the following types of functional units: nutritional, mass, or economic-based, (3) collection of empirical data in situ (e.g., on farms/production sites), (4) comparative analysis where production systems produce products that are realistic alternatives to the insect species under investigation, (5) inclusion of additional or previously unconsidered unit processes, such as processing and storage and waste management, and (6) use of a wide range of impact categories, especially climate change, resource consumption, nutrient enrichment potential, acidification potential, and impacts on land and water consumption in order to allow for comparison between studies (Halloran et al. 2016).

Needless to say this presents a daunting methodological challenge, but it also requires a considerate investment in time, energy and resources, and may not provide dependable results until the industry has stabilized and achieved considerable – and standardized – technological advances. The numbers currently circulating are thus promising, but they need to be understood, as a whole, more as enthusiastic speculation than actual demonstrable figures, and vast swaths of their sustainability landscape remain uncharted (Berggren, Jansson, and Low 2019). Thus market actors urgently need to adopt a coherent and consistent approach to claims in the environmental department, dropping wild claims for more restrained ones to maintain credibility as consumer interest in the product advances and matures.

Apart from all the uncertainty around facts and figures pinning insects against other animals, a central issue remains: insects may fare indisputably better, from a sustainability point of view, than behemoths such as cattle or lamb, but they still pale in comparison to most plant foods or even less resource-intensive, protein-rich animal foods that people already consume readily, such as eggs or even small fish in certain conditions (Halloran et al. 2018). In such a context, it is worth asking whether all the energy and attention mobilized to promote insects as a potential food and enhance their acceptance – especially through a sustainability discourse – could not be more efficiently directed towards supporting foods that are already familiar to consumers and

present less of an attitudinal hurdle, such as legumes for instance, if the real objective was to manage resources more efficiently and mitigate environmental destruction.

What's more, for any of these sustainability arguments to ring true as they compare insects to other livestock, actual consumption must use insects to *replace* meats and other animal products, not just add yet another food to an already crowded diet. However, the current product offer – mostly snack and convenience foods – and the limited similarities between meat and insects, from functional, usability, symbolic, and sensory points of view, preclude insects from being readily substituted for steak or chops (Shelomi 2015). I examine this category management issue in more detail in the following chapters, but the central idea remains here that purported environmental benefits are only foreseeable if insects become a substitute for meat in their own right, not a garnish, protein addition in flour for recipes that don't require it, or shock-value ingredient, as is currently often the case in available products. In a word, chewing on an insect protein bar between two carnist meals or adding cricket meal to your brownies (Cricket Flours 2019) won't stop global warming.



Why? And how is this more "sustainable" than brownies made with no crickets at all? (Cricket Flours 2019)

Arguments centered around environmental impact certainly seem to be making their way into consumer awareness; almost all the participants in my research cited sustainability when asked what they knew about edible insects, as do most people when I mention my research interests. While precise facts and figures are generally not retained, the overall idea of insects as a more "eco-friendly" option than many other animal products has percolated into lay discourse about their benefits, and is usually correlated with positive valuation. In a sense, this hazy sense of insects as a "greener" choice has thus become a heuristic measure – a mental shortcut used to make decisions about attitudes and behaviours, and one that has a particularly strong appeal with unfamiliar products, such as insects (Gallen, Pantin-Sohier, and Peyrat-Guillard 2019).

However, whether such an idea is sufficient to induce trial – let alone adoption – remains highly disputable. The information-deficit models typical of early pro-environmental behaviour-

modification campaigns "were based on a linear progression of environmental knowledge leading to environmental awareness and concern (environmental attitudes), which in turn was thought to lead to pro-environmental behavior" (Kollmuss and Agyeman 2002, 241). In many cases, insect promotion from a sustainability perspective still runs along these outdated lines, even though entomophagy presents many of the central factors that induce a discrepancy between rational attitudes and actual behaviour outlined by Kollmuss and Agyeman. These are normative influence, such as cultural norms and traditions (*bugs are not food*); attitude-behavior measurement wherein "measured attitudes are much broader in scope (e.g. Do you care about the environment?) than the measured actions" (2002, 242) (*greener behaviours are desirable, but insects are disgusting*); and, perhaps most importantly, direct versus indirect experience, which stipulates that directly felt effects have a much greater impact on behaviours than ones that are more distant or even imperceptible (*how does my cricket trail mix impact global warming?*). Indeed, the central issue at stake is that, like in the case of many utilitarian benefits,

> [t]ypical environmental-friendly behavior requires foregoing immediate and salient pleasures (e.g., flying to a tropical island, using a car instead of a bike when commuting to work in the rain, not eating excessive amounts of meat, etc.), while the benefits (less CO2 emission, more sustainability of resources, etc.) are temporally [and, I would add, mostly geographically] distant (Berger et al. 2018, 2).

Replacing a beloved steak by an unfamiliar and, for many, repulsive, plate of fried grasshoppers thus demands not only unwavering faith in one's personal potential to curb global warming (not to mention believing in environmental degradation as a whole), but also uncannily high amounts of self-control to overcome disgust and forgo direct, perceivable pleasures for mostly imperceptible, or at least spatio-temporarily remote, benefits.

The overwhelming focus on environmental impact in much of the industry, regardless of its limited effects, can be understood as a manifestation of what Ottman, Stafford and Hartman call "green marketing myopia"(2006), wherein marketers focus on a product's beneficial features for the environment, rather than on ways it can answer consumer needs and wants. Conversely, for "green" products to be adopted wholeheartedly and durably, they must "be positioned on a consumer value sought by targeted consumers" (2006, 24) as well as on environmental benefits, without sacrificing quality and product performance in the name of sustainability. In other words, insects cannot be sold solely as a greener alternative to meat or other less-sustainable foods; they must deliver clear, immediately perceivable benefits to those who consume them. This *inevitably* includes sensory or hedonic benefits, as I illustrate in the following chapter. In a word, environmental claims are part of the package, but over-reliance on them can prove detrimental to a more widespread development of the industry and a large-scale appeal that actually influences behaviours.

5.2 Health claims and the race for protein

The idea and practice of eating insects is in no way a novelty for humankind. Insects have been a nutritionally significant part of hominid diets throughout most of our evolution, being only recently cast aside in European-derived cultures (Shockley et al. 2018; Lesnik 2018; Dobermann, Swift, and Field 2017). Still today, over 2000 species are consumed – and often cherished – by close to 2 billion people around the world, in at least 113 countries (Van Huis, Van Itterbeeck, et al. 2013; MacEvilly 2000; Dobermann, Swift, and Field 2017).

From a human nutrition point of view, insects can present an interesting amalgam of protein, fats, calories, vitamins, minerals, and even fibre, thanks to their chitinous exoskeleton. Their specific nutritional content varies from species to species, throughout different life stages, and depends on factors such as environment and feed (for a breakdown of some of the more commonly eaten species' nutritional content, see for instance (Rumpold and Schlüter 2013)).
Insects' high protein content is usually their most flaunted nutritional characteristic. Overall, most of them present a profile that is grossly similar to other animal-derived protein such as meat or poultry. As such, they are often portrayed by advocates as a meat alternative or a protein addition. However, though studies on their digestibility show promising results with regards to the quality and completeness of the protein they contain, the current state of nutritional research for human diets is still piecemeal, meaning that specific and definitive recommendations for human consumption remain out of reach for now (Dobermann, Swift, and Field 2017).
In terms of fats, the content and quality vary widely. As a rule, larvae are usually much higher in fat than adults, as are soft-bodied insects such as termites when compared with species possessing hard exoskeletons such as crickets or beetles, for instance (Rumpold and Schlüter 2013). Some species also present beneficial fats such as Omega-3s, a favourable argument as many consumers are keen to include more in their diets, as shown by the increasing popularity, over the last decade, of Omega-3-rich foods such as flaxseed and salmon or other fatty fish, of Omega-3 nutritional supplements, and of enriched products such as eggs, dairy products, or even orange juice.
Other micronutrients found in insects include essential minerals and vitamins such as iron, calcium, zinc, and vitamins A and B12. In addition to the usual variability between species, it must be noted that the digestibility and bioavailability of such nutrients is still largely unknown (Dobermann, Swift, and Field 2017). However, recent research has shown encouraging results in the case of fibre from the chitin in crickets' exoskeletons, suggesting that it could exert a beneficial impact on gut health (Stull et al. 2018).

Despite the relative uncertainty surrounding insects' nutritional and health potential, this utilitarian justification has become, along with environmental sustainability, one of the most prevalent arguments for the consumption of insects, and it has largely shaped product development in many areas of the industry. For instance, snack bars and energy bites for athletes such as the ones Näak and numerous other brands market are geared towards improved performance through nutritional enhancement; as such, the insects are present as functional ingredients with utilitarian benefits, rather than as foods with an enviable hedonic profile, for instance. On Näak's page "*Pourquoi le grillon?*" ("Why crickets?"), the first featured promotional infographic lists crickets as a "superfood" that compares favourably to other better-known ingredients, often used as nutritional benchmarks in their respective categories : beef for protein, spinach for iron, milk for calcium, and salmon for vitamin B12.

Nutritional profile of insects as portrayed on Näak's webiste (Näak 2019).

Taste is not mentioned among the listed benefits; in fact, the founders told me they noticed a major uptick in purchases when they retweaked their recipes to *lower* the insect content, weakening functional (both helath- and environmental-based) claims but "improving" the sensory profile of their bars, since cricket powder has a strong taste and a gritty texture that is not appreciated by many (Interview 16). As I demonstrate in more detail in Chapter 7, this focus on nutritional properties is coherent with Näak's targeted segment, namely high-achieving athletes (Interview 16). Such a demographic is usually concerned not only with performance but with health and nutrition, and especially with the ways in which these factors intersect, while taste or hedonic pleasure are not always factors with a major impact on purchase decision.

Other advocates have used their own personal athletic performance to promote edible insects, as did American rock climber Meghan Curry when she scaled a challenging route on El Capitan, one of the most revered climbing walls in Yosemite National Park (California) (Curry 2015). For the 12 days of ascent and one day of hiking back down, she consumed only insect-centric foods to "raise awareness" about their potential to nourish high-performance adventurers such as climbers, who she deemed "naturally adventurous and concerned about the environment" (Corrigan 2016). With regards to benefits, she states their nutritional profile as a central motivation, crucial to athletic endeavour: "They have a lot of protein. Insects, especially crickets, are a complete protein, which is important on a big wall [ie. a long climbing route]. Insects also have good fat, lots of vitamin D, tons and tons of iron, calcium, magnesium, and fiber" (Corrigan 2016). Here again, though Curry does quickly mention hedonic or sensory aspects of her food choices during the ascent, using mild words such as "satisfying" or "nice" (Curry 2015), such factors are hardly emphasized.

A central issue with this type of positioning of insects is the risk of limiting their appeal to restricted consumer segments, namely ones with a particular interest in nutrition and, in the abovementioned examples, its impact on sports performance. Moreover, though many consumers include healthfulness as part of their dietary concerns, the impact of such claims on actual behaviours remains questionable, especially when it comes to transforming attitudes about highly unfamiliar products such as insects (Berger et al. 2018). In fact, some studies have shown that promoting foods along nutritional lines can even detract from their appeal, as healthier foods are often expected or perceived to be less delicious and less satisfying (Turnwald, Boles, and Crum 2017; Cliceri et al. 2019). Thus, if they are intent on using health claims as a driving argument for insect adoption, advocates urgently need to incorporate additional benefits to appeal to a wider pool of potential adopters, or alternatively modulate their discourse to tailor promises and claims to different types of audiences.

5.2.1 The nutritionist paradigm

Riding on the swelling tide of protein popularity, bugs have been promoted as valuable additions to just about every type of food, suggesting (problematically) that more protein is always a boon. Indeed, in many parts of the Western world, protein has largely become a heuristic for nutritional goodness, "a kind of secular unction: it instantly anoints any food with an aura of health and goodness" (Wilson 2019). This is coherent with the nutritionist paradigm, a reductive understanding of foods through the lens of individual nutrients, "at the expense of other ways of encountering food through its embedded sensual, cultural, or ecological qualities" (Scrinis 2008, 40). Though it has long been a structuring part of nutrition science, the focus on individual nutrients has come to inform consumer understanding (or lack thereof) of food and its impact on health, and been correspondingly coopted by the food marketing industry (Nestle 2002). This is evidenced by fads such as the low-fat, low-carb, and most recently high-protein crazes that have shaped dietary discourses over the last two decades or so, much like the stringent focus on individualized micro elements such as Omega-3s, antioxidants, or probiotics. Such a disconnection of components from the complex wholes that are foods and diets allows for heuristic – and often myopic – understandings of what is "good for you": follow the lens on a single nutrient, such as protein, and consume whatever foods contain the most. Despite this shifting focus, however, it is not clear that emphasizing nutritional properties largely leads to desired changes in consumer attitudes and behaviours. For instance, recent research demonstrates that if negative hedonic characteristics are attributed to member of a specific category, such as vegetables, the recommendation to consume more because of their beneficial nutrient content can have adverse effects, since it "may be indirectly associated with the suggestion to consume bitter foods and with low flavor intensity" (in the case of vegetables) (Cliceri et al. 2019, 143). Instead, focusing on sensory benefits and hedonic pleasure could lead to more promising outcomes for most consumers, especially those less familiar with the category in question. The case of insects could benefit from such insights, seeing as they too largely suffer from negative hedonic associations, to a much greater extent than vegetables. Focussing on changing these, as do the advocates I introduce in the following chapter, rather than on abstract, functional benefits such as nutritional value, could lead to more promising results.

In accordance with nutritionism's current protein diktat, a recent trip to my local supermarket revealed a proliferation of protein-enriched foods in all categories, including shakes, bars,

breakfast cereal, snack items, assorted beverages, breads, pasta, cookie mixes, and even water (which tastes even worse than it sounds). However, though the lucrative fad shows no signs of receding, the current obsession with high-protein diets is not only unnecessary but potentially harmful. Most of us in the Western world, barring those facing food-security and -scarcity issues, consume more than enough protein already. Those with enough disposable income to purchase enhanced, premium-priced foods are almost never those who would actually benefit from an addition of protein. In fact, the typical daily diet of most North Americans comprises close to twice the currently recommended amounts, which can prove detrimental to health in the long term, especially with regards to weight gain, liver and kidney function, and lifestyle-related chronic illnesses such as type-2 diabetes (Campbell 2015). What's more, protein production comes with a high environmental price tag, seeing as much of it is derived from animal sources, while plant-based sources such as soy also play starring roles in deforestation, water overuse, and environmental pollution. Selling insects as an opportunity to add yet more protein to our diets is thus problematic, even if it is billed as a more sustainable choice than red meat, as long as it is not stringently emphasized that bugs should replace other protein sources, not just add to them.

Thus the current product development and marketing of highly-processed, convenience-oriented insect products, as well as the sample recipes often offered through websites or promotional material that add insect powder to just about any food, serve solely the misguided assumption that we need more protein at all times. From soups and salads to brownies and muffins, insects are portrayed as valuable additions to just about any food intake opportunity, which not only paints them into a usage corner as "ingredients and garnishes" rather than as whole foods in their own right, but also turns them into a product primarily useful for its functional benefits. Reduced to their protein content, they become interchangeable with other foods with which they share this nutritional quality, with little regards to factors such as food appropriateness, cultural fit, or even pleasure – a chief driver in food acceptance. Instead, advocates might focus on developing recipes and uses specifically tailored to highlight not only insects' protein content, but their entire profile, nutritional and otherwise, including their taste and other sensory properties.

5.3 Feeding 10 billion

A third, though less often mentioned, facet of the rational-benefits approach to promote insects relates to the impact of Western disdain on other populations around the globe, specifically those perceived as marginalized, disenfranchised, or prone to hunger and scarcity. The first aspect of this argument examines the influence of the disparaging "Western gaze" on insect-consumption practices, advancing that they are endangered by our attitudes and beliefs (Dobermann, Swift, and Field 2017). A second version posits insects as a solution to a looming crisis as the world's population continues to grow, exerting increasingly unsustainable pressures on already overextended food procurement and production systems.

5.3.1 The Western gaze

> [I]n Sanambele, a village in the West African country of Mali, children have foraged for grasshoppers for generations. The rest of their diet consists mainly of millet, sorghum and maize, with some peanuts and fish, making the grasshoppers a crucial and wholesome

> seasonal protein source. Recently, smallholder Malian farmers have switched from growing extra food to sell in the local market to cotton as a cash crop. Now, parents discourage their children from eating grasshoppers out of fear that the grasshoppers are contaminated with the chemicals used to protect the cotton. The raw cotton is shipped elsewhere for processing, giving the Sanambele farmers minimal economic benefit at a high dietary cost to their children. The result is an increase in protein-energy malnutrition. […] [W]hile the people living in Sanambele, Mali, have a wealth of traditional ecological knowledge, the pressures of a global economy now do not permit them to practice sustainable living based on that local knowledge. (Looy, Dunkel, and Wood 2013, 131; 134)

It has become somewhat of a truism that Westernized diets exert a strong appeal around the globe, disrupting local supply chains, upending traditional cuisines, and bringing in their wake issues of overconsumption, environmental depletion, biodiversity loss, and displacement of smaller-scale, more integrated agricultural production in favour of monoculture and cash cropping practices. In the specific case of entomophagy, such a cultural shift can have many repercussions. Among the crucial ones are the abandonment of traditional practices due to awareness of the Western dietary stigma placed on insects, coupled with a misunderstanding and invisibility of entomophagy that preclude its protection as a vital and sustainable procurement practice in many parts of the world (Dobermann, Swift, and Field 2017). Because entomophagy is little-known, disregarded, or disparaged by European-derived agricultural actors, it falls prey to industrial agricultural practices that combat insects with liberal pesticide use, making them both unfit for consumption and increasingly rare (Looy, Dunkel, and Wood 2013). Thus many advocates call for a shift in our own perception and appreciation of edible insects (whether this includes actually consuming them or not) to prevent the abandonment of the practice in parts of the world where it represents a valuable source of nutrients, a sustainable food procurement strategy, and a culturally significant part of local cuisines. This begins with a better understanding of entomophagy in its many dimensions, and a reframing of our own approaches and discourses about the practice – yet another cognitive shift with far-flung utilitarian benefits.

It is widely accepted that the prevalence of entomophagy worldwide has long been underreported, a lack that should be "attributed more to the bias of the researchers than the infrequency of the practice" (Looy, Dunkel, and Wood 2013, 134). Questions such as "do you eat insects?" have often prompted negations. A number of reasons can help explain this phenomenon, such as a the fear of being stigmatized by Western researchers disgusted by the practice (Lesnik 2018) or the interviewing of informants (often male) that do not participate in a consumption practice mostly reserved to women and children (Looy, Dunkel, and Wood 2013; Meyer-Rochow 1973; Ramos-Elorduy 2009; Schiefenhövel and Blum 2007). Similarly, fieldwork and direct observation of food consumption may not have revealed the full extent of the practice, either because researchers were not attuned to the consumption of a substance so foreign to their own notions of edibility (Lesnik 2018), or because consumption patterns were hard to map. For instance, insects could be consumed as an informal and opportunistic dietary supplement by children as they encountered them on their way to and from the fields, rather than gathered in an organized way and prepared in the home in structured and established processes (Looy, Dunkel, and Wood 2013). Thus their consumption may not have been reported to a full extent (if at all). The lack of understanding of such practices, even their invisibility, threatens

their survival as they are not taken into account when agricultural or urbanization plans are developed.

But the issue of categorization is often at the heart of such underreporting, underpinned by culturally meaningless translations of the taxon "insect" or the non-inclusion of edible species into the category "insect", often associated to pests, by participants (Evans et al. 2015; Looy, Dunkel, and Wood 2013; Schiefenhövel and Blum 2007). Indeed, some entomophagists do not willingly acknowledge they are eating bugs; their hesitations can be consciously or unconsciously motivated. One of the rare cases of Western entomophagy still observable is that of the Sardinian cheese *casu marzu*, which is colonized with and left to alter by the larvae of the cheese fly *Piophila casei*. This insect partly consumes the sheep-milk cheese, digesting some fats and transforming them into *casu marzu*, a very creamy and highly fermented cheese that is consumed with the larvae intact and alive (Manunza 2018). Intriguingly, a research team from Copenhagen's Nordic Food Lab observed that enthusiastic consumers of *casu marzu* "did not even consider it to contain 'insects', let alone that they themselves eat 'insects'" (Evans et al. 2015, 298). When offered a tasting of a product developed by the Nordic Food Lab which contained another insect species – locusts – that were not visible but used as the base of a fermented sauce, they were disgusted by the prospect (Evans et al. 2015). The team and its local guide put this down to a discrepancy between the general thought of "eating insects" as a practice that exists in some parts of the world (meaning: elsewhere), and the particular cases of consuming a well-loved, well-known, specific traditional food.

I personally observed a similar case at the 2016 Edible Insects Detroit conference. A Korean professor of anthropology was stunned speechless when she realized, as she held the microphone, that she had never connected her own childhood consumption of silkworm pupae in Korea to the very entomophagous practices she was there to discuss with us, practices she tended to associate with *other* cultures distinct from her own. She saw the consumption of these pupae as a normal part of her childhood diet rather than an instanciation of a larger movement that is somehow understood to connect all eaters of thousands of disparate species that are, to Western observers, part of a single sweeping category based on scientific observation rather than culinary practice and use as well as lay knowledge. It is only to non-consumers, and to the ill-informed, that such a diversified group of food practices can seem amalgamable under the sweeping umbrella of "entomophagy". In this sense, the "[u]se of the term can continue to other members of insect-eating cultures, homogenising these diverse practices which can prevent their specific investigation and curtail their idiosyncratic evolution" (Evans et al. 2015, 302). Hence a reframing of our discursive approaches to the practice is essential to better map, understand, and safeguard local practices that provide ecologically sound, nutritionally adequate, and culturally appropriate foods in a context of prospective food scarcity, as the next section makes clear.

5.3.2 Famine and food security

Entomophagy been widely portrayed, most notably by the FAO (Van Huis, Van Itterbeeck, et al. 2013), as a potential solution to alleviate looming concerns about food security as the world's population is projected to climb to almost 10 billion in 2050 (United Nations Department of Economic and Social Affairs 2019). Thus insects' long-held reputation as a starvation food has been indirectly reenergized as it emerges as yet another "solution" for the world's poorest,

validated through its endorsement by industrialized nations. Such an attitude harks back to earlier writings by authors such as Bodenheimer who, in his seminal *Insects as Human Food*, while noting that insects are often "eaten as delicacies in many parts of the world", states that

> The French Colonial Service has played a leading role in investigating the actual diet of tropical peoples, followed by those of the British and Dutch empires. These studies revealed that very many of the primitive peoples of Africa, Asia and America are underfed or live on unbalanced, entirely unsatisfactory diets […] regarded as the main reason for the low standard of life and vitality, for the lack of energy which so often reduces the vital standard of men in hot climates […]. The gathering of insects has often helped to supplement grave dietary deficiencies either at certain regular seasons of the year or in times of emergency such as recurrent droughts. (1951: 7-8)

Such an example plainly illustrates the pervasive attitude, rife with colonialist tropes, that posits insects as a potential famine food to offset the nutritional deficiencies observed and corrected (though apparently not, by such accounts, caused by) the white "possessors of wisdom". Admittedly, recent attempts are less obtrusively imperialistic in spirit and in method. However, the aforementioned issues of nomenclature and lack of cross-cultural understanding also plague the contemporary goodwill approaches, tainting the efficacy of attempts to maintain or invigorate existing practices and their famine-alleviating potential. What's more, Western lack of knowledge about – and of interest in – the diversity and complexity of entomophagous practices around the world threatens the very livelihood and health of many populations for whom insects are a crucial dietary component:

> Insect cuisine is, for Westerners, emblematic of the alien, a threat to our psychological and cultural identity. Yet failure to embrace entomophagy prevents us from seeing the full humanity of those of other classes, races, and cultures, and leads to agricultural and food policy decisions that fail in their objectives to improve nourishment for all people. (Looy, Dunkel, and Wood 2013, 131)

It is thus essential to reflect on our own attitudes and beliefs towards the diverse practices of entomophagy if we wish to earnestly consider them as parts of a resilience-based food-security strategies.

a. Promoting "entomophagy"?

Once again, issues of nomenclature and discursive positioning are at the heart of the issue. According to Costa-Neto, "insect" eaters in non-European derived cultures proffer categorizations that vary greatly from Linnean taxonomies, distinguishing edible small creatures from ones that are not, for instance, and establishing categories on affective, ideological, and ethnological bases, rather than solely morphological or phylogenetic ones (Costa-Neto 2003; 2000). For his informants in Brazil, for example, the category "insects" can also include animals such as some types of snakes, lizards, fish, or even otters based on their behaviour or level of nuisance to human activity, showing how any number of culturally idiosyncratic dimensions can "mediate interactions between human beings and natural resources in their environments" (2000,

73). In truth, European-derived folk taxonomies are no different in their flexibility, often including non-insects such as worms, centipedes and arachnids within the category of insects or, more frequently, the "nontechnical group of invertebrates" (Lesnik 2018, 20) known as "bugs". Thus "entomophagy" is in itself a misnomer that fails to encompass the diversity of practices and vernacular classifications that inform food consumption habits and edibility classifications. Much like North Americans don't "eat mammals" or gnaw on fox bones just because they eat pork chops, so locust- or grub-eaters know to discriminate and select which species fall into the realm of culturally-defined edibility and which don't; the shunned ones are just as likely to elicit disgust or disdain as they are in European-derived contexts (Evans et al. 2015). The potential of insects in "feeding the world" is thus seriously hampered when protocols and practices are developed in the global North with little or no cultural sensitivity towards local practices and preferences. In Thailand, for instance, though familiar species such as grasshoppers or ant larvae are relished, others such as mealworms – among the most widely accepted in Europe thanks to positive press in recent years – elicit marked disgust (Tan et al. 2015). Similarly, when Dutch researchers developed industrially-grown and freeze-dried mealworms with the aim of improving food security around the globe, they found that their product was met with contempt in places such as rural Kenya, where fresh lake flies and termites are a much appreciated part of the diet. Villagers saw no operative relation – no family resemblance – between the tasty, local bugs they enjoyed and the bagged, dehydrated creatures that were offered by the European teams, leading the latter to conclude that "focusing on locally meaningful classificatory registers such as taste or presentation would have been far more useful in promoting insect consumption" (Yates-Doerr 2015, 110). One might argue that European researcher's intent to "promote insect consumption", in the form of highly processed, locally unavailable bugs, to African populations who already consume insects was problematic enough for its white-saviour complex, without needing the addition of a culturally insignificant Linnean hodgepodge. Nonetheless, such examples highlight the foundational importance of appropriate categorization in the establishment of edibility parameters.

The lessons drawn also hint at the need to position insects appropriately when promoting them to unfamiliar European-derived audiences, as members of categories that possess desirable traits and can be distinguished from more unsavoury members of the overly broad category "insect". As I demonstrated in the previous chapter, the taxonomic association of edible species with despised or potentially harmful bugs poses a threat to trial and adoption, as a sense of contamination can transfer from one member of a category to another. This is particularly true when knowledge about and understanding of the categorized items is low or insufficient, as is often the case for bugs.

b. Who actually profits from the rise of edible insects?

Beyond questions of cultural appropriateness, there remain issues around how the development of a market for insects in European-derived cultures *actually* impacts food security issues around the world. Does it provide a lift in entomophagy acceptance and diffusion, or does it instead hamper and disrupt practices already in place? In short, can your cricket snack really combat world hunger?

It is increasingly apparent that although the Western edible insect industry liberally mobilizes food security as a central argument, it is at best very loosely connected to actual issues of subsistence in the global South, or even in cultural groups who already consume insects and could potentially benefit from better access. Asserting the opposite is in line with what David Nally calls the "neoliberal truth regime" (2011, 49), a simplistic narrative which, in the realm of food security, upholds that producing more food is the solution to global hunger. Coherently, such a paradigm "presents global markets, agrarian biotechnologies and multinational corporate initiatives as the structural preconditions for alleviating world hunger" (Nally 2011, 49), and as the only viable avenues to producing yet more calories that will somehow trickle down the hunger chain. It conveniently conceals the notion that food insecurity is not the consequence of overall shortage, and that generating additional food does not translate into more widespread access. Instead, as organizations such as the Organisation for Economic Cooperation and Development (OECD) or the World Food Programme (WFP) have by now largely established, hunger is the byproduct of unequal distribution, waste, and political imbalances. In fact, as long as hunger is correlated with lack of means, "[c]alories will continue to flow up the food chain, reappearing as meat or fuel, available at a price" (Nally 2011, 49). Systematically resorting to capitalist market solutions and increased productivity to remediate food insecurity is thus inefficient and irrational, but also self-serving for those who advocate such means (Cook et al. 2013).

In the current development of the Western edible insect market, technologies and means are directed towards adding protein to already crowded diets instead of providing affordable and accessible nourishment to those who truly need it. What is depicted as a 'solution' to alleviate world hunger, following the FAO report, is actually a cooptation of the very system that drives hunger in the global South. The very high price point, the homogeneity of products on offer and their very nature – not actual subsistence but instead mostly snacks and convenience items – are incompatible with any possible understanding of food security. Admittedly, technological progresses and more efficient production means might in time lower prices, but in truth the majority of Western market developments are in no way oriented towards "feeding the world". Instead, as was demonstrated by the demographics of participants at the 2016 Detroit conference on edible insects, these developments overwhelmingly stem from and are oriented towards actors from WEIRD (Western, Educated, Industrialized, Rich and Democratic) socio-economic backgrounds (Henrich, Heine, and Norenzayan 2010); the large majority of attendees were relatively affluent and privileged white males. In such a context, leveraging food security in industrializing nations as a promotional argument somewhat signals colonial, white-saviour tropes. Any profits are unlikely to flow downwards, concentrating instead in the pockets of actors who are socially, economically and systemically privileged enough to gain access to the market in the first place: those with the resources, knowledge and connections needed to launch start-ups, access and fly to trade shows or conventions, promote unfamiliar and potentially reputation-damaging foods without too much fear of social retribution, and exert administrative or political pressures to change policy and legislation.

An array of insect-based products on display - mostly snack and convenience foods - at Eating Insects Detroit conference. Photo by Laura Shine. Detroit, May 27, 2016.

What's more, by engaging in a feed-the-world rhetoric, proponents not only ignore but in fact obfuscate and perpetuate the systemic inequalities that allow food and resources to be taken from those who need them and sold to those who can pay. Insect farming has been praised by non-market actors, most notably by the FAO (Van Huis, Itterbeek, et al. 2013), as an affordable and low-tech opportunity for disenfranchised and landless labourers to gain entry to agricultural practice, thus providing potential food security, financial stability and perhaps even economic growth (DeFoliart 1995; Itterbeek and Huis 2012; Ramos-Elorduy 1997; Van Huis A 2013). Yet recent reports suggest that procurement from countries such as Thailand to feed a growing demand, notably in North America and Europe, drives up market prices and makes traditional food sources increasingly difficult to access for local consumers. Moreover, increasingly high financial barriers in such markets significantly restrict entry into the industry while enriching a handful of well-situated middlemen (Muller et al. 2016). As they reproduce global inequalities and exploitive structures within food production systems, the local Thai markets investigated by Muller rely on cheap, foreign workforce from neighbouring Cambodia to accomplish physical labour with no welfare protection and little rights, including young girls who skip school during the locust season (2016). The vast number of labourers reap precious little benefit from the "extremely high" profit margins (2016, 130) hoarded by Thai entrepreneurs with the right connections and a socially privileged background. Muller and his colleagues notes that, overall,

> there has been a shift towards a more technical view of insects as food, with an emphasis on farmed insects, global environmental impact, consumer acceptance, nutritional properties and the importance of upscaling production. Questions of structural inequalities, justice, access and distribution are rarely considered (2016, 131).

The more traditional economic system of insect harvesting, a timeless method of procurement with little barriers to entry apart from access to a harvesting zone, can also become rife with structural inequalities as the popularity of edible bugs ramps up on international markets. In Burkina Faso, for instance, researchers have highlighted the economic insecurity of insect harvesters as part of the larger difficulties undermining the creation of a stable, integrated and fairtrade market for non-wood forest products (NWFPs) (which are defined by the FAO as including "products used as food and food additives (edible nuts, mushrooms, fruits, herbs, spices and condiments, aromatic plants, game), fibres (used in construction, furniture, clothing or utensiles [sic]), resins, gums, and plant and animal products used for medicinal, cosmetic or cultural purposes" (FAO 2014)). In the documentary *BUGS* (Johnsen 2016), researchers from Noma's Nordic Food Lab travel around the world to uncover the different ways in which local insects are gathered, processed, prepared and consumed. In Uganda, team member Ben Reade is appalled to meet a child labourer slowly loosing his vision due to the strong floodlights used to attract insects at night. The young boy's situation prompts him to question the impact of their pursuit and the consequences of bringing yet another food to Westerner's overflowing plates.

As these cases exemplify, the insect harvesting industry suffers from a lack of structuration and coordination, a total reliance on offer and demand that induces high price fluctuations, and the informal nature of a workforce that is largely illiterate (Wenceslas 2019). All of these factors benefit international buyers rather than local actors, perpetuating systemic inequalities in the insect food economy that are almost entirely overlooked by proponents in European-derived cultures. While such inequities may not be predominant in every market, these examples illustrate the very real potential for power imbalances to deviate the redistributive promises hailed by entomophagy proponents in Europe and North America, as well as ever-looming "corporate efforts to gain control over agricultural life and to turn agrarian systems into a vehicle for capital accumulation" that are "profoundly transforming the evolutionary life of animals and plants, and, in some cases, the very existence of the hungry poor who are finding that their access to vital provisions, and indeed their control over the means of production, is being progressively eroded" (Nally 2011, 38). In the corporate capture of entomophagy, lives both human and nonhuman are seized and subjected to the systemic inequalities that plague production, distribution, access, autonomy, and resilience.

Yet on some levels, introducing insects into Western capitalist industrial food production and distribution systems might not be a much more promising alternative than hauling the bugs out of Africa, Asia or Central America. As the Nordic Food Lab team visit a factory insect farm in the Netherlands for the film *BUGS*, they search for a local alternative to importing insects harvested in uncertain conditions from halfway around the world. But the vision of yet another food turned into a mass-produced substance brings up issues of commoditization, standardization (of taste and processes), and monoculture imbalances that have been plaguing Westernized food systems. Indeed, in our latitudes, insects need to be produced on a large scale, factory-farm like, to ensure

consistency, establish a dependable supply chain, and lower prices. The unreliability of wild populations, the high cost of personpower needed to gather wild insects, and the seasonality of the resource would preclude the development of a robust market. To Reade, and to other enthusiasts, however, the story of factory farming over the last century is synonymous with a gradual deterioration of sensory qualities, especially taste; a loss of biodiversity as a minute number of species comprise the quasi-totality of production; the spread of large-scale diseases that eradicate large swaths of global production; and the exploitation and abuse of labourers and animals alike. Instead of the diversification of food sources and the advent of a more sustainable and ethical provisioning system, the Nordic Food Lab team is disillusioned by the vision they encounter of what a future with edible insects could look like: one that is coopted by domineering capitalist structures, the very ones they were seeking to undermine through their research (Johnsen 2016). Closer to home, a similar process is at hand, as demonstrated by the entrance of large corporations into the insect business. The arrival of food behemoth Maple Leaf as a minority shareholder in the Ontario producer Entomo Farms (Entomo Farms 2018), or the distribution of cricket flour by Loblaws under their private label President's Choice as of 2018, reinforce the existing capitalist system by seamlessly integrating it and highlights the tendency towards concentration in the hands of a few massive players rather than a constellation of smaller ones. The "feed the world" discourse thus appears to hint at yet another fiction of Western minds trying to justify their own appetites through a discourse of altruism.

5.4 How convincing are rational appeals anyway?

Rational-oriented arguments, whether they are articulated around discourses of environmental awareness, personal health, or empathetic worldliness, hinge on what Carolan calls the "never-ending drumbeat of "more education"" (2017, 57): *if only people knew,* they would (or wouldn't) consume such and such food. According to this premise, all that is needed to influence behaviour is an ever-more appropriate type of communication, which can take the form of educational campaigns, sensitization ads, or similar unidirectional discourses directed towards a consumer that is blanketedly assumed to make rational, informed decisions about consumption matters. What's more, by shifting the onus on the consumer to make educated choices at all times, the discourse remains conveniently apolitical (Carolan 2017). Rather than addressing systemic matters that plague the food system, for instance, the focus is directed towards personal responsibility, though the issues at stake often largely surpass the individual's capacity to address them (especially in cases such as environmental depletion or food insecurity in politically unstable regions). Adding to this, the relatively comfortable lifestyle of most consumers in European-derived cultures generally shields them from pressures to adopt more sustainable behaviours; so long as the immediate need is not perceived, there is little incentive to change appreciated and habitual consumption patterns for unfamiliar and potentially repulsive ones such as entomophagy (Séré de Lanauze 2015).

Rational approaches that emphasize distant benefits also suppose vast levels of cognitive control on behaviour, especially for a practice as unfamiliar and potentially disturbing as entomophagy. While it is "currently framed as an experience with hardly any immediate rewards, but instead, with long-term utility such as being healthy or being environmentally friendly" (Berger et al. 2018, 2), it appears that not only do such appeals have limited effectiveness, but that their

shortcomings are actually *compounded* by the presence of disgust, which mobilizes cognitive resources and impairs one's capacity to make decisions based on long-term or distant benefits (Berger et al. 2018). In the case of disgust, because avoidance is not due to rational factors, rational appeals make little headway in transforming attitudes. Relatedly, a rift appears between consumer agreement on large-scale issues, such as the need to act more sustainably or to prevent food shortages, and a sense of both personal agency and willingness to adopt repellent behaviours. As Séré de Lanauze notes, discourses about benefits in the macro-environment tend to generate widespread rational agreement about their importance, while in the microcosmic context of one's own cultural context, and especially one's personal experience and interaction with an unfamiliar product, cognitive control cedes way to emotional or hedonic barriers (2015, 23–24). In other words, more eco-friendly, healthy, or empathetic behaviours are considered important and valuable, but the experience of putting an insect in one's own, actual mouth generates a whole different set of affects and feelings that tend to disproportionately weigh into decision-making processes.

In short, whether they are promoted along the rational lines of a lessened environmental impact, an enviable nutritional profile, or a potential solution to alleviating hunger around the globe, it remains unlikely that insects can be largely adopted on the basis of purely cognitive-based arguments. While such claims can sway limited consumer segments, they are insufficiently persuasive – and too poorly substantiated – to efficiently overcome strong affective barriers such as disgust. Moreover, the purported impacts of insect consumption are too removed from the actual act of ingesting them; when benefits are largely remote, they weight less in the decision to consume a food that is not considered desirable on other levels. Consequently, bottom-up processes, wherein a sensory or corporeal approach is privileged as an entryway to influence rational processes, rather than the other way around, may prove a more successful strategy. Consumers who have already been exposed to the immediate, intimate benefits of entomophagy – such as a positive hedonic experience – "may be more likely to respond to Utilitarian claims when positive feelings for entomophagy have already been developed" (Berger et al. 2018, 3), especially since research suggests that heightened expectations about liking correlate with actual appreciation of edible insects and novel products in general (Tan, Verbaan, and Stieger 2017). In the following chapter, I thus examine some of the approaches that suggest strengthening the emphasis on insect's hedonic values and intrinsic sensory properties, rather than focussing chiefly on their rational benefits, as do most current promotional strategies.

Chapter 6. Insects are actually good

While rational arguments are most widely used to promote insects and induce trial, their variability, lack of credibility, and limited scope often prove insufficient to motivate durable adoption, as demonstrated in the previous chapter. Accordingly, many advocates are increasingly looking towards delicious and pleasurable experiences to entice consumers to try bugs. This chapter explores some of the approaches that focus on sensory and hedonic properties to promote insects, rather than on functional or external benefits, following the assumption that hedonic gratification can help bypass individual and cultural barriers. Yet, as I demonstrate below, this focus sometimes overlooks another crucial variable, namely the perceived appropriateness of a novel food, which can override hedonic appreciation. To better grasp how these two factors are intertwined, I examine some examples from an insect food design workshop I organized. Finally, I discuss an opposite approach to sensory characteristics, where what is emphasized is not intrinsic deliciousness but instead the absence or concealment of sensory properties.

The University of Copenhagen campus was almost deserted when I visited in July 2015. Students had gone home for the summer, and I was having trouble encountering anyone to provide additional directions to the lab I had come to visit. When I finally stumbled upon what seemed like the right door, however, I found the space was buzzing with creative activity. Young women and men, some in white coats, were handling pipettes and petri dishes, while others wielded knives and chopped various ingredients. Some carried plastic bags filled with small items or notebooks and pens in which they jotted down thick rows of detailed observations. It was like a research lab, a cooking school and a creative studio all rolled into one. Josh Evans, at the time the lead researcher and manager of the Lab's entomophagy research project, came to greet me and introduced me to the team members working with edible insects.

The Nordic Food Lab, which has since integrated University of Copenhagen's Future Consumer Lab in the Department of Food Science, was the research offshoot of the Copenhagen-based restaurant Noma, which has topped the World's 50 Best Restaurants list four times and is widely seen as the trailblazer of New Nordic Cuisine (Pomranz 2018). In 2013, the Lab had received a 3-year grant totalling 3.6 million Danish kroner (about 630 000 Canadian dollars at the time) from the Velux Foundation's program for environment and sustainability for its project "Discerning Taste: Deliciousness as an Argument for Entomophagy". Instead of "focussing on environmental and nutritional benefits of entomophagy", it aimed to "make insects delicious to the Western palate and thus bring them into its culinary culture" as "celebrated ingredients with high gastronomic value" (Nordic Food Lab 2013). This intention signalled a turning point from rational benefits-oriented consumption to one centered on sensory appreciation – from external to internal motivation sources. Without discounting insects' potentially smaller environmental footprint and nutritional qualities, the multidisciplinary team at the helm of the ground-breaking project sought to uncover the ways in which bugs could be turned into desirable foodstuffs in the context of gastronomic preparations, emphasizing sensory properties such as smells, flavour profiles, or texture.

Before giving me a tour of the Lab, Evans explained some of the projects they had already accomplished (Interview 17). The most emblematic one, which had received press attention from around the world, was the Anty Gin, an English gin from Cambridge distillery flavoured with distilled *Formica rufa*, a local type of red wood ant. Every bottle contained the aromatic essence of approximately 62 ants. These insects produce formic acid as a defense mechanism, which tends to lend them a citrusy flavour ranging from citronella to grapefruit, depending on the species. A tiny-batch, handmade distillation process and the use of various hand-foraged forest plants supported the exclusiveness of the star ingredient, which was matched only by the rarity of the finished product: only 99 bottles were released in the first batch, at the highly limiting price point of 250 euros per 700 ml unit (approximately 350 Canadian dollars at the time). Each came with a 50 ml vial of pure ant distillate. Despite some voices calling it "the drink you never asked for" (Alexander 2015), an "almost entirely underwhelming" (Knoll 2016) tipple that "might make your skin crawl" (Johnson 2015), bottles flew off the shelves amid a media storm. When I tasted it in the lab, my own palate, unaccustomed to tasting undiluted spirits, was overwhelmed by the alcohol content. The distillate on its own certainly had a citrusy flavour, but again, the harsh tinge of distilling alcohol prevailed.

Anty gin. https://www.thewhiskyexchange.com/p/47350/cambridge-anty-gin. Accessed July 30, 2020.

This product signalled a major turn in the way insects were portrayed as a potential food : far removed from their image as starvation sustenance, they were making a solid entrance into the rarefied world of high-class, luxurious gastronomy. Noma had been rather more discreetly pioneering this approach by including some insects into its many-hundred dollar, twelve-to-fifteen courses tasting menu, starting with live ants wading in *crème fraîche*. But the Anty Gin was the most highly visible talking piece of this ongoing endeavour, one that unabashedly "surfed the wave" of the growing interest in edible insects "rather than critiquing it", Evans explained to me (Interview 17). The reaction and interest in novel foods, he added, was highly dependent on contextual cues such as location of tasting, material surroundings and serving implements, and social interactions. All of these variables and more needed to be factored in when accounting for the whole experience. Evans pointed out that, in his experience, affects towards novel foods seemed to happen "very spontaneously" when the right contextual cues were combined. What such contextual cues could be depended, of course, on individual preferences and experience, but uncovering promising ones

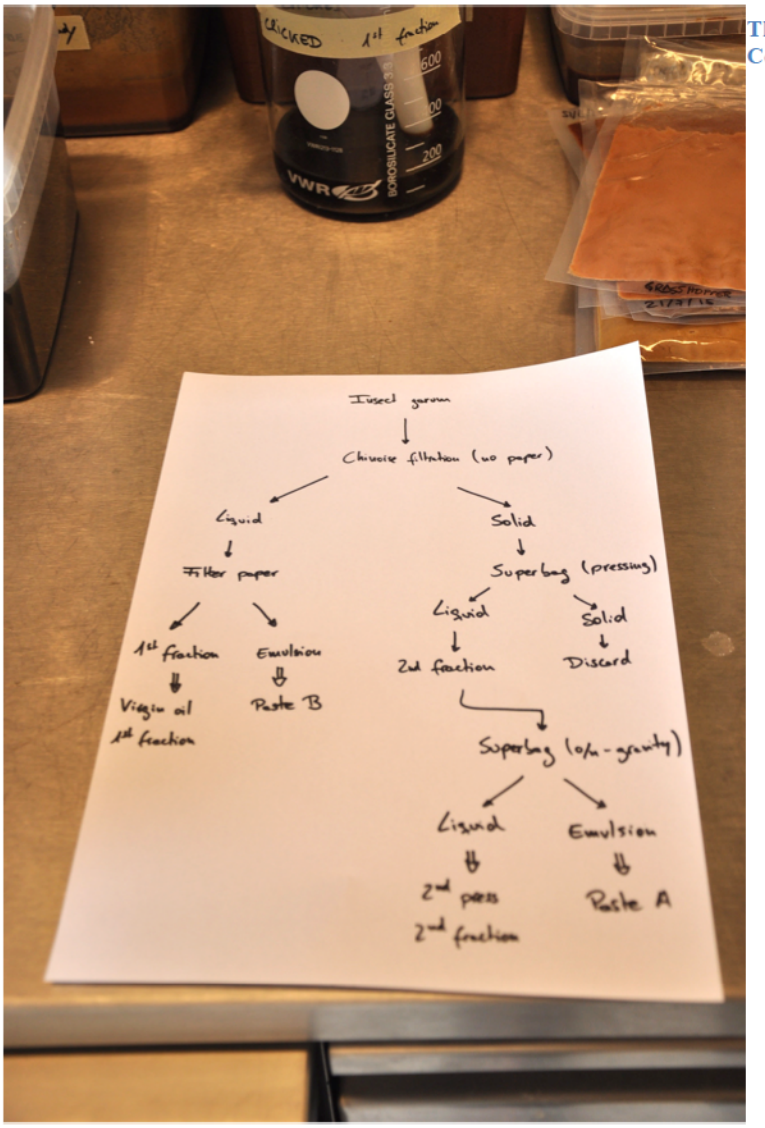
was part of the challenge. Of course, the Nordic Food Lab team could count on a singularly remarkable venue – the Noma restaurant – to showcase their best findings and present them to diners who were, presumably, in a receptive state of mind and body.

For now, however, the team was focussing on developing the very products that would seal the deal through a positive sensory experience. Later projects, some of which were already in the works, would be less conspicuous than the Anty Gin, tending towards the normalization of insects as a food, rather than on making them stand out. It would also be more weary of the 'shock value' often used to promote them, a tactic that the Anty Gin did not hesitate to mobilize, not least with its bottle full of crawling ants and its pipette dropper bottle, antique type face, and label reminiscent of a scientific experiment.

Some of the upcoming endeavours included a variety of riffs on *garum*, a type of salted fermented fish preparation dating back to the Antique Roman era. Because of many insects' high protein content and umami flavour profile, the team had decided to mix different batches of *garum*, some with fish, some with shrimp, and some with various bugs: waxmoth larvae, bee larvae, crickets, and grasshoppers.

Different stages of the garum preparation process. Clockwise from top left: Liquid phase of bee larvae mixture; Heating box used to keep fermenting products at a constant temperature; Different phases of waxmoth and grasshopper garums. First fractions are from liquid residue, second fractions from solid residue. Paper coffee filters are used to strain liquids. Photo by Laura Shine. Copenhagen, Denmark, July 21 2015.

Left: Grasshopper and cricket pastes. Right : Various finished garums. Photo by Laura Shine. Copenhagen, Denmark, July 21 2015.



The garum flowchart. Photo by Laura Shine. Copenhagen, Denmark, July 21 2015.

The garum-making process was stringently regulated and followed a flowchart that suggested a more scientific process rather than an artistic one, an impression compounded by the use of laboratory instruments. This encoding allowed for the precise evaluation of insects' culinary potential, instead of the more impressionistic approaches often used to induce trial. These variations in ingredients, but not in processing, would allow the team to assess and appreciate the insects' unique sensory profiles. In Evans's words, they were treating the insects as "differentiable functional component in a series of preparations unified by the method and technique" (Interview 17), rather than as shocking ingredients that could be sprinkled onto a well-known dish for novelty value. This was a valuation of bugs for their own defining, intrinsic characteristics, rather than for purported, cognitive-based benefits such as a diminished

environmental impact or an enviable nutritional profile. The insects had become the means to an end – deliciousness – rather than an end in and of themselves.
If eaters would only pop these insect foods into their mouths, they'd be delectably convinced – or at least, that's what the Nordic Food Lab team was setting out to prove.

6.1 Sensous vs. Sensible

Food choices are notoriously difficult to change. Yet they do, and are in fact in constant evolution (Mintz 2002) – in often mysterious and unpredictable ways that sometimes seem obvious in retrospect. Not all introduced foods face comparable challenges. In the case of foods that elicit negative reactions such as anticipated distaste or even disgust, or that suffer from a low perceived level of appropriateness, the pathway to adoption is fraught with difficulties, with neophobia – the fear of new foods – often presenting a seemingly overwhelming challenge. In such a context, making the abhorrent palatable can take on many forms.

In the case of insects, the overwhelming majority of efforts to enhance their acceptability has thus far concentrated on the rational benefits of entomophagy, mainly a lower environmental footprint and an enviable nutritional composition, as examined in the previous chapter. Yet although such claims have circulated widely both in specialized and mainstream media, their appeal remains limited, and insects' lack of attractiveness remains a significant barrier. It appears that disembodied constructs based on demonstrated benefits for health and the environment are insufficient to counter the almost visceral reaction expressed by many when faced with the idea of eating insects, let alone adopting them as a new food. Indeed, while it may enhance awareness, focussing on externally-motivating "facts" to promote adoption or even trial neglects the cultural and emotional dimensions of attitudes in general, and food choice in particular. Also inefficient is the reminder that scores of people around the world already consume them, with the implicit reasoning that since they are safely eaten and even enjoyed in many cultures, we in the "Western" world have no reason to shun them. Tastes are famously treated with a hefty dose of relativism ('they may like it, but that's no reason I should'), and culinary choices serve as delineators of identity that highlight who the eaters are and, perhaps especially, who they are not (Messer 2007). In this sense, pointing out that many people eat insects can backfire as non-consumers use this argument to reinforce the dichotomy between themselves and the entomophagous 'others', as I demonstrated in Chapter 4.

6.1.1 Reframing the discourse towards deliciousness & gastronomy

The rational line of argument nonetheless continues to be prevalent in most lay discussions of entomophagy, and in many experts' discourse (see for instance, among countless others, DeFoliart 1997 and 1999; Mignon 2002; Mlcek and al. 2014; Van Huis et al. 2013 and Yen 2009). Interestingly, it is also used by all the businesses that I have come across, who seem to hold on to these constructs in the face of evidence that they simply do not work all that well. Indeed, as demonstrated by innumerable healthy eating campaigns, existing food behaviours are already very difficult to change along these lines, so why would introducing new, particularly challenging ones be any more successful? In response to this, other researchers focus instead on insects' reported lack of sensory and gastronomic appeal to Western consumers. Among them,

Tucker strongly underlines the importance of sensory attractiveness in investigating potential meat substitutes, including but not limited to insects (2014). Schouteten and his co-authors report that the overall low sensory quality of available insect products such as burger patties hampers their adoption, even among an informed group sensitive to arguments about insects' alleged benefits (2016). In this vein, Deroy, Reade and Spence suggest a "radical revision of our strategies" (2015: 48) in entomophagy promotion by replacing rational arguments with sensory-based approaches. Only by making them attractive as a delicious food – not as an ethical or moral ideal – could proponents hope to sway eaters' minds and help them overcome their initial apprehensions (see also Berger et al. 2018; Evans et al. 2015). Yet their ideals can be confronted with accusations of elitism and close-mindedness, stemming as they do from the rarefied preserves of world-class dining and specialized food-lovers' circles (such is the case, for instance, with Reade and Evans, both former researchers at Copenhagen's Nordic Food Lab). This idea has, however, stemmed into the publication of a few cookbooks in a more "try this at home" cooking style (see for instance Gordon, McAndrews, and Fildes 2013; Huis et al. 2014; Radia, Whippey, and Holmes 2016). As the Dutch scientists developing insect-farming techniques repeatedly admit, "markets will only open if mouths will open" (Yates-Doerr 2015, 109). In other words, "facts" and rational arguments can only go so far, and in no way be disentwined from tasting and testing.

Many proponents now contend that it is a sensuous approach, not a sensible one, that stands the best chances of promoting unattractive foods, arguing that "people's food choices are relatively immune to rational changes of representation, and instead tend to be driven by taste preference and exposure" (Deroy, Reade, and Spence 2015, 44). Ben Reade is a chef who was part of the Nordic Food Lab team that embarked on the "Discerning Taste: Deliciousness as an Argument for Entomophagy" project. His dedication to finding, creating, and showcasing deliciousness was wholeheartedly applied to bugs; coherently, he and his co-authors Deroy and Spence advocate the deployment of a gastronomic approach to facilitate trial and motivate a more durable adoption of insects as food. In marketing terms, instead of 'pushing' insects as the unavoidable food in a context of limited planetary resources, the idea is to promote a 'pull' strategy that draws eaters towards bugs with alluring epicurean appeals. This might help bypass the herculean task of rewiring attitudes, beliefs, and behaviours and instead address the senses directly through culinary delights, "[u]sing perceptual cues to guide choices in context instead of formulating explicit rules" (Deroy, Reade, and Spence 2015, 47). In other words, as they maintain the traditional mind/body dichotomy, they suggest that the increased acceptance of repulsive foods hinges on circumventing – perhaps even fooling? – the former by tempting the latter.

6.1.2 Know your food

To render the unenticing palatable, they insist first on the necessity of establishing the right categorization, stressing, like others (see especially Shelomi 2015), that promoting insects as a meat replacement is bound to disappoint as they possess none of the sensory attributes meat-lovers expect. Instead, to them,

> the real challenge is category distinction, and not category extension: people's initial single category of insects has to allow for a distinction to be made

> between inedible and edible insects, and the latter set has then to be seen as a source of rich variety, open for distinct food experiences, and pleasures (Deroy, Reade, and Spence 2015, 52).

This, however, would call for a deeper prior familiarity and even engagement with the insect world – to form an "initial single category of insects" that allows for differentiation – before they are even considered as foods. Once the abhorred foods are part of the pantry, the chef – and ideally the home cook – must find ways to make them appealing through cuisine and the use of familiar flavourings and ingredients to reduce aversion.

My own findings support the idea that greater familiarity can breed interest, as many of my informants' responses exhibited a differentiation of affects related to different types, or species, of insects. The soft vs. crunchy preferences discussed in Chapter 4 sketches out the debate in sensory categories, pitting insects with certain physical characteristics against others. But other means of classification run alongside taxonomic lines, as when Simon Martin (Interview 10) professed that dragonflies are "noble" in their pest-eating function, and that he would hesitate to eat them because of this almost moral valuation. Further refining this hierarchy, he argued that the larval stage of dragonflies seemed more acceptable as a food, "less noble"; beetles in general also seemed suitable. Hesitating between categorization schemes and highlighting the fuzziness of their boundaries, he proposed that soil-dwelling insects seemed dirtier and less appealing, while flying ones seemed cleaner and more appropriate as food. Utility and function also played a role, as the more useful ones, which "eat dirty insects or pests", should be left alone; wasp larvae, on the other hand, were judged both acceptable and delicious after he participated in a tasting trial during the wild harvesting workshop with Gourmet Sauvage. Butterflies, in a separate category altogether, were deemed "untouchable" – beautiful and ethereal, not meant to be used as food. No matter the sorting criteria for categorization, however, he affirmed that his knowledge, gained from childhood curiosity of insects species and, specifically, of their names, had positive repercussions on his openness to sampling them. Instead of an indiscrete mash-up of squirmy things, they were seen as differentiated and as possessing specific characteristics that made them appealing as a food, or not. Similarly, Isabelle Morin (Interview 3) affirmed that attending the wild harvesting workshop provided her with a more refined classification scheme and a better knowledge of different species, which translated directly into a "greater desire to know" wild insects, a "respect" for them, and a desire to sample some of the ones she previously would never have considered. Thanks to guidance from entomologist Étienne Normandin, she felt more confident and curious, about both insects in general and as a potential food.

Some authors investigate the effects of such concrete interactional settings aimed at promoting familiarity with insects, such as outreach events where bugs are presented and promoted to the public by experts or enthusiasts (Lensvelt and Steenbekkers 2014; Shelomi 2015; Pitt and Shockley 2014; Caparros Megido et al. 2014). Though they caution that more research is needed to properly assess long-term effects, they find that increased familiarity and direct contact tend to foster "more positive views of insects and arachnids" (Pitt and Shockley 2014, 100). Shelomi in particular sees in such occasions the potential to increase willingness to consume bugs, stating that "these efforts are largely successful: positive contact with insects and/or entomophagy events both lead to more positive views of insects overall, and increased stated willingness to eat insects in the future" (2015, 312–13). Others call for more research into the issue, seeing promising but yet unchartered impacts on our human-insect relationships and their attending affects (Shockley

and Pitt 2014; Looy, Dunkel, and Wood 2013). Such findings suggests that lay perception of insects "needs to be differentiated in order to dissociate food insects from species that actually do carry disease, are otherwise inappropriate for consumption, or actually cause harm" (Looy, Dunkel, and Wood 2013, 138).

It is hard to imagine that such a renewed relationship and the building of more positive affects would come easily, especially given the negative status of insects in general among European-derived cultures (Lockwood 2013). The ultimate focus of gastronomic approaches on taste (and by association, smell) also fails to take into account the wide diversity of affective relations many people sustain with insects across all of their senses, and the hand-in-hand fascination and revulsion, highlighted by authors such as Hugh Raffles (Raffles 2007; 2010) and Jeffrey Lockwood (2013), that insects elicit outside of the realm of edibility, many of which I examined in Chapter 4. Contrary to what Deroy, Reade and Spence suggest (2015), though some particularly despised species may induce dread more frequently than others, most species also elicit distrust or trepidation in a variety of ways for a large portion of the general public. For instance, when I asked her about her feelings towards insects in general, Anna Krahotin (Interview 2) explained that, though she understood their environmental relevance and the importance of their ecosystemic roles, her rational acceptance could not overcome her general disgust towards all insects – even the usually endearing butterflies did not escape her scorn, though she "pretends to like them for the kids". Indeed, creepy, crawly, swarmy things in general are often perceived as nuisances, especially when it comes to keeping them out of our food – from the field to the fork (Lockwood 2013). Thus increasing familiarity with these creatures is a noble ideal, but one that is far from being easy or evident to implement.

6.1.3 Good but still gross?

The "radical revision of our strategies" that Deroy, Reade, and Spence call for (2015, 18), replacing rational arguments with sensory-based approaches to make insects appealing, hinges on a problematic view that frames the refusal of insect foods not as a matter of disgust, as is usually understood, but instead as a case "of acquired sensory distaste, or rather of multisensory-driven distaste" (Deroy, Reade, and Spence 2015, 50). Such a premise justifies their emphasis on gastronomic strategies, rather than cognitive ones, to stimulate adoption – if it's a matter of *dis*taste, then a 'better' taste (and, more broadly speaking, an improved multisensory profile) is the solution. There is thus no need for a profound cultural transformation to alter a supposed disgust perception among potential consumers.

This idea is inconsistent, however, with the classification scheme established by Rozin and Fallon, which Deroy and her co-authors draw on to distinguish distaste and disgust. In the case of distaste, foods are said to be rejected primarily on the basis of sensory factors, without a strong underpinning on ideational grounds or fear of harmful effects. Such foods, more importantly, are "accepted as edible within the culture, and they account for most within-culture individual differences in food preferences" (Rozin and Fallon 1987, 24); examples include coffee, chilli peppers and broccoli. Abhorred foods, it seems to me, do not conform to many aspects of this definition; within the "Western", European-derived cultures examined by Deroy and her colleagues, insects are certainly not viewed as an acceptable foodstuff, nor are they free from ideational rejection and fear of harm following ingestion. Furthermore, Rozin and Fallon's

definition of *disgust*, on the other hand, not only uses cockroaches (again) as an example, but incorporates many of the qualms surrounding the consumption of bugs. Disgust is "primarily motivated by ideational factors: the nature or origin of the item or its social history […] disgusting items have offensive properties, with the result that there is a presumption that the item would taste bad. Thus, disgusts are negatively loaded on both sensory-affective and ideational motivations" (Rozin and Fallon 1987, 24). What's more, there is most certainly a notion of contamination – a key factor of Rozin's disgust – at play here (as empirically verified by my parents' shock that I had baked cricket-flour cookies in their oven and their insistent request that I meticulously clean all cooking instruments… twice). Deroy and her co-authors' "downgrading" of insects' lack of appeal from disgust to mere distaste seems to me a result of their uncommon immersion in matters of unusual taste(s) and extraordinary cuisine, and of their mingling with daring gastronomic luminaries such as those leading Copenhagen's Noma restaurant and its research offspring, the Nordic Food Lab. This is underlined by some of the examples they employ, for instance of Noma chefs preparing alluring bites for peers and enlightened connoisseurs at dedicated and exclusive food festivals. As the title of the article – *The Insectivore's Dilemma, and How to Take the West Out of It* - demonstrates, the authors here play on the concept of the omnivore's dilemma, which pins the human eater between the opposing forces of neophilia (desire for new foods) and neophobia (fear of unknown foods). Within the rarefied spheres of high cuisine and culinary inventiveness, it is of course plausible that neophilia takes center stage – to the point where, as Josh Evans explained (Interview 17), such specialized crowds are the only ones to whom he dared serve insect foods without explicitly stating what they contained. Yet, among the more general public, it is safe to suppose the levels of neophilia to be much more constrained, especially when insect foods have to outcompete an already vast array of less threatening and already well-loved, and well-known, foods. Herein lies the importance of considering another factor that crucially impacts and modulates sensory appreciation, namely perceived appropriateness.

What's more, even strong hedonic appeal may not prove sufficient to induce durable adoption if ideational factors are not appropriately addressed. Though sensory appreciation plays a strong role in trial and potential acceptance, it has a limited capacity to reverse the idea that a specific novel food has no place on the dinner table (Tan et al. 2015). Taste may matter in the process of acceptance, but the lack of perceived appropriateness of insects as food can still hinder actual adoption, with researchers finding that "[w]illingness to buy products for trial consumption was always significantly higher than for regular consumption" (Tan, Verbaan, and Stieger 2017, 103). What's more, professed acceptance of novel foods – and even declared willingness to adopt them – in a experimental setting does not accurately reflect actual behaviour at the supermarket checkout counter (Shelomi 2015; Tan et al. 2015). Such a reality seems overlooked in many studies (see for instance Caparros Megido et al. 2014; Balzan et al. 2016; Verbeke 2015) that somewhat hastily equate sensory acceptance and appreciation with promising market outcomes. For a variety of reasons including availability, convenience, and social acceptability, attitudes do not always translate into corresponding behaviours, and these foods might not be as widely embraced as participants report in a trial setting, though they express positive sensory experiences (Tan, van den Berg, and Stieger 2016; House 2016). Such studies rightly state the importance of consumers' attitudes towards a type of consumption that triggers deep-seated beliefs and apprehentions, but by neglecting actual behavioural components, they fail to provide an accurate representation of real entomophagy acceptance.

6.2 How good is good enough?

Many of us react in uneven and unpredictable ways when we find insects in our environment – especially in domestic spaces dedicated to food preparation and consumption. That is because, for a number of reasons, we have come to consider that bugs *do not belong there*, that they are out of place in such a setting. Their lack of perceived appropriateness in the context of dinner significantly complicates their recognition as a potential food.

Though sensory appreciation does indeed play an essential role in the acceptance of novel foods, it is often the notion of food appropriateness that proves vital in the durable adoption of an unknown ingredient, beyond a simple trial motivated by curiosity (or even by the imperative experimental context of a research lab). This leads some advocates to explore strategies to enhance this perceived appropriateness such as fostering a greater familiarity with insects in general, establishing favourable category cues, or tailoring consumption context, as outlined below. Indeed, in cultures where they are not commonly consumed, particular novel foods are often rejected for reasons other than their rational benefits or their intrinsic sensory properties, "as deeply entrenched attitudes, food-related concerns, and socio-cultural norms still stand in the way" (Tan et al. 2016, 293). The alleged inappropriateness of such foods can even taint gustatory appreciation because of negative expectations, possibly leading to a permanent rejection. While sensory liking is usually at the forefront of food choice, mere appreciation remains insufficient in the case of unfamiliar foods, not in small part because "consumers tend to base their decisions on their pre-consumption beliefs" (Tan et al. 2016, 294) and have no prior experience on which to base their expectations – a situation that can provoke fascination or revulsion, or a amalgam of the two. Familiar flavours and preparations can in some cases help mitigate the apprehensions toward novel foods, as demonstrated in part by the willingness of research subjects to consume burgers purported to contain potentially abhorrent ingredients such as mealworms, lamb brain, and frog meat. But, as the researchers stress, "curious tasting does not imply acceptance" (Tan et al. 2016, 293), a truth too often overlooked in studies of food choice. Indeed, in this study, although in the case of each novel food the sensory appreciation after sampling was rated significantly higher than was expected before the tasting, the perceived food appropriateness was not, and remained far inferior to that of the regular beef burger. The two are, of course, inextricably linked, as "the quality of the taste experience is likely to play an important role in the process of learning of a food's appropriateness for consumption" (Tan et al. 2016, 300). But *in fine*, the participants' willingness to consume the items again was predicted chiefly by the ingredients' familiarity and their perceived appropriateness as food, *not* by their pleasant flavour or agreeable sensory characteristics, which played a supporting rather than driving role.

How, in such a situation, to go about promoting novel foods when existing, more familiar ones are plentiful, appealing, and satisfying from a sensory perspective? Assuredly, developing products that fare well on sensory and ideational levels remains paramount. But that may not be sufficient in a context where choice is abundant, and the relative advantages of novel foods are not entirely explicit or convincing.

6.2.1 Categorization and appropriateness

Here the notion of categorization comes into play once again. Whether to create entirely new food categories or to extend existing ones remains a matter of debate (Deroy, Reade, and Spence 2015); in the latter case, the chosen category is of paramount importance. As discussed in Chapter 5, the typicality of food items within established categories can have a crucial impact on consumer acceptance. The familiarity, but perhaps especially the frequency of instantiation, are important modulators of perceived typicality – in other words, how often the item has been encountered in general, but especially in the context of the category at play (Barsalou 1985). Whether or not an increase in typicality is seen as a positive factor depends on the category in question, and the beliefs associated to it. The inclusion or exclusion of novel items within an established or well-known category, but also their perceived typicality, could thus impact consumers' willingness to try them.
Indeed, a greater typicality is not a guarantee of acceptance, since this hinges on the hedonic values associated to the category (Cliceri et al. 2019). For instance, the hedonic values of meat are often correlated positively among human omnivores, suggesting that a novel food which could gain membership to the category and be perceived as a somewhat typical member might be more easily accepted. Were vegans to be the target demographic, however, a purported resemblance to steak might not be an enticing factor (unless the said veganism is purely morally-based, notwithstanding a love of meat). Thus the correlation of typicality and acceptability is highly dependant on the hedonic valence associated to the category as a whole.

In the case of insects, as with other novel foods, this suggests that the category of inclusion must be carefully chosen, and potentially adapted to the targeted consumer segment. It should also consider the appropriate family resemblances in establishing how typical a member insects could be. For instance, bugs are often touted as a meat replacement, a strategy which has thus far yielded rather poor results (Evans et al. 2015; Deroy, Reade, and Spence 2015; Shelomi 2015). This could be caused by insects' paltry resemblance to any kind of meat product, whether it be a highly typical grilled steak or less typical but associated items such as meatballs or even poultry. The comparison to seafood has also been tried, based on taxonomical lines of resemblances, since crustaceans and insects are both part of the arthropod phylum. Following this logic, some have proposed rebranding crickets as land shrimp (Saletan 2008), a moniker that is often used for woodlice (which are actually not lice, but rather land crustaceans). This attempted categorization hasn't really taken off either, although most people are able to recognize – and, in my experience, often spontaneously suggest – the family resemblance between shrimps or lobsters and crickets or grasshoppers, or even crabs and spiders, questioning at the same time why they accept and even relish the crustaceans while they despise the bugs.

Riffing on the proposed re-categorization of edible insects as land crustaceans, prominent members of the entomophagy community invert the logic to highlight their unusual familiarity with bugs – lobsters and shrimp become "Sea crickets", supposing that crickets have been successfully rebranded as land shrimp. Kevin Bachhuber, left, is one of the most active and well-regarded insect farming consultants in the US, and once operated one of the largest cricket farms in that country. Screen capture from Facebook.com. https://bit.ly/2CRQ20N

Promoting insects as an alternative to nuts could on the other hand generate more interest because of the sensory attributes shared by both types of items (crunchiness, size, colour, and, to a certain degree, taste, for instance) (Shelomi 2015). Through such family resemblances, insects might be able to gain a foothold in the category, which generally benefits from a positive valuation among a wide number of consumer segments. Nuts are also included in a very large variety of preparations, be they savoury or sweet, in meals, snacks, or baking – a versatility that is also shared by insects and could be exploited by the industry. The two foods thus share both sensory and functional characteristics.

Including insects in the "protein source" category, an often-used strategy, also makes some sense, as it focuses on (little-perceivable) functional attributes to establish category membership, allowing resemblances to be recognized with a greater number of differing items such as meats, eggs, nuts or pulses, but also functional supplements such as whey or soy powders, with whom insects share little or no sensory attributes. Such a strategy would be limited, however, by consumers' willingness to choose foods based on their functional value, rather than their hedonic one. While this may work for some segments, such as high-level or aspiring athletes, or adepts of specific, directive diets, it might leave many others indifferent.

As Evans underlined (Interview 17), contextual cues are also paramount in establishing category membership. Participant Anna Krahotin (Interview 2), an enthusiastic meat-eater who expressed marked disgust and absolute disinterest at the thought of eating insects, placed a strong emphasis on the contextual appropriateness of the foods she consumed. Though she did not consume shellfish or seafood because of their taste and texture, she admitted "wanting to like them" when

she was in a maritime context, looking envyingly at diners enjoying their lobster chowder beachside. She told me she frequently tried unfamiliar foods while travelling, but felt no desire to consume them back home. Context was felt as paramount. She initially affirmed a total revulsion towards trying insects as food, feeling absolutely "no motivation to get over the mental hurdle" of integrating them into her diet when comparable nutritional value was available to her in more familiar products. However, towards the end of the interview, she hinted that she might consider trying them were she placed in a cultural context where insects were readily prepared and considered a wholly appropriate food, breaking down some of those mental hurdles, many of which were dependent on the social context of consumption.

On another note, coming from committed consumers, Isabelle Morin (Interview 3) and Martin Chayer's answers (Interview 8) highlight the importance of social contextual factors in cementing acceptance – or refusal. They have weathered social distrust, scorn, and mockery from friends and coworkers, but they persist in serving insects to guests who visit for the *apéro* in hopes of normalizing the idea and making new converts in a familiar and trustworthy context. Their crusade reinforces Shelomi's observation that *observability* among peers is a key factor in acceptance:

> For people to believe eating insects is acceptable rather than just plausible, they need to see their peers engaging in entomophagy in everyday environments. Insect dishes must become items one is comfortable bringing to a potluck, bake sale, or child's birthday party. These peers must also be "homophilous" to the observers […] Seeing insects in a grocery store or a friend's pantry would have a more significant impact than in a restaurant or on YouTube, since their presence alongside familiar foods in a familiar environment implies edibleness and normalization without novelty (Shelomi 2015, 314).

Likewise, Isabelle and Martin's participation in the wild harvesting workshop was largely motivated by Isabelle's desire to find a peer group and see what fellow adepts were like; she says she was surprised to encounter "normal people", with motivations and interests similar to hers. Contrary to their usual social interactions around insects, here they were not the trailblazers but part of the majority, in some cases even the laggards as they hesitated to consume more unfamiliar species, which they found highly motivating. The "group effect" that the couple found in the workshop motivated them to try the unknown insects on offer, as they looked around and noticed that others were consuming them without a second thought – as if nothing were more ordinary. Thus contextual cues exerted a strong pull on the evaluation of acceptance, even for highly motivated consumers.

Encountering a novel dish or preparation in a upmarket restaurant, a tailored tasting event, a 'Future Foods' symposium, a natural health store, or a mom-and-pop joint provides valuable and differentiated information about what the food is and should be approached as. Insects in a taco served out of a dingy hole-in-the-wall kitchen might be less likely to integrate the luxuriously desirable category than those served as part of a 15-course gastronomic dinner at Noma (Rao 2015); in a food cart on a trip through South-East Asia, however, they might have another kind of appeal. The material surroundings – paper napkins and handheld bites? White tablecloths and silver cutlery? Pipettes and petri dishes? – also shape the tasting expectations by mobilizing prior experiences or providing hints about what is to come, as do the surrounding ingredients and types of preparation: Are insects used as a garnish, sprinkled on a salad? Are they candied? Are they

turned into powder and included in baked goods? Each of these scenarios signals a different type of category membership. The level of trust in those offering the food and the possibility of observing others in the act of consumption provide additional cues. Is this a world-renown chef or an anonymous, invisible cook? Are friends or strangers the purveyors? Are there others around who are trying out the dish, and what are their reactions like? Such observations can orient the eater in classifying a novel food into a category of either luxury edibles or pedestrian fare, for instance. Context as a whole is thus crucial in establishing category boundaries and, in turn, influencing potential acceptability.

The flexibility and adaptability of categorization schemes, as well as the fuzziness of category boundaries and of their graded structure, suggest that a one-category-fits-all approach is likely to yield poorer results than a more differentiated choice of categories in which to propose insect membership, depending on the target segment's overall attitude towards the proposed category.

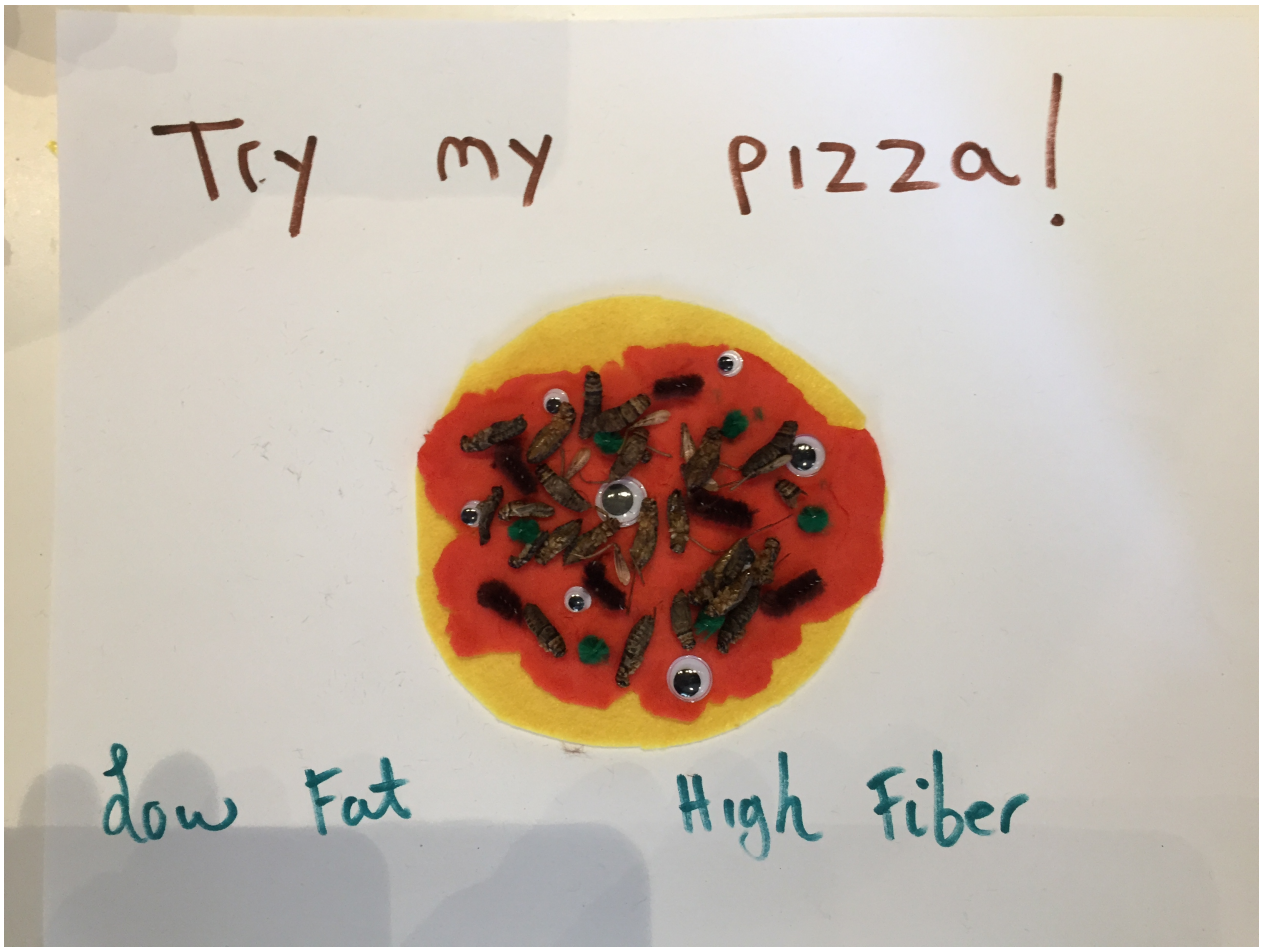
6.3 From Novelty to Normalcy – An experiment in appropriateness

Purely sensory approaches, then, may not be sufficient to induce adoption, or even trial, of edible insects, as the notion of acceptability strongly factors into the decision to sample and eventually adopt a novel food. Recent research has highlighted some of the ways this discrepancy between beliefs in rational benefits, expectations about sensory appropriateness and appreciation, and intention to consume are manifested when participants are faced with an unfamiliar product such as insects. Tan, Verbaan and Stieger (2017) show that the expected sensory features of different products play a crucial role in establishing perceived appropriateness, especially before the products are tasted. With such unusual foods as insects, trial intention can prove to be a major hurdle; offering products with a high level of perceived sensory appropriateness could thus be a fruitful strategy. In an experiment, the authors proposed regular and mealworm meatballs as well as regular and mealworm dairy drinks to participants. Before trial, the mealworm meatballs were perceived as being much more appropriate than the mealworm drink by both willing and unwilling tasters, and intention to both taste and purchase were higher. In most eating contexts, utilitarian benefits are not paramount, and related claims might not heighten the perceived appropriateness of insects as a food if the expected sensory liking, which Tan, Verbaan and Stieger find correlates strongly with perceived acceptability (2017), is not taken into consideration. For instance, situated as they are outside of a fitness context, the researchers discover that their mealworm-enhanced dairy drink suffers from a grave lack of perceived appropriateness, while the mealworm meatballs rally more participants. When functional benefits are not front and center, predicted sensory factors strongly enter into play to shape expected liking. The related perceived appropriateness of a particular product was also found to be positively correlated to the intention to buy *before tasting*, especially for willing tasters, with interesting marketing implications. Taking this into consideration, product developers need to remember that, though their holy grail of willing consumers may be ready to try insects, the forms under which these will be prepared and presented, and the perceived appropriateness of these forms, exerts a strong influence on whether or not their products will stand up to indirect competition from related, insect-free products that seek to fulfill the same need. As the authors note, "a product preparation that is higher in familiarity and [expected] sensory-liking may improve trial intentions, but product appropriateness is important when regular consumption is considered" (Tan, Verbaan, and Stieger 2017, 101).

In order to explore some of the ideas around the acceptability of insect foods, I organized an insect food design station at Concordia's 4th Space gallery on April 3rd, 2019. Participants were randomly self-selected Concordia undergraduate and graduate students who were visiting the "When Disciplines Converge" event organized by the university to showcase doctoral research by its Public Scholars 2018-2019 cohort, of whom I was a member. In addition to discussions with me about entomophagy, its purported benefits and characteristics, and about my research, participants who approached my station were presented with a loaded table. They could sample whole roasted crickets, two different types of protein bars (by Montreal company Näak), and playful spider- and worm-shaped gummy candy (containing no insects) for the more neophobic. They were then invited to take a seat in front of an array of craft materials including paper and markers, colourful pipe cleaners, foam shapes, play dough, cookie cutters, popsicle sticks, kids' toy food garnishes, scissors, glue, and pompoms.

Participants using provided craft materials to design more acceptable insect foods. Photo by Laura Shine. Concordia University, Montreal, April 3, 2019.

The 8 attendees (6 women and 2 men) who decided to try their hand at crafting were asked to create or design something that would make insect consumption more acceptable and culturally appropriate, such as preparations, processing techniques, packaging or other marketing aspects. No other examples, hints, or ideas were given. Pictures of all designs, as well as of the overall setup and process, were taken, many of which are included here. The 4 most forceful creations are discussed in the following pages. They highlight the extent to which functional and hedonic approaches are, in fact, intertwined, suggesting that treating the two as opposing and mutually exclusive poles may be misleading. They also showcase the importance of appropriateness in lay conceptions.



Healthful pizza with crickets. Photo by Laura Shine. Concordia University, Montreal, April 3, 2019.

Though the googly eyes might foil its popular appeal, this creation builds on a beloved and ubiquitous dish, pizza, to introduce edible insects. Defying the modest charm of their more restrained ancestors, contemporary (especially North American) pizzas are notoriously garnished with a wide variety of toppings. Some are more outlandish than others – durian, a whole lobster, peanut butter, a thanksgiving dinner or even 24 karat gold flakes have all found their way onto pies (Rotondo 2017). Crickets, then, might actually stand a chance in such a cultural context. Adding to the appeal of this novel pie are two health claims, "Low Fat" and "High Fiber" which, though they hark to a somewhat earlier era of dietary commands, provide an additional enticement to try the bugs, in line with one of the two main cognitive-based incentives typically used to promote entomophagy (the other being environmental sustainability). This approach is somewhat typical of the way many novel foods are introduced, namely as (usually less prominent) ingredients in a well-known dish, largely to avoid adding the strangeness factor of a new dish to the unease of an unusual ingredient.

Yet full visibility of insects, as a garnish rather than a fundamental ingredient, may diminish the willingness to sample, and research has demonstrated a clearly differentiated gradient in intention to sample related to the degree of transformation of the insect – the less visible and the more integrated into a familiar context or preparation, the smaller the barrier to trial (Gallen, Pantin-Sohier, and Peyrat-Guillard 2019). Consequently, another participant's creation in the design

workshop highlighted a similar approach, focussing on discreetly including insects into a relevant and highly familiar contextual frame without emphasizing their presence.

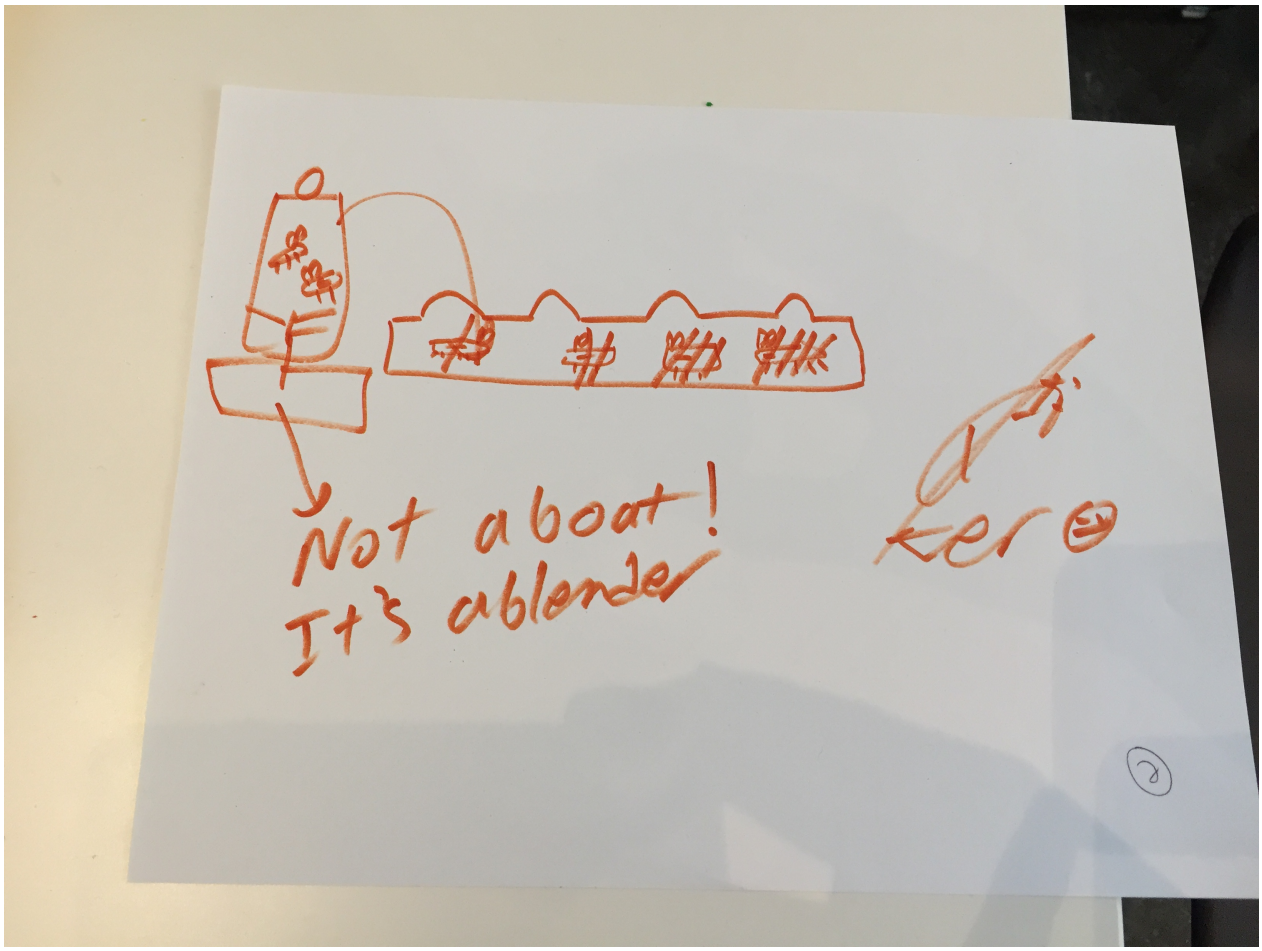
Spaghetti with bugballs, with a side salad. Photo by Laura Shine. Concordia University, Montreal, April 3, 2019.

This particularly detailed preparation hinges strongly on appropriate usage context and on the perceived safety of well-known and beloved dishes. Insects are here set as an invisible part of a complete meal. They are included in the meatballs, which are in turn included in the sauce and pasta dish, in absolute visual conformity with the ubiquitous and beloved spaghetti-with-meatballs recipe. What's more, a side salad is included; when asked whether it contained insects, the participant indicated that it didn't, but that salad goes well with pasta and provides a portion of vegetables. Here, insects are thus included not for their intrinsic culinary or gustatory properties, much less consumed as is, but instead as barely-noticeable replacement for the more usual ground meat. To heighten acceptability, they are set in conformity with culturally-inspired rules and norms about which dishes go well together, and institutionally-derived prescriptions about healthfulness and nutritional balance. It is worth noting that in their study, Collins and her co-authors find that while insect-enhanced snacks are a practical, efficient and low-risk entryway into the edible insect market, their participants showed a similar interest in trying a fully cooked dishes into which insects were incorporated. Furthermore, children, whom they consider to be a promising demographic that could change the insect consumption landscape in coming years, "minded more what the insects were served with or what the dish was than the fact that the dish contained insects" (Collins, Vaskou, and Kountouris 2019, 9). One of their participants, for instance, indicated he'd surely like the insect quiche – if only he liked quiche itself, a caveat similar to that expressed more forcefully by the young participant in a tasting workshop I helped

organize in Ottawa's Museum of Nature in February 2016, who turned away disgusted from a snack of apples, honey and mealworms because he couldn't stand honey. Children's infamous neophilia often hinges on unpredictable and idiosyncratic preference patterns, rather than the more structured and culturally consistent disgusts or refusals expressed by adults. Inclusion in a familiar recipe and conformity with existing, well-liked patterns of consumption – such as the complete, balanced meal of pasta with salad here created by the crafter – are thus important criteria to consider when proposing uses for edible bugs, no matter the targeted segment.

Of course, for a novel ingredient with little history of consumption, the evolution of perceived appropriateness is hard to predict. In the Western context, insects' specific and individual sensory profiles and appropriate uses are not clearly delineated, and culturally-defined rules around the consumption of specific species do not yet exist (Gallen, Pantin-Sohier, and Peyrat-Guillard 2019). Typically, though, they have often been discursively positioned as a meat replacement, perhaps shaping expectations that they are more appropriately prepared as savoury foods (Tan, Verbaan, and Stieger 2017; Tan, van den Berg, and Stieger 2016; Shelomi 2015). It is thus rather surprising that sweeter items or usages such as protein bars and smoothies have so far taken center stage in Québec (and most of North America), highlighting the opportunity in diversifying available insect products. Indeed, there may be an untapped market for potentially contextually and sensorially appropriate, convenient savoury insect foods, such as pasta (which only Melio commercializes in Québec so far, on a very small scale), burger patties (available in some Belgian and Dutch supermarkets), or crackers (such as Crické's in the UK or Chirps in the US, and which Montreal company Crickstart manufactured until they rebranded as Landish in 2018 and discontinued the product line).

Interestingly, while meatballs and patties were prominently featured in the design workshop, only one participant included insects as part of a sweet preparation.



Chocolate bar with powdered crickets. Photo by Laura Shine. Concordia University, Montreal, April 3, 2019.

The original drawing included whole crickets ensconced in a chocolate bar. But when asked about them, the attendee modified his design to chop the insects into small, inconspicuous pieces with a blender before adding them to the bar, judging that whole crickets would insufficiently contribute to enhanced acceptability, because of their visual impact and unusual texture. Here again, insects' sensory attributes were not put front and center, and their presence was made as inconspicuous as possible in order to enhance acceptability.

Another participant's creation was strongly anchored in popular North American and local cultural markers for edibility, hitching a ride on convenience foods' mass-scale appeal to obscure the presence of insects in the dish.

Insect-based offerings from fast-food chain restaurants. Photo by Laura Shine. Concordia University, Montreal, April 3, 2019.

In the weeks prior to the event, A&W Food Services of Canada Inc. had launched Beyond Meat *Sausage and Egger* breakfast sandwiches to great media fanfare. It was extending its Beyond Meat product line, adding to the burger launched the previous July and capitalizing on the growing popularity of alternative "meats" in Canadian diets, including in the fast-food industry (Mintel Press Team 2018). Riffing on this news item that had made headlines all over the country, this participant imaginatively extended the product line even further, giving the restaurant 18 months to add a bug burger to its menu as a logical next step in the quest for more sustainable meat substitutes. The cricket kebab, composed of cricket "meat"balls complete with the standard garnish of cherry tomatoes and onion pieces, was to follow shortly after at Boustan, a Montreal-based Lebanese-Canadian fast-food chain whose original location is situated a few streets from Concordia University. Both of these ideas inscribe insects into a socially acceptable form of consumption – fast food meals – and highly recognizable preparations with widespread appeal and perceived appropriateness. The fast-food setting is used as a heuristic marker – if it's at A&W, it must be edible. Here again, the bugs are not used for their particular sensory attributes but instead for their functional qualities and ability to 'blend in' more or less imperceptibly. The point is not to know or sense that you are consuming a novel food, but to got about your usual convenient food habits while forgoing meat.

6.4 Shutting down the sensory

The importance of taking sensorial preferences and expectations into account when considering preparation of insects for maximum appeal and adoption cannot be overstated. Yet as the previous sections show, and as participants in the insect food design workshop demonstrate through their creations, hedonic benefits alone are insufficient to motivate trial or adoption. The actual gastronomic appeal of insects is inextricably linked to appropriateness, and even a fabulous tasting experience may not result in actual adoption if factors of appropriateness and contextual 'fit' are not taken into consideration. In fact, because of insects' low perceived compatibility with the food setting, it seems that highly processed foods and ones that contain no perceivable insect presence may fare better on acceptability and appropriateness, at least for a general audience. This suggests an entirely different approach to dealing with insects' intrinsic sensory properties: instead of showcasing them, make them as inconspicuous as possible. This is compatible with the functional attitude that focuses on insects' nutritional benefits, for instance; it also allows a wider-ranging 'fit' with culturally appropriate foods, since it is treated as a basic component rather than a showcased ingredient.

When asked what an ideal insect product would look like to him, José Audet (Interview 4), a fitness enthusiasts who already consumed insects as a protein boost, imagined insects "chips" or crackers. Something "crunchy, salty, munchy" – in a word, with a "junky" feeling, but with an added protein boost that would make it a more palatable source of nutrients and an acceptable post-workout treat. In many of the tastings and events I organized, as well as in my work with GrowHop, I experimented with wholegrain, spiced cricket-flour crackers and found they (as well as granola) were systematically preferred to less crunchy offerings or ones that presented whole or visible parts of insects. This is in line with current research demonstrating that

> Not all insect foods are created equal– a number of studies with American, Belgian, Indian, and Swiss samples suggest that people prefer insects foods with crispy textures and familiar tastes, and that they are more willing to eat processed foods containing insect flour, such as cookies or crackers, than they are to eat whole insects (Ruby and Rozin 2019, 156).

A rare study of school children's interest in adopting insects found that pupils had similar sensory expectations and preferences. Crispiness and recognizable flavourings such as BBQ spices were positively valued, while a "slimy" appearance was said to look "not tasty" (Collins, Vaskou, and Kountouris 2019, 5). Preferences clearly veered towards preparations with no visible insect parts, and with looks similar to those of well-known, "regular" foods, with little perceptibility of insects' presence. Adults were also more willing to try dishes and products that looked and tasted similar to ones they already consumed, hinting at commercial opportunities for convenient preparations such as burgers or ready-made meals (Collins, Vaskou, and Kountouris 2019). This confirmed previous findings that before consumption, participants anticipated preferring insect products and recipes that most closely resembled the familiar foods they were based on (Tan, Verbaan, and Stieger 2017) – in other words, they wanted the benefits without the taste, the function without the actual sensing of the bugs' presence on their plates.

6.4.1 Try it, you won't know

So far, the majority of products sold in Québec, namely protein bars, or suggested uses of available ingredients, such as adding powdered crickets to smoothies, have banked on purported functional benefits that are familiar to a specific targeted segment: athletes (or aspirational athletes). Indeed, bugs have been mostly marketed as source of lean protein for sports enthusiasts, who are already fervent consumers of enhanced smoothies and proteinated energy bars. In this restricted setting, this type of use can be perceived as a contextually appropriate replacement of the more widespread whey or soy protein. As a nutritional element, insect powder as a supplement also dovetails neatly with the "usage context" imperative, which refers to the more or less satisfactory correspondence between the consumption context and the food consumed (Cardello et al. 2000; Tan, Verbaan, and Stieger 2017). For instance, in most Québec kitchens, a seafood stew is not an acceptable breakfast food; similarly, for most, crackers or fruit are more appropriate snacks than a whole steak. When understood as a functional nutritional element, insect powder finds a productive niche in on-the-go, post-workout products for busy high-achievers who emphasize quick recovery and muscle building – benefits that appeal to the particular targeted segment. Sensory aspects are often then overlooked. In such a context, insects are able to achieve a higher level of appropriateness as nutritional supplements for athletes; after all, the other protein powders they aim to replace are also used for their functional benefits, and preferred when they are as tasteless as possible (or laced with vanilla or chocolate to mask the products' intrinsic flavour).
Coherently, when I organized or attended insect product tastings where protein bars were on offer, I frequently heard the entrepreneurs claim that the included cricket powder had a neutral or even indiscernible flavour, perhaps influencing many tasters to conclude that they 'would never have known' that the bars contained bugs, had they not been told. This tactic helps shape sensory expectations, a crucial determinant in expected liking that exerts a strong influence on judgment, likeability, and perceived sensory characteristics (Berger et al. 2018). The dominating concealment or overlook of sensory properties is highly typical of the current marketing of highly processed insect products. To a more seasoned consumer such as myself, though, it could not ring more false. My strong dislike of crickets' pungent taste, which has surprisingly increased along with repeated exposure (a taste that some producers reluctantly and anonymously admitted existed, in *other farmers'* products, because of less-than-exemplary growing and processing practices) allows me and other habitual consumers to discern their presence, even in the minimal amounts usually contained in ready-to-eat products. Nonetheless, a vast majority of first-time eaters maintain that they cannot discern particular, unfamiliar sensory properties that they associate with insects, and seem overall content not to.

Both this dissimulation tactic and this reaction from general audiences were confirmed without hesitation by William Walker and Minh-Anh Pham, founder of Montreal-based Näak, a cricket-protein bar company (Interview 16). In fact, the successful entrepreneurs consider that the most pivotal decision made over their three years of existence was the reformulation of their cricket bar recipes to *lessen* the proportion of powdered insects, thus making the taste and texture more discreet. Like me, they were ambivalent about the flavour of roasted crickets, a distaste that grew over time and amplified with repeat consumption. Because of its strong flavour and gritty texture, the entrepreneurs also expressed some surprise at the fact that people actually purchased and consumed pure cricket powder, which they sell under their brand to cater to their consumers' demands. Lowering the insect's proportions from about 25% to 10% of the energy bar recipe

content undisputably diminished the total amount of protein, therefore weakening some functionality claims, but allowed them to create more "gourmand" bars with a much wider appeal, one that did not hinge on the bugs' sensory characteristics but instead on the other ingredients'. This coincided with a marked uptake in repeat purchases. Customers started buying recurrently online, with some participating in the subscription scheme launched shortly after, in which members are sent one or more boxes on a regular basis. This milder flavour and less conspicuous "bug presence" generated an extremely positive response and allowed them to widen the segments they were targeting – from dedicated athletes to more athleisure crowds. The actual sensory properties of the insects were here seen as a constraint, rather than a motivating factor for trial and adoption. Thus making them more discreet was a successful tactic.

Because most of us don't make food choices based solely on cognitive imperatives, many proponents have been advocating sensory-based approaches to promote insect consumption. Making them delicious enough should make it possible to bypass individual and cultural barriers that still stand in the way of adoption, and which rational-based approaches have thus far not succeeded in broaching. However, as this chapter demonstrated, outside of rarefied gastronomic spheres, the general public' hedonic appreciation is still likely to be modulated by another crucial factor, namely perceived appropriateness. The latter, when perceived as negatively charged, can even override sensory pleasure, making 'delicious' food still seem unacceptable at the dinner table. For this reason, anchoring insects to appropriate categories of edibility can help enhance their acceptability. Moreover, as the insect food design experiment shows, it is misleading to understand rational- and sensory-based arguments as opposite and mutually exclusive poles of a spectrum; participants' creations suggest that they are, in fact, intertwined in lay understandings of food appropriateness. Finally, because insects' sensory properties do not always garner widespread appeal, some proponents strive to make them as inconspicuous as possible. Treating taste as non-existent – and therefore apparently non-important – is of course coherent with the overwhelming Western focus on the functional benefits of edible insects, to the detriment of the unique and distinctive sensory properties advocated by Nordic Food Lab researchers and other hedonic preference-inclined proponents. But in fact, though they seem to disregard them, these actors are taking stock of the sensory properties and deciding that they need to be addressed – albeit in a dissimulating way – to overcome rational arguments' insufficient appeal. Thus they showcase once again just how tightly the two approaches are intertwined, and how crucial it is to take into consideration insects' intrinsic sensory characteristics rather than their sole appeal as sustainable or healthy foods.

Chapter 7. An industry on the move

When Jérôme Fortin-Légaré launched Neoxis with his business partner Miguel Pérusse in April 2016, his initial idea was to raise crickets for human consumption (Interview 13). Though he possessed no specific experience in agriculture or animal husbandry - never mind in insect rearing - he was in no way resistant to the idea of insects as food, or disgusted by bugs in general. He did have a marked interest in nutrition and was always on the lookout for innovative food products, and insects seemed to fit those bills perfectly. Their rarity on the Québec food scene also looked like a promising business opportunity. Crickets seemed like they'd be easy to grow; they were, and still are, the most widely farmed insect in North America. But more in-depth research into European businesses, which tended to be more successful and larger-scale than ones closer to home, convinced him to gear his production towards mealworms instead. Not only might an outlier product prove a competitive advantage, but mealworms seemed simpler to raise, their nutritional profile more promising, and their farming more efficient and less resource-intensive, partly because of the high temperatures needed to successfully breed crickets.
Inspired by recommendations published in the seminal 2013 FAO report on entomophagy (Van Huis, Van Itterbeeck, et al. 2013), Neoxis' initial plan focussed on raising insects for direct human consumption. The firm decided to concentrate on the business-to-business trade, selling raw material to transformers rather than finished products to consumers. Their prospective market seemed poised to grow: more and more consumers expressed curiosity towards edible bugs, and the demand was mostly geared towards convenience products such as energy bars or ready-to-use ingredients like pasta, which were all made with raw material from a single Canadian farm, Entomo, located in Norwood, Ontario. But the leap from initial interest to actual adoption was slower to materialize than they had initially hoped, and the team decided to explore other options. To circumvent the resistance expressed by a still very significant portion of the population, Neoxis subsequently decided to direct most of its production towards pet food manufacturers. Consumers, Fortin-Légaré explains, are generally less reluctant to feed insects to their cats and dogs, and somewhat receptive to the idea of offering protein with a smaller environmental impact. Pets themselves obviously do not mind, as long as the taste and texture are acceptable, and the functional benefits of insect powder, such as its nutritional profile and high digestibility, are a definite draw. The high price of raw material, however, remains a major barrier.
Neoxis plans to start commercialization towards the end of 2019. Their entire 2018 production, about a ton, was used as samples and testing materials for the many companies that expressed an interest in integrating the powdered bugs to their recipes.

Fortin-Légaré's story encompasses many of the typical strengths and weaknesses typical of the current situation in the Québec industry. It is rife with highly motivated, but non-specialized, entrepreneurs who begin with a clear project in mind, only to find down the road that their initial business plan needs to be stringently revised. Neoxis' endurance is somewhat remarkable, since many fledgling companies have shut their doors after only a short stint, plagued by technical, social, or financial difficulties. Turnover is extremely high, and much like Fortin-Légaré, many entrepreneurs quickly realize that the initial promises of high yield and high profit margins are slow to materialize. Some, such as Umamize (formerly Tottem Nutrition, located in Blainville, Québec), decide to re-brand, and, much like Neoxis, switch species and take a few steps back in the supply chain to cater to the demand for raw material rather than transformed products. Such a change does not come easily, as Umamize's founders realized as they struggled to rent industrial

space and to keep their head above water while waiting for their first generations of insects to mature enough for market (they have indefinitely suspended activities since I spoke to cofounder Brenda Plant, in June 2019) (Interview 12). And notwithstanding each firm's specific organizational challenges, all of them face some of the same difficulties in the wider environment, such as unpredictable and fluctuating consumer interest, indirect competition from better-known products, and difficulties in normalizing an unfamiliar food. In short, it is an industry on the move.

In this chapter, I examine some of the prevailing concerns, challenges and opportunities currently encountered by members of the edible insects industry in Québec. Because consumer attitudes are still a major concern, I begin by examining how the consumer decision journey model can be mobilized to assess and address some of these factors. Based on examples from the field, I then detail some of the approaches businesses have trialed, adopted, or rejected, and the creative ways in which they tackle issues such as acceptability, usability, and negative consumer attitudes. Finally, I discusses the crucial matter of normalization, addressing some of the strategies and pitfalls that can help or hinder the process in order to move from trial to adoption. This eminently concrete and practical chapter also aims to suggest further directions for members of the industry interested in developing a critically informed stance on a novel food with a vast growth potential, with takeaways that could also be applied to other products facing acceptability challenges.

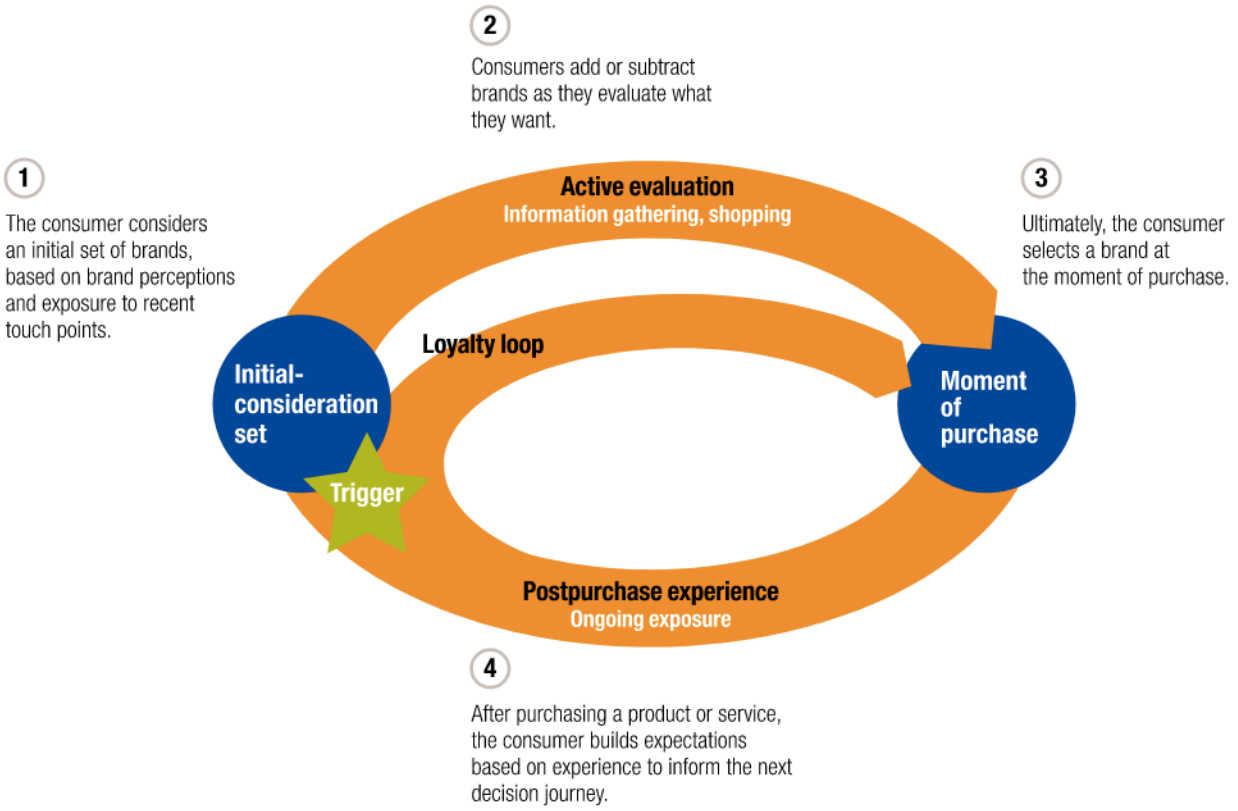
7.1 Crawling along the consumer decision journey

Most insect food products currently marketed present an interesting challenge. Although they often belong to mundane, low-involvement categories that would usually fast-track the decision-making process (energy bars, crackers, or pasta for instance), the novelty aspect (and sometimes sheer repulsion) of an ingredient as unusual as insects generally increases the level of involvement required for considering trial and, even more so, adoption.

For the marketer, this can present both a threat and an opportunity. It becomes very difficult – even ethically disputable – to bank purely on behavioural impact. Indeed, the consumer reaching for an energy bar at the cash register is likely to be startled by the addition of insects and to require additional information about the product, dragging it out of the 'impulse buy' arena. Any attempt to bypass this step backwards in the decision process – for instance, by obscuring or concealing altogether the presence of the novel ingredient – is likely to backfire dramatically, harming both the firm and the edible insect category as a whole. However, making insects the star of the show can also hamper long-term adoption as it uses sheer novelty as a selling point, an appeal that inevitably wanes after trial, especially if the product does not live up to expectations (of performance, sensory attributes, etc.). As I will show, many businesses have chosen to acknowledge that insects generate a level of involvement and intensive information-gathering atypical of more standard ingredients, while also striving to treat them as just one food among others. In a sense, they seek to inform curious consumers of the purported benefits without overly capitalizing on shock value. In this, they endeavour to engage the consumer throughout her decision journey.

The consumer decision journey (Court et al. 2009) is a marketing model that seeks to illustrate the process consumers navigate when making a purchase. It identifies the key "touch points" where such consumers are likely to respond to marketers' influence as they ponder their decision to buy a certain product or brand. This model replaces the more traditional purchase funnel, wherein consumers were understood to start the decision process with a set of brands in mind, whittling down that initial collection through a series of touch points until they settled on a choice. However, more recent models such as the consumer decision journey posit that such a reductive linear structure fails to take into account contemporary factors in decision-making, such as the importance of digital channels, the multiplication of choices, and the heightened engagement of consumers who have become more proactive and demanding. The funnel model emphasized a "push" strategy in which marketers strove to exert influence at every touch point "through traditional advertising, direct marketing, sponsorships, and other channels" (Court et al. 2009) in the hopes of making it to the end and securing a sale. Instead, newer models acknowledge consumers' inclination to "pull" information useful to them, "such as Internet reviews and word-of-mouth recommendations from friends and family, as well as in-store interactions and recollections of past experiences" (Court et al. 2009). It also recognizes the importance of non-rational and non-cognitive factors in decision making.

Such a model takes a circular, rather than a linear, shape. It identifies 4 crucial touch points where marketers can exert sizeable influence. The initial consideration set consists of potential choices of which the consumer is already aware before she engages in the journey. During the active evaluation phase, wherein information is gathered and evaluated, she can either eliminate or add items, contrary to older funnel models which posited a constant narrowing of the initial set. Closure occurs when a choice is finally made, and the postpurchase experience entails an ongoing evaluation that will shape future journeys, when the need occurs again. The importance of this last phase cannot be underestimated – ongoing engagement after the purchase has occurred can foster more durable relationships and even turn consumers into active loyalists willing to recommend and promote the item or brand. The holy grail for marketers is of course to embark consumers into a loyalty loop, thereby bypassing the active evaluation phase with its threats of displacement and heading straight for another closure.



The consumer decision journey model and its key touch points (Court et al 2009)

Such a model holds promising insights for the edible insects industry. With such an unfamiliar product, the insect marketer can seize the opportunity to engage the curious consumer in a quest for information and knowledge. Not only must insect ingredients be clearly identified for reasons of transparency and legal compliance, but they can be leveraged as a powerful way to engage consumers in a discussion about benefits and advantages, and about the drawbacks of competing choices. In my own work, during talks, tastings and participant observations, I've witnessed the powerful polarization induced by edible insects – they leave virtually no one indifferent. Many consumers, entrenched in negative attitudes regarding not only insects as a food, but about insects in general, are violently repulsed, and the possibility of engaging with them is slim, at least at that particular time. However, those who are not appalled – often neophilic consumers – are almost always interested in obtaining additional information, and thus find themselves fully engaged in the decision-making journey. This can provide various opportunities to tap into consumers' incentives and motivations to try insects for the first time. Are they looking for alternative protein sources? Sustainable products? Meat replacements? Or simply a novel food or a delicious experience? Each of these preoccupations generates differing strategies to orient consumer choice.

The following sections outline some of the critical challenges and opportunities faced by actors in the contemporary edible insect market. Broad factors such as a changing environment and competition are considered, along with their impact on the developing industry. I then mobilize some examples from my fieldwork to examine some of the more prominent barriers to adoption situated at different touch points along the consumer decision journey, namely lack of inclusion

in the initial consideration set, active rejection, and low availability. I demonstrate how each of these is addressed by marketers from a strategic and tactical perspective. Finally, I investigate some approaches and pitfalls in fostering durable adoption, from trial to repeat purchase – in a word, engaging consumers in a product loyalty loop.

It must be noted that, throughout the chapter, I mobilize the consumer decision journey in a broader approach, using not simply brands as a stand-in for variety of choice, but considering insect products in general as an option among many other products, regardless of actual brand. This provides a more useful analysis, since competition with products that serve similar needs is so fierce, as I will outline shortly, and because insect foods are still highly unfamiliar (and the level of differentiated brand awareness is still extremely low). Thus for the moment, the interesting question, as far as my research is concerned, is how to get consumers interested in trying insects and potentially consuming them on a regular basis, rather than adopting a narrower focus on specific brands (though that is, of course, of concern to the firms themselves).

7.2 A changing marketing environment

Within the more restricted task environment – which refers to elements and actors of the external environment that influence an organization or industry's ability to attain its business goals – many factors shape the actual and future orientations of the industry.

Although suppliers, transformers and retailers face different challenges and issues, some aspects of the task environment have repercussions on all levels of the production, distribution and promotion processes. The rarity of local, stable supply chains, as well as the low diversity and high cost of the raw material confer important bargaining power to the handful of sellers and a premium price to all insect products. Distribution remains an issue, as precious few products have made their way into important retail chains, which are most likely to reach the bulk of food consumers; some are sold in specialty stores and local markets, and most are offered exclusively online, which raises concerns of convenience and visibility. The consumer end of the task environment is of course of crucial importance here, as the low level of acceptance remains the dominating focus of most organizations. Most firms expand significant energy and resources to promoting the acceptability of entomophagy to the greater public. Research seems to indicate sustained growth in both interest and potential market size (Schouteten et al. 2016), likely thanks to increased familiarity and sustained exposure through a wide variety of communication channels with both paid and earned media. However, Shelomi suggests the industry should focus instead on supply-side innovations to increase the availability and convenience of products, proposing that in innovation contexts, "accessibility drives demand" (2015, 312). While the aforementioned realities are some that shape the overall state of the industry, each insect-food business needs to conduct a more in-depth assessment of the task environment relevant to their own organization, with a specific focus on each individual actor.

The various dimensions of the broad environment are also of particular interest for the development of the edible insect industry. Looking towards consumers, the market particularly strives to leverage broad shifts in the **socio-cultural** environment, banking on large consumer movements towards healthier, more sustainable, and less resource-intensive foods. In a sense, this relates to changes in the natural environment, as global warming and issues of resources scarcity

loom on the horizon. Many firms capitalize on related socio-cultural trends, such as the desire for local, organic, non-GMO, high-protein and functional 'super'foods, gluten-free, "paleo", and/or natural foods. Of course, attaching product to trends runs the risk of rendering them obsolete as the trend fades out; moreover, as Shelomi points out, "whether selling more insects is worth contributing to pseudoscientific or orthorexia-enabling dietary trends is debatable" (2015, 316). Some producers also actively mobilize their target market's anxieties about the current food provisioning and distribution system and its shortcomings. When I asked Jérôme Fortin-Légaré what was the single most important argument that Neoxis put forward to sell their insect products, his answer surprised me: "transparency" (Interview 13). He lamented an era in which consumers are increasingly wary of an industrial food system that has mostly alienated them and unmoored foods from the realities of their production, processing, and transportation. Though industrial agrobusiness behemoths may not value transparency – perhaps self-servingly – he chooses to bank on a promise of openness which he says resonates with consumers that are more aware, curious, and enterprising. Though this type of discourse targets a relatively limited segment of the general population, he believes the number of adepts is poised to grow. Less afraid of edible insects than even just a few years ago, they are interested in the specifics of insect rearing and want to know that their decision to thus diversify their diet – or their pet's – for reasons of sustainability are well-founded. This commitment, Fortin-Légaré admits, is not an easy one to follow; whereas many players in the industry tout improbable statistics and flawed claims (as outlined in Chapter 5), Neoxis has chosen less polarizing and attention-grabbing tactics and placed its faith on the consumer's purported desire for informed choice, without precluding the nuance and complexity inherent to sustainability issues. It is a bet that he believes will pay off in the long run as confidence builds through trust.

Parameters of the **demographic and economic** environments delineate much of the industry's current strategic and tactical approaches to promoting their wares with consumers. While researchers disagree on the specific importance of gender in perceived food appropriateness of insects (see, for instance, Verbeke (2015) and Tan et al. (2016)), authors generally find that young, educated and food-enthusiast segments are most prone to regard them favourably. Neophilia and neophobia, of course, also need to be factored into market segmentation – curious, daring eaters are more likely to sample insects than highly neophobic ones. I would add affluence to the criteria, as the insects are still priced far out of reach for the average consumer. Indeed, their proponents in westernized cultures strive to overthrow the widespread perception of insects as an emergency food for impoverished populations - their presence on the menu at Denmark's Noma, one of the world's most celebrated and exclusive restaurants, testifies to this. Yet firms struggle between positioning them as a luxury food and one that retains an aura of affordability.

On another note, factors from the **natural** environment also influence the production side, though to what extent is still a matter of speculation. Indeed, the minuscule size of the Québec industry and its fragmented and emerging nature preclude much home-grown research from being conducted, which could take into account the particular environmental conditions – harsh winters and the need for additional heating, for instance – and local specificities – such as cleaner hydroelectric energy or the high cost and low availability of manual labour. It is surprising, for instance, that most firms choose to grow crickets, which require high temperatures and stable humidity, and might not be the most sustainable choice under our latitudes; however, because they are most widely grown in the United States and Europe, they are more familiar to

consumers, and their husbandry is better understood. Further research into the specific local factors that influence production could point to new avenues and potential market openings.

The **technological** environment also exerts an important influence on the field. This is relevant in the broader context of emerging globalized marketspaces, as many sellers rely almost exclusively on online retailing in an attempt to cut distribution costs, reach a geographically dispersed market, and limit resources spent persuading retailers to stock their products for admittedly limited consumer segments. But perhaps the most important effect of changes in the technological environment relate to the micro-level of advances and innovations in raising edible insects to make them more widely available and less expensive.

Much more research and development are needed to establish and regulate practices in the realm of production, which includes husbandry but also safety and sanitation, monitoring, processing, packaging, storing and transportation to ensure consistent optimal results (Rumpold and Schlüter 2013; Dobermann, Swift, and Field 2017). Newcomers in the industry often believe insects practically raise themselves, that starting a bug business is a straightforward path to financial success. After all, the thinking goes, we usually struggle to get *rid* of them, so how hard can they be to raise? To Jérôme Fortin-Légaré, this partly explains the extremely high rate of turnover in the nascent industry (Interview 13); startups launch and then fail just a few months later as entrepreneurs struggle to navigate the transition between artisanal and industrial production. Growing a few bugs in your basement – or, unwillingly, in your pantry – is relatively easy; scaling up is the real challenge, with processes still relying very heavily on manual labour, driving up costs. Yields are unpredictable at first, and many bugs turn out to be fastidious eaters that require precise living conditions, with stable temperatures and humidity levels, particular surroundings and spaces to lay their eggs. Some of them are prone to cannibalism if the environment isn't perfectly calibrated; others suffer from diseases. Overall, the lack of research hampers the industry's advancement as a whole; emerging businesses work to keep their precise methodologies secret, resulting in a patchwork of practices and a cottage industry that struggles to present a united and coherent front. What's more, Fortin-Légaré points out as he asks which language my thesis will be written in, the lack of research in French is a particular barrier for many small business owners in Québec, who are less fluent in English and sometimes struggle to follow the precious few technical treatises that have been published. And of course, much research remains difficult to access online, hidden behind prohibitive paywalls for those outside the confines of the research community.

In this regard, changes in the technological environment that include further research and greater accessibility of published work could have important and beneficial repercussions for the local industry.

Finally, the **political-legal** environment has a major influence on the industry's development. Legislators in Europe, Canada and the United States have adopted vastly different positions that limit, tolerate or encourage the production and distribution of insect-based foods. Even within the EU, countries such as Belgium and the Netherlands have adopted favourable policies that have notably allowed processed insect meat-replacements to find their way into major supermarket chains, while most others are either ambivalent or hostile to the idea, leading to uneven development and patchy distribution within an allegedly open market. In Canada, as mentioned in Chapter 6, no specific food and safety regulations apply to edible insects – yet.

Interestingly, among the general signs of growing awareness and interest for edible insects, Fortin-Légaré cites increasing institutional responsiveness from a wide berth of organizations,

both governmental and private (Interview 13). As examples he personally observed, he notes that Québec's *Ministère des Pêcheries et de l'Agriculture* (MAPAQ) is working on a specific set of norms and practices to regulate the new industry and is conducting research on safety and sanitation, whereas only a few years ago the only mentions of insects referred to contaminations and norms violations in the food industry, and regulations concerning the deliberate introduction of insects were entirely nonexistent (Agriculture, Pêcheries et Alimentation Québec 2019). The *Commission des normes, de l'équité, de la santé et de la sécurité du travail* (CNESST), which regulates and enforces workplace safety, rights, and regulations in Québec, has also started to pay attention to the specific working conditions that prevail on insect farms, which present unique risks and contaminants such as the continued inhalation of mealworm frass (excrements). Fortin-Légaré also mentioned financial evidence of a promising industry: granting agencies now take insect farms into consideration and sometimes finance their projects, and banks contemplate loaning to insect startups. This was the case for GrowHop in the Ottawa region (Interview 11), which benefitted from a 50 000$ loan from the Business Development Bank of Canada's Futurpreneur program as early as 2015, just before I started conducting research there. Private banks were a bit slower on the uptake, Fortin-Légaré said, but they are notably more receptive now than when he started out three years ago (Interview 13).

Any shift in these spheres is certain to exert a major influence on the expansion and progress of the industry, and will present new opportunities and threats that marketers must take into account.

7.3 Competition

As it stands, the edible insect category does not comprise unbearable internal competition – it remains exceedingly small and, as many producers point out, demand – tiny as it may be – still outstrips supply, especially for insect growers producing the raw material for burgeoning firms who transform them largely into convenience foods. One growing competition issue within the industry, however, is the homogeneity of the proposed transformed and ready-to-eat products. At the first North American Eating Insects conference held in Detroit in May 2016, a vast majority of the vendors proposing ready-to-eat products were offering energy bars; almost all products, bars or otherwise, were made using cricket meal. This reflects both the limited offering in terms of raw material (North American farms grow almost exclusively crickets and mealworms) and a lack of creativity and differentiation in product development, fostering supply chain issues that will need to be addressed urgently as the industry moves forward. In such an underdeveloped market, most brands can get away with a positioning that relies on the originality of their star ingredient rather than their specific brand's points-of-difference, but that will need to change in the very near future. It also runs the very real risk of shaping consumer ideas about what insect products look and taste like in a very narrow way – more or less homogenous, undifferentiated bars with low involvement levels and low purchase loyalty.

Direct competition from outside the insect industry, though, is fierce, as most of these firms are seeking membership in product categories that are already well developed (some might even say close to saturated): energy bars, crackers, pasta… low-involvement, low-differentiation items that make it difficult for the premium-priced insect foods to assert their place, even as they already face challenges in changing consumer attitudes and beliefs about the edibility of their products.

Why pay double or more for a product that contains ingredients with a low level of attractiveness or, worse, low acceptability?

However, it is the indirect competition that proves most interesting. In establishing their competitive frame of reference, I found that most firms are insufficiently critical of the edible insect industry's doctrine, which promotes insects as the next 'miracle food', 'good for you, good for the planet', etc. In satisfying a consumer need for food, insects can compete with an immensely vast number of items that seek to answer to that same need. It is therefore crucial to choose wisely which categories insects should be positioned in.

Based on their protein content, insects are most often compared to meat. This is not only inconsistent with the uses the industry itself currently makes of them, namely as ingredients in processed convenience foods, but also disserving. Indeed, meat dishes such as hamburger patties to which insects are added do not usually compare favourably to the traditional versions, both from a sensory-affective and ideational perspective (Schouteten et al. 2016; Tan et al. 2016; Tan, van den Berg, and Stieger 2016). Moreover, as Shelomi shows in his portrayal of entomophagy as a failed innovation, insects also fare poorly in terms of non-sensory relative advantages when compared to meat, and while an insect diet might compete favourably in terms of environmental impact and resources use (water, feed, space, etc.), it is likely still less beneficial than a meatless diet in terms of sustainability (2015). It provides, at least outside of the very restrained entomophagous population, no status benefits (and can even, I would add, pose a social risk undermining such a status). Its convenience level is very low, as edible insects are still very hard to procure, and knowledge about how to prepare and consume them is hard to come by. Finally, were the enthusiast to find some through online providers or one-time insect-eating events, the economic disadvantage is significant, as they remain much more expensive than almost any other animal protein. In any case, as Verbeke (2015) points out, edible insects (especially when 'disguised' as an ingredient in snack foods) also appeal most to convenience seekers, whereas meat lovers show abysmal levels of interest. With meat as the main competitor, it is a true oddity that almost anyone would choose insects at all.

Thus, if nutritional value is a chosen as a leading category point-of-parity, it might be better used to establish insects as a competitor to small seafood, or especially to nuts, with which they share not only nutritional properties but also sensory qualities (texture [whole or ground], size, appearance, even taste). As consumer make decisions about unknown and novel products, the anchoring category to which they tie their evaluation – nuts instead of meat – can provide a subtle but effective nudge in adjusting perception (Thaler and Sustein 2008). Proponents of 'rebranding' insects – "land shrimp" instead of crickets, for instance – share a similar logic as they propose anchoring evaluations to well-loved edibles (shrimps) instead of biting and invading nuisances (insects). Such orientations will influence not only how the consumer understands and evaluates the product, but also how and where insect foods are located in the retail environment (thus influencing behaviour): in the meat section, or with nuts and salad garnishes? In this context, establishing the right competitive frame of reference and providing beneficial category cues is a central challenge that must take into account not only direct competition, but especially indirect competition, which presents the greatest difficulty in establishing insects as an acceptable food.

7.4 Some barriers to adoption and related industry strategies

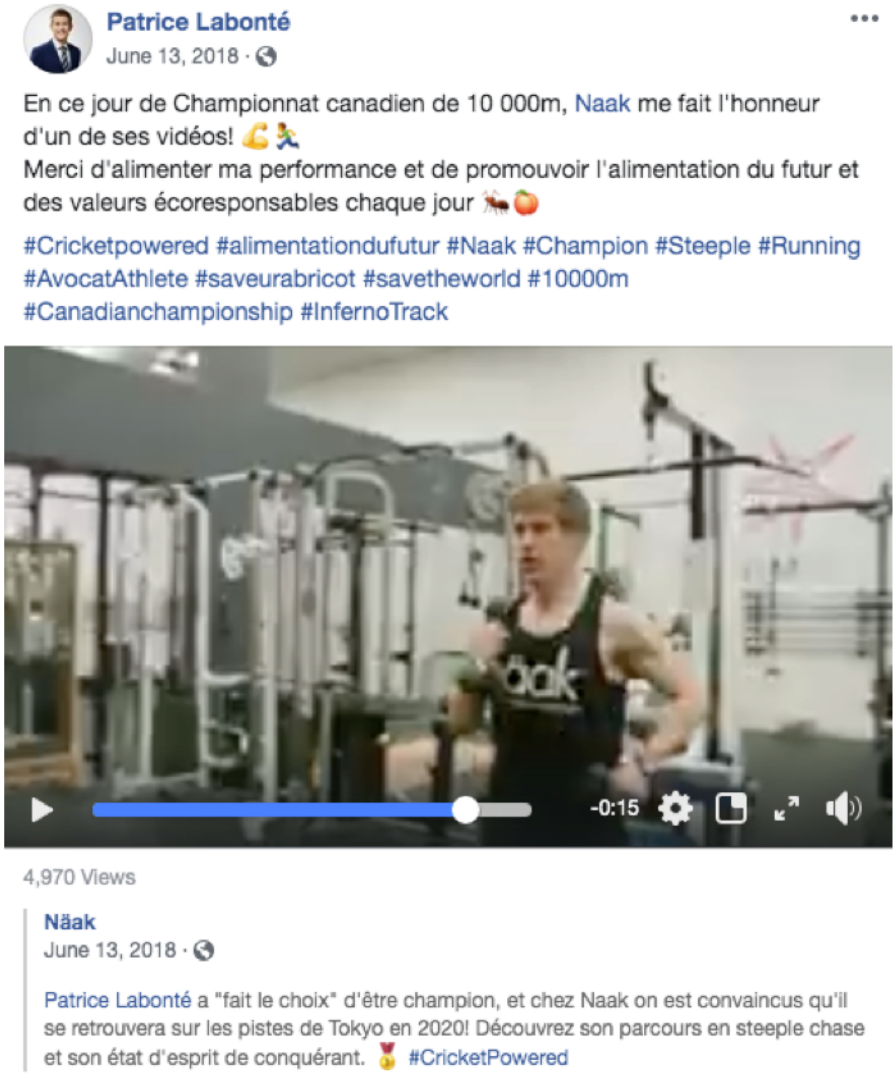
7.4.1 Non-inclusion in the consideration set

As a new-to-the-Western-world product with no established category need, edible insects risk not being included in the initial consideration set – the various options actively considered when a consumer looks to satisfy a need, such as hunger – out of sheer lack of awareness. Let's assume the consumer has identified a problem or trigger (hunger) and is already engaged in seeking to address it. According to the traditional purchase funnel, the initial consideration set of options is whittled down, step by step, until the purchase decision is reached (possibly translating into loyalty when the trigger presents itself again). If the product – insect protein bars, for instance – is not included in the initial awareness set, there is no chance it can make its way down the funnel, through familiarity and consideration down to purchase. However, contemporary models such as the consumer decision journey posit that, while initial awareness remains important as it increases likelihood of final purchase, items are often actually *added* to the consideration set once the active evaluation comparative phase is set in motion, as consumers seek information on the available options (Court et al. 2009). This creates opportunities for lesser-known options such as edible insects to make their way into the fray, even though the consumer might not have known or thought about them initially.
Nonetheless, it must be said that this requires a very high level of involvement, atypical of the hungry consumer who simply wishes to satisfy a late-afternoon hunger pang and is unlikely to engage in a thorough evaluation of alternatives, typical of larger or more unusual purchases.

Strategically speaking, marketers must seek to enhance their influence at all touch points along the consumer decision journey. Because consumers are less likely to devote much time and energy to researching options for such low-involvement items as protein bars or other convenience items, it is crucial that marketers multiply the touch points at which consumers might hear and learn about their products in order to generate awareness and possibly interest. In this way, they maximise the chances of being included in the consideration set, especially if they are present and visible when the need is most acute – when the consumer is hungry. But they also improve the likelihood that insect products will be present all along the journey, not only for a trial closure but also as a potential repeat purchase.

Montreal-based Näak provides an interesting case study in tactics to reach consumers at multiple touch points. Their cricket meal energy bars are promoted most aggressively to a target segment comprising young, elite athletes such as triathletes and Ironmen and –women (Interview 16). As high-level triathletes themselves, the founders started with direct marketing, by spreading the word among their networks and distributing samples to fellow competitors. They then toured various events on the summer triathlon calendar, setting up booths to propose samples just as the weary and hungry athletes were looking for a quick-fix, low-fat, healthy protein snack, nudging their way into the consideration set at the exact moment when potential consumers were most likely to pay attention.
In order to increase awareness and reiterate the message to their target market outside of the "prime time" hunger zone and at other key touch points, they also took photos during races and posted them to their social media page in exchange for a 'like', thus increasing their media presence as they capitalized on the athletes' desire to obtain action shots of themselves. Later on, they created flashy videos of their brand ambassadors, clad in Näak wear and chewing on protein

bars, to strengthen their association with performance lifestyles. Note, in the image below, how the athlete is said to have "made the choice" to become a champion – a choice which no doubt included Näak protein bars. This type of engagement generated significant loyalty of the active kind, wherein loyalists not only engage in the loyalty loop but actively promote the brand (Court et al. 2009).



Steeple-chase runner Patrice Labonté has become an "active loyalist" willing to recommend the brand (https://www.facebook.com/naakteam)

In a classical conditioning scheme, Näak reinforces the association between their bars and athletic performance, increasing the likelihood of being included in the consideration set once hunger sets in again. Moreover, in engaging with their consumers in this way, they move beyond the classical "push" marketing tactics to incorporate the increasingly prevalent consumer-driven interactions, typical of the empowered-consumer marketing context. Ongoing exposure and post-consumption engagement helped maximise their influence at this often-neglected key touch point (defined, as explained above, as a node where consumers are likely to respond to marketers' influence as they ponder their purchase options).

Other touch points have been actively invested by Näak. Their use of athletic brand ambassadors – the "Näak Crew" – with a wide influence and large number of followers has helped prop up the name on podiums around the province and entice non-users to sample the bars. In the post below, by triathlete Marie-Laurence Chevalier, a sale incentive seeks to convince potential consumers at the active evaluation and moment-of-purchase stages. Note also how the use of "tu/ta", a familiar pronoun and adjective, rather than the more formal "vous/vos", fosters a sense of proximity and similarity, an invitation to join a gang of consumers/athletes in the know (though it also speaks to a typical familiar tone used on social media banter).

Post on the Näak Crew Facebook page luring in curious observers with a discount (https://www.facebook.com/naakteam)

Näak has also invested significant energy into implementing and promoting a protein bar membership that automatically renews purchase on a one-, two- or three-month basis, with a small discount, in order to bypass consumers' active evaluation phase, in which they risk being displaced by competitors. What's more, cancelling the membership, though it can be done at any time, requires actual action on the part of the subscriber, a powerful tactic that often induces inertia (and continued payment). Taking magazine subscriptions as an everyday example of what they call the "yeah, whatever" heuristic, Thaler and Sustein note that "when renewal is automatic, and when people have to make a phone call to cancel, the likelihood of renewal is much higher than it is when people have to indicate that they actually want to continue to receive the magazine" (2008, 35). Whether this happens because of lack of attention to things that happen automatically, or because the cost of switching acts as a deterrent, such behaviour favours the status quo and, of course, allows marketers to bypass the hazardous touch points in which the consumer might decide to switch brands or products – whether these are magazines or protein

bars. Näak's use of recurrent membership schemes thus capitalizes on the power of inertia to secure recurrent sales.

7.4.2 Active rejection

By far the most researched and discussed issue in bringing edible insects to Western plates is active rejection. For a number of reasons discussed in previous chapters, many consumers do not consider insects an acceptable food, thus ejecting related products from the evaluation of alternatives or active evaluation phase (if they even made it into the awareness phase in the first place). Disgust and distrust towards insects is a widespread phenomenon, as is considering them as general household and agricultural pests and nuisances. Guidelines such as the FDA's that explicitly limit the number of insect part "contaminants" that can legally be contained in various foods (US Food and Drug Administration 2018) strengthen this view, making insects incompatible with the notion of acceptable food. Even among those who agree to try insect foods in a controlled setting, adoption is far from guaranteed, regardless of sensory appreciation (Tan et al., 2016); the common rational-based approach that extolls the purported benefits of insects, mainly their nutritional qualities and limited environmental impact, also shows limited effectiveness (Deroy et al., 2015). As Tan et al. demonstrate, "despite an awareness of benefits, […] deeply entrenched attitudes, food-related concerns, and socio-cultural norms still stand in the way of [their] acceptance as food" (2016: 293). They consider the triad of sensory-affective motivations, ideational notions and safety concerns as pillars of food acceptance or rejection; since the relative importance of each factor depends on familiarity and cultural context, the scale is simply not yet tweaked in favour of insects.

Marketers must then strategically aim to increase positive observability and exposure to normalize insects as a food. Indeed, lack of observability in the public sphere – wherein a product, for instance, can be commonly seen, consumed, or used – impedes the development of novel or unfamiliar food practices such as entomophagy. In the case of a food as uncommon as insects, an unusual level of involvement and motivation is required from early adopters to seek out information, process it, and make the leap. Of course, the prospective market size is bound to shrink as the level of necessary involvement rises. Not everyone wants to or can afford to investigate in depth even the most mundane impulse buy such as protein bar. From a broad cluster of quick-fix hunger solution seekers, the target segment is thus whittled down to highly engaged and neophilic food enthusiasts, at least at first. There are thus far fewer consumers who can be observed engaging in insect consumption in the ordinary consumer's peer group. If marketers successfully mobilize all available communication channels to provide information and foster interest, it is reasonable to expect that repeat exposure and increasing familiarity with edible insects might decrease the level of involvement required to sample and adopt such products, paving the way for increased acceptance among less involved consumers. Indeed, a higher familiarity with an unusual food is correlated with more positive evaluations, both in expected sensory liking and in evaluations of food appropriateness (Tan et al. 2016).

a. Endorsement by public figures and influencers

One tactical approach to increase observability is to promote insect products to influential consumer segments with high aspirational value, such as influencers, well-known individuals, or well-regarded public figures. In the case of companies such as Näak, high-level and high-profile athletes are used as a gateway to involve more cautious consumers who hope to enhance their own athletic performance by adopting similar lifestyles (Interview 16). The athletes part of their Näak Crew, a crowd of active loyalists, are present on social media that caters both to laypeople, such as Facebook or Twitter, and specialized crowds, such as Strava or other athlete-oriented groups. Thus they are able to reach a vast and diverse crowd of potential consumers sensitive to their aspirational impact, in both homophilous (peer) and heterophilous (non-peer) segments.

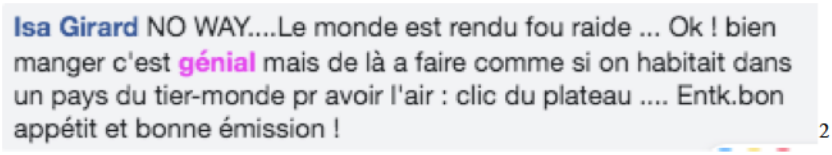
Celebrity consumption also dramatically increases reach and visibility. When Salma Hayek posted a video of herself eating Mexican *chapulines* on Instagram, it generated 12 960 likes and 5 182 comments (salmahayek 2015). Justin Timberlake's bug buffet, catered by the Noma restaurant team for the launch of his *Man of the Woods* album in early 2018, made headlines around the world (Nevins 2018) in a successful exposure tactic for the insect-promoting restaurant. Nicole Kidman's appearance on Vanity Fair's Secret Talent Theater, during which she ate a four-course meal of hornworms, mealworms, crickets and grasshoppers (Vanity Fair Video 2018), was heralded by some as "progress" (Heller 2018), "riveting" (Lang 2018), and "extremely elegant" (Lindsay 2018), in stark contrast to the more traditional portrayals of entomophagy-for-shock value in Western popular media such as *Survivor* or *I'm a Celebrity Get Me Out of Here*, as exemplified in Chapter 4. Interestingly, Kidman acknowledges this lineage as she bluntly states, "I'm telling you, I'd win *Survivor*" (Vanity Fair Video 2018).

In 2019, a particular popular culture milestone was reached in Québec when cricket powder made its way into the kitchen of the province's best-known TV chef, Ricardo ("Pain aux bananes ultra moelleux (avec poudre de grillon)" 2019). The ingredient was introduced on the air by nutritionist Bernard Lavallée, a well-known figure who writes about nutrition in a number of media outlets under the name "Le Nutritioniste Urbain" (Lavallée 2019). In the episode, Lavallée, who has long advocated for insects as an occasional, sustainable protein source, explicitly states that if someone can make Quebecers eat insects, it must be Ricardo. The host initially looks uneasy, scratching his head as he reveals the controversial ingredient, no doubt mindful of his target audience's probable hesitations.

Ricardo (right) and Bernard Lavallée preparing cricket banana bread ("Pain aux bananes ultra moelleux (avec poudre de grillon)" 2019)

Arguments of sustainability and resource scarcity in the context of a growing population are invoked, as is insects' nutritional value. Ricardo later justifies the inclusion by stating that, year after year, he observes a marked increase in audience requests for alternative protein sources – but not to the detriment of taste, pleasure, and "fun". He announces, looking earnestly at the camera, that to convince viewers, he's going to include ground crickets in a familiar dessert, a moist banana bread – "one that you probably already know", "possibly the most beloved on our website" (my translation) ("Pain aux bananes ultra moelleux (avec poudre de grillon)" 2019, 2:50). Lavallée explains Quebecers' reluctance to consume insects in terms of categorization, asserting that we don't include bugs in the food category but instead in that of nuisances, "bibittes", and Raid – the popular insecticide – reactivating the popular pest and eradication tropes. But he claims cultural associations can evolve, naming tofu, sushi and lobster as examples of advancements in acceptability, from the margins to the mainstream.

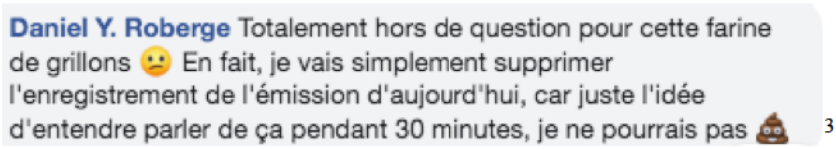
For the companies that were showcased in the episode – namely Näak, uKa Protéine, La Mexicoise, Crickstart, and Loblaw's (under their President's Choice label), this was undeniably a fruitful exercise in both product visibility and brand awareness. The episode no doubt increased the wide audience's familiarity with insects as food, though it was met with mixed reviews. Many proponents, with or without commercial interests in insects, strove to increase the positive impact by sharing the video and posting enthusiastic comments to counteract the pushback, which was also strong. On Ricardo Cuisine's Facebook page, which is "liked" by more than 442 000 fans, many viewers loved the idea, while others were appalled that their beloved chef would sully his kitchen with pests, as highlighted in a selection of comments below (Ricardo Cuisine 2019).



[2]

Ricardo Cuisine, Jan. 28, 2019. https://bit.ly/3hbj5M2

The reference to otherness is here used in a derogatory manner, casting insects as "Third-World" foods while simultaneously castigating them as a highbrow type of conspicuous consumption.



[3]

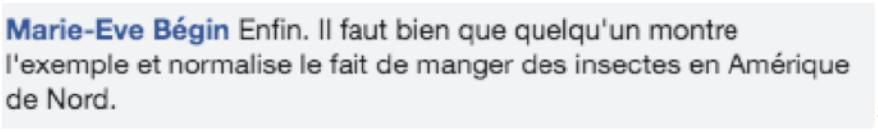
Ricardo Cuisine, Jan. 28, 2019. https://bit.ly/3hbj5M2

This devotee is so repulsed by the mere thought of consuming insects that he retaliates by deleting his usual daily recording of the show, publicly announcing the expression of his discontent through shunning and avoidance (as well as a choice defecation emoji).

[4]

Ricardo Cuisine, Jan. 28, 2019. https://bit.ly/3hbj5M2

Notwithstanding the revulsion she feels, this poster fears that eating bugs will become a necessity in time, feeding into the scarcity narrative outlined in Chapter 5.
Some were more enthusiastic:



[5]

Ricardo Cuisine, Jan. 28, 2019. https://bit.ly/3hbj5M2

[2] "NO WAY….. The world has gone totally mad… Ok! Eating well is great but eating as if we were in the third world just to look like the "clic [sic] du Plateau" [a derogatory term for people from one of Montreal's trendy neighbourhoods]… Anyway! Bon appétit and have a good show!"
[3] "Absolutely out of question for this cricket flour… I'm actually going to delete the recording of this episode because I can't bear the idea of hearing about it for 30 minutes."
[4] "Me too… I'm totally disgusted… but I'm afraid we're going to have to accept the idea… insects are the future of food."
[5] "Finally. Someone has to serve as an example to normalize the consumption of insects in North America."

Marie-Noël Denis Excellente initiative ! Je vais essayer votre recette. C'est des gens comme vous qui petits à petits vont faire changer les mentalités. Je suis persuadée que d'ici quelques années les gens se rendront compte que manger des insectes n'est pas dégoûtant (surtout quand ils sont sous forme de farine !). Allez ! Un peu d'ouverture sur le monde. [6]

Ricardo Cuisine, Jan. 28, 2019. https://bit.ly/3hbj5M2

Elevage Vermeil Bravo à toute l'équipe d'avoir osé les insectes! Plusieurs élevages d'insectes sont en train de se développer au Québec, et c'est grâce à des initiatives comme la vôtre que nous allons faire découvrir nos produits! Les insectes sont des bons aliments, santé, écologiques et aussi bon au goût! Même s'ils provoquent le dédain de certaines personnes, les gens vont commencé à en intégrer de plus en plus dans leur alimentation. Bravo encore et j'ai hâte de voir vos autres recettes! Pourquoi pas des ténébrions la prochaine fois? [7]

Ricardo Cuisine, Jan. 28, 2019. https://bit.ly/3hbj5M2

These comments highlight the normalization potential when influencial public figures use and consume a novel product, serving as "examples". The second commenter explicitly relates this observability to increased acceptability over time. The third, a mealworm producer who grows the insects on her family's duck farm, recaps the arguments most typically used to promote bugs, namely health, sustainability, and taste.

Marie-Josée St-Pierre Y'a 25 ans quand nous parlions de cuisiner du végé pâté, nous passions pour des "urluberlus" d'ici 2-3 ans on va utiliser cette farine spontanément! [8]

Ricardo Cuisine, Jan. 28, 2019. https://bit.ly/3hbj5M2

Somewhat like Lavallée, this poster compares the possible acceptance of insects over time to that of vegetable pâté, a novel product a few decades ago (though, I would argue, one with less of a shock value, due to the previous familiarity of its ingredients).
These examples demonstrate the powerful effect of increased observability – though all may not be convinced or won over, the overall increased reach generates much more widespread familiarity, among viewers and among their peer groups if the topic is brought up. In fact, the Ricardo Media team confirmed to me that they had indeed received a few negative comments, but that the unfamiliar addition was mainly welcomed by devoted viewers who took the time to

[6] "Excellent initiative ! I'm going to try your recipe. It's people like you who are going to change mentalities, step by step. I'm convinced that within a few years people will realize that eating insects is not disgusting (especially as flour !). Come on ! Be a little open-minded."
[7] "Congratulations to all the team for daring to serve insects! Many insect farms are developing throughout Québec, and it's through endeavours such as yours that we're going to be able to promote our products. Insects are a good food, healthy, sustainable, and good tasting! Even if they provoke some disgust, people are going to start integrating them more and more into their diets. Congratulations again and I'm looking forward to seeing more recipes! Why not mealworms next time?"
[8] "25 years ago, when we talked of preparing vegetable pâté, we were considered crazy 2-3 years from now we'll use this flour without a second thought!"

share their opinion about their beloved chef's endorsement (Ricardo Media 2019). Marketers and proponents, such as Lavallée and the brands showcased in this episode, should then actively pursue opportunities to enhance visibility in a positive, popular context to overcome active rejection, using well-regarded public figures as endorsers and influencers.

b. Direct and indirect engagement and communication

The general objective of normalizing the presence of insects in the food landscape also requires putting active communication tactics in place. Some firms, for example, have developed packaging and design that provides adequate category cues to include their products in ordinary categories (without obscuring the fact that they contain insects, which would likely lead to consumers feeling mislead or even duped). This effort at advantageous categorization can also take the form of inclusion in familiar rituals and well-loved consumption practices to promote observability among a peer group.

Montréal-based Näak has adopted packaging in almost every way reminiscent of classic energy bars. Its online retail store, through which most sales are made, emphasizes the same type of information as more standard products, those judged significant to its target segment, namely athletes: nutritional values such as protein, vitamin and mineral, calorie and carbohydrate content.

Cricket energy bars for sale on Näak's website, https://fr.naakbar.ca/collections/energy-bars/products/choco-orange-box-of-12

The inclusion of crickets is mentioned, though not overstressed as a sole point-of-differentiation, but rather as an integral part of a set of enviable features which includes natural sweeteners and makes vague claims about sustainability.

Cricket energy bars for sale on Näak's website, https://fr.naakbar.ca/collections/energy-bars/products/choco-orange-box-of-12

In this case, the packaging clearly reveals the product's ingredients and recognizes the importance of providing additional information on what is likely an unfamiliar inclusion to most consumers. But it largely focuses on the overall benefits – health and nutrition and, to a lesser degree, environmental claims – to promote its content. In doing this, it looks to enhance the normalization of powdered cricket, as an additional component of an athlete's diet, rather than an unusual or shocking ingredient in its own right.

Mélio, currently the only Québec company to market pasta containing insects, also employs sober packaging similar to that of regular pasta, which allows consumers to see the product through the transparent window. The presence of crickets is revealed implicitly through artwork, and explicitly (though subtly) in the green background, and more visibly in the product description, though it comes after the more familiar ingredients durum wheat semolina and yellow peas. Here again, additional information on cricket powder is provided to satisfy consumers' curiosity (or assuage their fears), but it is relegated to the side rather than the front-of-packaging, diminishing its purported importance and enhancing its normalization. Instead, the front-of-packaging boasts a very high protein content (a large part of which is likely attributable to the pea content, which also helps keep costs down – a 170g package of this pasta already costs an impressive 7$ or so). The benefits listed on the website do not even mention insects. They are thus included in a very mundane food, one that is often associated with both generous family meals and simple weeknight quick-fixes. Thanks to the familiarity of pasta, the uses and appropriate contexts are well known and do not even need to be explicitly suggested, a promising approach that can help consumers anchor their sensory and usage expectations when faced with a highly unfamiliar product (Gallen, Pantin-Sohier, and Peyrat-Guillard 2019).

Cricket-powder spaghetti (left) and information about benefits (right) (meliofoods.com)

In France, where the types of product and market are more diversified, French business Micronutris packaged its earlier versions of insect *sablés* in transparent bags very similar to those that might contain regular shortbreads, allowing the consumer to clearly see the product and allay any fears about apparent insects. It also explicitly suggested how to use the product ("Idéal pour l'apéritif", "Idéal pour le goûter ou pour accompagner votre café"). Such nudges imply normalization and integration into pre-existing daily rituals, thus increasing ease of use and familiarity by association through a conditioning scheme.

Left: the insect version (micronutris.com); right, a more regular cookie (patisseriebretonne.fr)

This type of product and packaging makes it easy for enthusiasts to introduce insects to friends and family – close, homophilous social groups with a major impact potential on perceived edibility (Shelomi 2015; Gallen, Pantin-Sohier, and Peyrat-Guillard 2019).

Another French firm, Jimini's, adopts a similar tactic. Their branding and packaging, which includes a tasting pack with different flavours, humorous stickers and badges, positions their whole spiced insects as an entertaining food with high trialability, perfect for "[a]pporte[r] une touche de fun et d'originalité à vos soirées entre amis" (Jimini's n.d.). They also organized the *Apéro Jimini's*, monthly events held in various Paris districts where enthusiasts could congregate for a drink and tempt neophyte friends to try (or at least be exposed to) insects, as the co-founder of the enterprise Bastien Rabastens explained to me (Interview 14). Such events are successful because of the "hot", tempting state in which they place participants (Thaler and Sunstein, 2008: 42). You might not try Moroccan-spiced crickets alone at home, but when potentially pressuring peers are gobbling them down, you've had a few cocktails, and with no dinner in sight, you might more or less mindlessly lower your guard – and then all bets are off.

The overall consumer reach of direct, interpersonal channel schemes such as *Apéros* or friends bringing *sablés* or a tasting pack to share over a drink may be narrower than more blanket approaches, but their impact on acceptability among participants is greater than that of impersonal appeals in the realm of edible insect acceptability (Pitt and Shockley, 2014). The integration of insects into daily activities such as post-workout recuperation or into well-loved, culturally appropriate social rituals and culinary interactions such as the convivial pasta dish, the *apéritif*, or the *goûter* increases their compatibility with pre-existing behaviours and the conceptualization of them as appropriate foods (Bom Frøst 2017). Moreover, the format and nature of products such as protein bars, pasta, cookies, and *sablés* increase trialability and may help mitigate or overcome initial neophobia, as the insects are invisible (Hartmann and Siegrist,

2016) and it is possible to try a small, non-threatening piece that presents striking multisensory similarities to already-known products.

7.4.3 Low availability

Shelomi (2015) identifies limited availability as one of the major challenges for the edible insect industry. If the consumer has held on to the insect option throughout the stages of the decision-making process, as part of either the traditional model or the updated journey, and chooses to purchase it, an absolutely critical issue arises: where can it be found? As of today, insect products are usually absent from mainstream, large-scale Canadian, and even North American, retail stores, with the notable exception of the powdered crickets that made their way into Loblaws' in 2018. Some enthusiasts find them in pet or bait shops, along with real or perceived health and sanitation threats; they sometimes turn to specialty or Asian or Latin American stores, or more frequently to the Internet, all of which imply a more or less significant loss of convenience as a special trip or a shipping delay is involved. This considerably increases the complexity of use and can certainly drive away even convinced, but time-constrained, consumers. Beyond the purchase, low or inconsistent availability also obviously impedes the development of either active or passive loyalty, as does the limited variety of insects on the market (almost exclusively mealworms and crickets) and the uneven quality of transformed products. Shelomi (2015) raises the issue of "passive rejection". Contrary to active rejection, which is already extensively damaging to entomophagy's potential success, what he qualifies as "passive rejection" arises when early adopters are ready to accept insects, for instance after having tried them at an outreach event, but are unable to find a reliable and convenient source. This significantly harms durable adoption. Marketers must actively invest in strategically developing and maintaining convenient, accessible and varied distribution channels to allow consumers to easily purchase their products once they have reached the moment of purchase.

In terms of appropriate tactics to increase access, many large retail chains may still be out of reach for the moment, both because they might not be ready to introduce such polarizing items into their product mix and because slotting fees would still be prohibitive for most small-scale businesses (Sechler 2019). Consequently, online channels such as web-based stores must provide efficient, easy-to-use platforms and fast, affordable shipping. Steps should be taken to improve search engine optimization, traffic and engagement with the website and related social media. Online grocers could also be investigated in countries such as the US where they are gaining popularity. More importantly, alternative retail channels should be aggressively targeted: local markets and buying clubs, university campus cafés, smaller and/or independent retailers and specialty stores, etc. Depending on the product, joint merchandising should be explored: selling baked insect goods in high-end, independent coffee shops; offering *apéritif* crackers with the purchase of a specific brand of craft beer; adding whole spiced bugs to the snack menu in local bars, and so on. Non-food retail channels should also be explored: Jimini's, for instance, have sold their bugs in the French outdoors retail chain *Nature et Découvertes*, thus associating them to the adventurous, natural and active lifestyle the brand promotes. In the same way, Montreal-based uKa Protéine managed to place some of their energy bars in the outdoors retail stores *La Cordée,* and Näak bars are found in a vast number of biking shops across the province, sitting next to the cash register to increase the probability of an impulse purchase. In a word: make insects as easy to find and as hassle-free an option as possible. Finding original and low-cost

ways to distribute insect foods could provide trial incentive – trying a fried grasshopper in a bar with friends, once emboldened by a few beers, or buying a bar before setting out on a long bike ride – and ease out the availability bottleneck, with the added benefits of increasing familiarity and exposure, paving the way for greater acceptance.

Another strategic approach entails aggressively pursuing research and development opportunities. This would allow firms to adopt more advanced technological means to streamline production and improve the offer to stimulate demand. Tactically speaking, this likely requires a trans-organizational approach that reaches beyond each firms' individual competitive interests. In addition to developing his own company, Jérôme Fortin-Légaré has attempted to organize the industry, deliver a coherent and consistent message, and present a united front to encourage innovation funding (Interview 13). As the founder of the Fédération des Producteurs d'Insectes Comestibles du Québec (FPICQ), he has invested considerable time and energy to place the standardisation of facts and figures and the transparency of practices at the forefront of the industry's challenges and responsibilities. Public education about the benefits of insects are thus among the chief preoccupations of the new organization. But the driving idea behind the FPICQ's inception, in 2018, was to create cohesion within the industry to promote larger-scale research opportunities and collective projects, and to present a integrated front and communications delegates to regulatory agencies such as the MAPAQ. It also aimed to develop a "best-practices" rulebook for newcomers to the industry in the hopes of guiding them, minimizing turnover, and avoiding missteps that could plague the entire industry, such as conflicting messages, or worse, permanently damaging safety and sanitation scandals. In a field whose growth is held back by questions of safety and cleanliness because of the nature of the product it looks to sell, such an event could have dramatic and far-reaching consequences.
At the time of our interview on March 21, 2019 (Interview 13), the FPICQ counted 39 members among its ranks, most of them very small players and agricultural producers who were looking to diversify their commercial activities. Apart from two initial meetings and some limited constitutive undertakings such as member surveys, however, the association's activities had remained limited and progress had been nearly nonexistent, due in part to Fortin-Légaré lack of personal time to invest in the organisation processes and to the entrepreneurs' hesitancies in sharing their practices. In fact, somewhat like in the case of the North American Coalition for Insect Agriculture, the initial dynamism and enthusiasm seemed to have slightly fizzled in the face of structural, organizational and operative challenges. Any actual successes had yet to materialize, highlighting the concrete difficulties in uniting disparate and emerging players under a single representational front.

7.5 Normalization: from trial to repeat purchase

Awareness of and interest in edible insects has grown significantly over the past few years, possibly as a result of increased exposure and of their positioning as an (purportedly) easily implementable answer to many contemporary issues such as resource management and lower environmental footprints (Hartmann and Siegrist 2016; Schouteten et al. 2016). More and more people have had the opportunity to try edible insects, especially in affluent, educated segments of North American and European populations. Trial, however, does not necessarily translate into repeat behaviour; while many researchers investigate "intention to purchase" insect products, little is known for the moment as to how that translates into actual sales (although, as Thaler and Sunstein point out, even just asking about intention to purchase can have a performative outcome, a nudge they call the "mere-measurement effect" (2008, 70)). Moreover, there remain considerable cultural and technical barriers to the more durable adoption of insects, and outright rejection is still prevalent among the general population.

As a whole, insufficient normalization hinders a broader cultural acceptance of edible insects (Hartmann et al., 2016). While they may be increasingly acceptable for trial in outreach events or special settings, insects are still not generally considered a suitable staple by the vast majority of the Western population. Improved observability and greater familiarity have an important role to play in enhancing such products' acceptability, as I've demonstrated. But as I explain in the coming section, questions of usability need to be addressed, wherein firms need to clarify how to use and consume their novel product. I then borrow Bolthouse CEO Jeffrey Dunn's Three A's approach, namely accessibility, availability, and affordability, to suggest some pathways to enhance normalization and move beyond trial onto repeat purchase. Finally, as a word of caution, I highlight some of the pitfalls that can hamper normalization, such as relying on shock value to promote bugs and the thorny issue of nomenclature.

7.5.1 Issues of usability

Research demonstrates that consumers tend to prefer when insect-enhanced products conform according to product category standards, tasting as similar as possible to the original products consumers are familiar with (Tan, Verbaan, and Stieger 2017) – meatballs should taste like meatballs, energy bars like energy bars. This may be due to the strong emphasis that has so far been placed on functional benefits rather than sensory properties. But it might also be because more cautious consumers tend to like what they know, and are reluctant to incorporate more than minute neophilic changes in their mostly neophobic habits.
Discussions with more neophilic and adventurous consumers, however, suggest that shifting the focus to include insects' unique sensory profiles and to design recipes that complement and enhance these profiles could yield promising future results – as long as these culinary innovations are developed with acceptability in mind. Many participants in my research indicated that lack of knowledge about appropriate or ideal use was a barrier to adoption, and others indicated a higher willingness to try or adopt them if they knew of recipes that were tailored to insects, instead of familiar preparations that simply used them as a garnish or replacement. For instance, Simon Martin (Interview 10) expressed disappointment towards the commercial insect products he had previously tried, explaining that these sensory discontents hindered his willingness to consume them in the future or add them to his diet. However, he was open to changing his mind if a

marketing effort was made to both diversify the types of available products, moving away from the sole dried or powdered crickets and mealworms towards potentially tastier or more exciting species, and to design a purchasing and consumption experience that would entice diners to try specific ways of preparing insects that were "uniquely suited" to bugs or "only realizable with them". A distinctive and discernable taste profile was thus seen as a motivating factor. In Isabelle Morin and Martin Chayer's case (Interviews 3 and 8), the perceived complexity of insects' use a food was manifested on two levels. In the case of wild insects, the usability level was perceived as very low as long as they did not acquire information directly from a knowledgeable and trustworthy source such as Étienne Normandin, the entomologist leading the wild harvesting workshop at Gourmet Sauvage. Lacking confidence in their own knowledge of insects, they were wary of trying any type of wild bug. In the case of farmed insects, sold in retail outlets and thus pre-established as safe for consumption, the complexity was of another nature. This time, it was knowing what to actually do with the food that was a challenge: how to cook insects, to integrate them to recipes, to prepare them so that their kids, and other potential publics, would find them acceptable. To mitigate this, they consulted relevant Facebook groups and added them to well-known favourites such as tacos, but they expressed a desire to find more ways to integrate them to their regular meal rotation, and suggested retailers consider adjoining recipe booklets to their products.

Such barriers to trial, or even adoption, should remind advocates of the importance of providing adequate contextual cues when framing the suggested consumption of their insect products. One tactic is to provide suggestions to integrate an unfamiliar product into familiar rituals; firms such as Micronutris and Jimini's have done this with the aperitif, as outlined above. In a more tailored approach to increase perceived usability, Näak includes suggestions to seamlessly integrate their bars into the target segment's ordinary routine, further highlighting their normalization objective by inserting the product into daily rituals such as physical effort and post-activity restoration. Such an approach suggests that, in fact, adopting insects does not require overwhelming lifestyle changes or even strong motivation to transform culinary habits and overcome reluctances. A simple trick of brand switching magic can allow one to profit from insects' purported environmental and health benefits, without any further trouble or adjustment.

Suggested uses for cricket energy bars on Näak's website, https://fr.naakbar.ca/collections/energy-bars/products/choco-orange-box-of-12

For other brands, which propose different products and cater to different target segments, this can also mean proposing recipes that present insects as traditionally prepared and culturally appropriate foods. Emilio Hernandez, a Montrealer of Mexican origin behind *La Mexicoise* brand, sells some traditional insects featuring Mexican-inspired flavourings, such as chipotle or lime *chapulines* (local grasshoppers from the Oaxaca region, in southern Mexico). Such insects are presented as part and parcel of a foreign culinary repertoire, with the implication that sampling them provides a culturally appropriate foray into another culture. Other Mexicoise products are instead adapted to local Québec traditions, such as maple-flavoured Canadian-grown crickets and mealworms, thus tapping into a more familiar sensory repertoire.
Moreover, many of the recipes Hernandez proposes on his website or social media feeds incorporate bugs to familiar everyday meals such as pancakes, and integrate them into known events and rituals like Mothers' Day (see image below) or the weeknight rush family dinner. Again, such contextual cues suggest ways to introduce small, not-too-challenging changes into a well-known routine.

"You can suprise mom with a special breakfast". La Mexicoise. Screen capture from Facebook.com. May 2, 2019, https://bit.ly/39gDrjY

Hernandez thus capitalizes on two forms of contextual appropriateness, one pointing towards the traditional or even the "exotic" origins of edible bugs, and another using the more widespread strategy of banking on the perceived "safety" of culinary familiarity to introduce novel products. Such an approach provides wide berth to increasing normalization.

7.5.2 Three A's to consider?

Although the cultural landscape is evolving, with more food enthusiasts willing to try insects, other barriers prevent even the converted from durably integrating them to their diets. In his quest to make cut carrots cool, Bolthouse CEO Jeffrey Dunn (2015) details the company's three-pronged strategy, which he labels "The Three A's": *Accessibility*, or making carrots desirable through appropriate advertising, market research and product development; *Availability*, or making carrots easy to find; and *Affordability*, in order to compete with rock-bottom prices of the junk food competitors. The insect industry should consider drawing inspiration from such a framework.

Accessibility is being addressed more or less adroitly by many firms as they promote their offerings and try to boost desirability. Yet I believe there remains a dire lack of critical engagement with the ubiquitous discourse of environmental protection and nutritional benefits, replete with conflicting and often unfounded statistics and doubtful health claims. For instance, now-defunct Austin-based Crickers, who made cricket crackers, stated in 2016 on their webpage that raising one kilo of crickets required one liter of water (and, on the same page, that one pound required… one gallon, as well as a woefully vague 'one bag of feed'), whereas the same amount of beef purportedly required 22 000 liters – a whopping 22 000 times more (Crickers 2016).

Meanwhile, the most credible numbers, published by the FAO, are closer to a 1:20 ratio (Van Huis, Van Itterbeeck, et al. 2013).

In other cases, products are either of such minimal functional value, such as Critter Bitter's cricket-infused cocktail bitters, or contain so little insect material that their actual impact is bound to be insignificant, yet the very same environmental-health discursive scheme is used to promote their offerings. For instance, though it quaintly acknowledges that "Cocktails won't save the world", Critter Bitters still opens its selling pitch with the all-encompassing claim that "[i]nsects are the first viable solution to the world's food shortage" (Critter Bitters n.d.). In many instances, it is simply the poor quality of products that rapidly disqualifies them for adoption. In Belgium, researchers found that commercially-available insects burgers scored *higher ratings on expected liking* than when participants actually tasted the product, an absolutely stunning finding they attributed to the increased familiarity and acceptance of insects food, on one hand, and the disappointing quality of available products on the other (Schouteten et al. 2016). Such offerings thus seem to ride the wave of insect-eating trendiness, relying more on curiosity, conspicuous consumption social status needs, and the personal appeal of their picturesque hip, Instagrammable founders (in the case of Critter Bitters), than on actual product benefits. While such a strategy may yield short-term results in the initial inquisitive phase, there is little chance that they will make it to the adoption stage if they do not deliver promised benefits – especially since environmental and health gains usually score low on observability (Shelomi 2015), thus leaving only blind faith and expected tangible benefits to justify the premium pricing. In any case, the effectiveness of rational-based approaches to decision-making in food is far from being well established, to state things mildly (Fenko et al., 2016; Kim et al., 2009; Schulte-Mecklenbeck et al., 2013; Tan et al., 2016).

Other firms, however, focus much more skilfully on functional benefits and product development, another crucial part of Dunn's *Accessibility* concept. Toronto-based C-Fu Foods, for instance, turns insects into tofu-like blocks that can be used much like the now-mainstream soy-based meat replacement. Its can be crumbled like tofu or feta and seared in the pan, in which case it browns like meat; its flavour is bland and accommodates various seasonings, making it a versatile and non-intimidating product that delivers clear, immediately perceptible functional benefits against a backdrop of more distant environmental and health benefits. Many firms also leverage current food trends, using ingredients that are organic, 'natural', gluten-free, paleo-friendly, and so on – capitalizing on real or perceived consumer anxieties while minimizing the risk of being excluded from an assertively parametered choice set. In a word, experience with a product as unusual as insect foods must be extremely satisfying if it is to move beyond simple trial to more durable adoption. Indeed, as Tan et al. (2016) proposed various burgers to participants, labeled as containing novel ingredients (lamb brain, mealworms, frog meat[9]), they found that although perceived food appropriateness, and not sensory liking, was the main driver of expressed willingness to have the burgers again, trial was also a crucial moment: while an extremely satisfying sensory appreciation might enhance the desire to reiterate consumption, a disappointing experience was as likely to reinforce initial negativity and foster a permanent resistance to the food. They point out that "the low willingness to eat the burgers again could be partly due to the abundance of other sources of more familiar and enjoyable foods, where participants may not perceive the necessity to consume such foods in current times, apart from

[9] In fact, they did not, and the meat was adulterated with breadcrumbs, tofu and hazelnuts.

satisfying their curiosity" (Tan et al. 2016, 300). In other words, to break through the clutter of offerings, your insect product had better be nothing short of outstanding. Indeed, as a general rule, once engaged in the postpurchase experience of the decision journey, the consumer must be satisfied enough, and ideally even delighted, to consider bypassing the initial consideration and active evaluation phases and engage in the loyalty loop once the need presents itself again. Actively collecting feedback and providing after-sale support – such as online recipes, as many of my respondents wished for, social media interaction with users, coupons for repeat purchase, etc. – could help turn prospective faithful consumers into active loyalists, likely to promote the brand and display greater commitment than the more common passive loyalists, more prone to switching when the opportunity arises (Court et al. 2009).
Of course, in products such as low-involvement convenience foods, the need for variety, rather than dissatisfaction, can induce brand-switching. Thus well-established firms should ensure they remain a strong part of the consideration set and extend product lines or propose related offerings to satisfy the desire for change.

Availability, as I've already underlined, remains one of the central problems in the adoption of insects as food. Supply chain issues must be addressed to provide safe, reliable and reasonably priced insects for direct sale to consumers and transformation by intermediaries. As of today, only one Canadian farm – Entomo, in Norwood, Ontario – raises and sells insects on a considerable scale, with a few competitors in the US and a handful of emerging small farms in Quebec. Not only does this hamper diversity, as the insects grown by these farms are mostly the same species of crickets and mealworms, but it also weakens supply chain stability. For instance, Ohio-based Big Cricket Farms, one of the very rare growers, lost the entirety of its production in 2014 due to Youngstown's water poisoning scandal and a devastating epidemic cricket disease in quick succession, wiping out many developing partnerships and forcing buyers to completely revise their supply chain – a major issue when the handful of suppliers already struggle to meet the strong demand. On the other end, as I've underlined earlier, distribution and placement remain a concern, as many enthusiasts experience difficulty simply finding the products they wish to try and perhaps even adopt. Multiplying distribution channels is thus crucial to fostering greater adoption, in order to at least allow for the inclusion of insect foods in the consideration set – by increasing their presence in a variety of retail environments, for instance.

Finally, *affordability* – or, rather, lack thereof – remains a major threat to adoption. Though I did not include it in the Chapter 4 section on risk typology, economic risk was a category outlined by many of my participants, and is far from being irrelevant when considering barriers to adoption. The possibility of wasting precious food dollars on an unknown product that might taste bad, not deliver expected benefits, or not be willingly accepted by family members can prove a daunting one for uncertain consumers. Moreover, in the case of insects, which are in the general environment usually considered too abundant and hard to get rid of, price point expectations are very low, as most people (erroneously) expect them to be easily and cheaply raised. Their premium pricing thus comes as a both an absolute and a relative shock – why pay so much, and why earmark these funds for something I might not like rather than for something I know I will? Derived products such as crackers, which may contain negligible and thus affordable amounts of insects, can arguably stand their ground in the 'premium convenience' category along with artisanal and organic counterparts. Whole or ground insects, however, at their initial price point of 40-50$ a pound, definitely qualify as a luxury protein, a fact that is not reflected in their habitual (and disserving, as I've demonstrated) comparison to ordinary meat.

Some participants underlined the price of insects as a turn-off to buying them, including Anjali Wildgen (Interview 1), who was otherwise enthusiastic about integrating them to her diet but decided against buying a 100g bag of cricket powder for over 13$ in her local supermarket. Another enthusiast, Lucie Bednarova (Interview 6), indicated she would like to buy insects products more often and to try different ones, were they not so expensive, and hoped that prices would soon drop as the offer became more plentiful. While in both of these cases the participants were already very receptive, even enthusiastic, to the idea of consuming insects, their hesitations suggest that economic risk is an important factor in the decision to sample, and eventually to adopt, a novel product, especially one that can elicit such negative responses as insects.

As the industry progresses, it must then research and implement means to lower operational costs and increase efficiency, and develop supply-side 'disruptive innovations' that are "paradigm-changing technologies that create new markets and value networks while replacing or displacing old ones" (Shelomi 2015). As long as affordability does not improve, durable adoption will remain low; even among the penetrated market, consumers might be able to afford insects once in a while, but not on the regular basis that commodity provisioning usually entails.

As the edible insect industry moves forward, it will thus need to ensure it maintains a consistent and unwavering normalization discourse through all communication channels, in order to enhance perceived acceptability of insects as a standard food to be included in consumers' regular purchase patterns. Yet this can only happen if kinks in the supply chain are smoothed out, allowing for the development of high-quality, persuasive products that deliver concrete benefits as well as less tangible ones and are widely distributed to increase availability and convenience. As the industry is still in its infancy, now is the time to address such issues to capitalize in a predictable and consistent way on Western consumer's developing interest in edible insects.

7.5.3 Shock value and naming issues: some communication pitfalls to avoid

As I suggested in previous sections, the acceptability of insects as a food beyond simple trial undeniably requires more widespread exposure, for instance through popular figures and the larger reach of mass media. But this cannot be pursued at just any cost.

As I and many other enthusiasts have personally experienced, entomophagy is media candy. It provides a compelling and intriguing story, replete with arresting visuals and set against a backdrop of serious, current environmental concerns; it proposes "hopping" calls-to-action in an arena usually dominated by gloomy, we're-all-doomed bylines. The potential for earned media is hence colossal and should be actively exploited to increase visibility and improve awareness. There is a genuine risk, however, that some of this exposure could be misdirected if it is conveyed through inappropriate imagery and vocabulary.

For the longest time, the most pervasive cultural landmark in entomophagy has been the insect-scoffing challenges on shows such as Fear Factor, unabashedly revolting scenes that, far from questioning Western norms about insect edibility, reinforce them with the added support of unavoidable disgust. Even the more benign wordplays, jokey tone and shocking graphic visuals typical of much media portrayal today can backfire, leading consumers to file insect consumption

under a "fun food" category whose sole worth is the defiance of social norms, rather than the "actual food" one which includes items consumed for their intrinsic value.

Of course, the novelty factor should not be discounted altogether, as it can attract some more neophilic potential consumers. Indeed, at least in the trial phase, novelty appeal plays a major role, possibly larger than the compensatory weighting of benefits. Indeed, although some research shows that neophilic consumers evaluate novel foods cognitively rather than affectively (Fenko et al., 2014) or that rational appeals are more efficient in changing negative attitudes (Greenacre et al., 2016), many authors suggest that acceptance of and satisfaction with novel or unusual foods are not predominantly anchored in rational evaluations (Deroy et al., 2015; Schouteten et al., 2016; Solér and Plazas, 2012; Tan et al., 2016). Of course, as the previous chapters demonstrate, the two approaches cannot be untangled, and neither of them can be mobilized in exclusivity to ensure widespread and durable acceptance or enhance perceived appropriateness. Thus it is crucial to develop a long-term strategy in which novelty plays only a supporting role, one that engages consumers beyond the trial phase in order to foster actual adoption.
In this context, advocates must remain especially vigilant not to fall into the 'circus-freak' trap, focusing instead on portraying insects as an additional option in today's diversified foodscapes rather than as a sole novelty item or, worse, an opportunity to show off one's bravado. Prepared snacks and insect meals and flours, even whole prepared insects, are all good candidates to demonstrate how bugs can be prepared and adapted to pre-existing frames of culinary know-how. This is central to implying a sheen of ordinariness, not only one-off satisfaction of curiosity or try-me-if-you-dare novelty. Only once a significant portion of consumers learns to perceive insects as 'just another food' among many others will they become real candidates to durable adoption. Mass media and their widespread reach can certainly help in this regard, but the message must be skilfully handled and delivered so as not to compromise the already fragile image of edible insects.

On another note regarding communication pitfalls, advocates must be mindful of the vocabulary they employ when discussing eating insects. As Nordic Food Lab researchers point out, the term "entomophagy" has, historically, largely been used by non-insect eaters to denote practices considered inappropriate in their own cultures. Thus the word has long stood as a marker of otherness, of distancing and division (Evans et al. 2017). In fact, general terms based on taxonomic distinctions are generally not used to describe culturally familiar – "normalized" – food practices. The framing of the practice by Western researchers and enthusiasts as "entomophagy", and the delineation of its edible objects as "insects" in the stricter biological sense – as members of the taxonomic class *Insecta* – or the more flexible lay category – encompassing various "bugs" such as spiders, earthworms, slugs, centipedes or woodlouse – is somewhat exceptional in this regard.

First, the taxonomic etymology and scientific ring of the term "entomophagy" do not exactly connote edibility (Looy, Dunkel, and Wood 2013). In fact, they may do just the opposite, denoting instead a set of "animal or pathological behaviours, and a correspondingly diagnostic tone" (Evans et al. 2017, 64), as do some linguistic bedfellows such as anthropophagy (eating humans), coprophagy (eating faeces), hyalophagy (eating glass) or geophagy (eating earth). In short, instead of promoting normalization, the term can make insect eaters "sound insane, animalistic or both" (Evans et al. 2017, 64).

Second, when we talk about "eating insects", we create an artificially-bound category of potential foods that may or may not overlap with personally and socio-culturally defined categories of edibility. Many people around the world willingly consume some types of creatures that have been defined as insects in our Linnean-taxonomical culture. Yet there is a great chance that they do not consider these (solely) insects, rather than parts of other lay or local classifications, or perhaps even just "edibles" (Evans et al. 2017). In much the same way, Western eaters who consume beef rarely think of themselves as mammal-eaters; rather, we discriminate between the mammals we eat and those we don't, with a clearly established classification system that organizes edible species. Pigs and deer, yes; rats and wolf, not likely. And we certainly do not have taxonomically-derived names for such practices – who here, as a non-vegan, would consider themselves a mammaliaphagist?
With the possible exception of fish, we don't think about our food in Linnean terms, and neither do insect eaters; instead, classification schemes are based on perceived edibility and sociocultural acceptance of an item as food. As one researcher from the Nordic Food Lab points out, the term "entomophagy" is never used in Mexico, where she is from, though it is by some accounts one of the countries where the largest diversity of insects is traditionally consumed, a practice that lives on and is treasured in many regions and is in strong resurgence in the cosmopolitan capital (Ramos-Elorduy 2009; Ramos‐Elorduy 1997). In fact, she says, people do not "distinguish between those who choose to eat insects and those who don't. It is considered a matter of personal preference, influenced by exposure during childhood and regional custom" (Evans et al. 2017, 61). Thus both the actual expression and the concept behind it are notably absent.

The homogenization of vibrant and variegated food practices behind a single, all-encompassing terminology hinders the process of differentiation crucial to normalization. Eating grasshoppers is not done is the same way, nor does it produce the same results, culinary or otherwise, as eating ants or palm weevil larvae. Proponents need to stress the variety and richness of the practice, rather than cover it with an othering blanket term (Deroy, Reade, and Spence 2015). With this in mind, some researchers call for a renaming of entomophagy, as well as the edible insects species themselves (Deroy, Reade and Spence 2015; Evans et al. 2015). Could rebranding crickets or cicadas as a 'land shrimp' make them more appealing? What about using *Galleria* or *chapulines*, respectively the (partial) Latin and local names of waxmoth larvae and a type of Mexican grasshopper of the *Sphenarium* genus?

As insect-eating practices develop and take hold in the Western world, perhaps it would be time to consider more appropriate – and more normalizing – nomenclature that focuses on distinct species, for instance, instead of broad taxonomic categories, much as "beef recipes" are not subsumed in an overarching category of "mammal dishes". Thus proponents need to engage in a serious reflection about how they communicate benefits and practices in order to develop a differentiated and rich approach to eating insects, more likely to integrate them into a durable culinary repertoire.

As a new and dynamic industry in Québec, the edible insect market offers plenty of opportunities for growth and innovation. In order to seize these, however, advocates and marketers must imperatively take into account specific factors affecting the industry, such as evolutions on all fronts in the broader environment, and competition, especially from indirect sources. The consumer decision journey model can help identify key strategic orientations and tactics to

promote such an unfamiliar ingredient as insects, and address some of the main barriers still standing in the way of adoption, namely lack of inclusion in the consideration set, active rejection, and low availability. Beyond these, the overall goal should be to promote the normalization of edible insects, increasing their acceptability as a food to foster durable adoption. To do so, firms must address issues of usability, showing clearly and compellingly how their products can be used and ideally seamlessly integrated into consumers' existing practices and lifestyles. The three A's of accessibility, availability and affordability can be examined as a potential approach to incorporate insects into the mainstream. However, some communication pitfalls need to be avoided, and advocates need to adopt practices that enhance normalization rather than highlight otherness, as has often been the case in the past. As the industry moves forward, it is essential that it addresses issues of nomenclature and discourse to encourage adoption of insects as part of an ordinary diet.

Conclusion

I spent the last six years reading, thinking, dreaming, and of course, eating, insects. Growing ever more attuned to their presence in my environment, to their ubiquitousness, and to the myriad ways in which they unsettle us – from wonder to disgust – I developed an intense curiosity and a profound sense of respect for these billions of tiny disregarded or unseen creatures that shape our world, often unbeknown to us. I was, myself, wholly uninterested in insects until they crawled into my own particular prism for viewing the world – that of edibility. Their potential as food provided an unexpected valuation – a limited, self-serving, and utilitarian one, no doubt, but one that served as a gateway to uncovering the multitude of ways in which insects affect us, and in which we affect them in turn.

As I dove more deeply into the world of edible insects, I became fascinated with their potential to illuminate the dynamics at play in food acceptance and the normalization of novel ingredients. Much more than most foods we in European-derived cultures once shunned and have now embraced – sushi, tofu, or many others – insects demanded a tremendous leap of faith. Not solely from inedible to edible, but from dirty, disgusting, and dangerous to edible, wholesome, and nutritious. What a journey. It required changing perceptions and ideas about bugs themselves, addressing critical sensory and emotional issues such as taste and texture but also disgust, and developing products and recipes that could appeal to potential eaters while delivering the promised benefits. Advocates hesitated – and still do – between rational arguments and sensory ones, often discounting the (lack of) appropriateness of insects as food in most European-derived cultures, reasoning that if only the information was compelling enough, or if the gustatory experience was delicious enough, adoption would follow through naturally. Yet while the edible insect market was experiencing vibrant growth, it was still having trouble converting trial into adoption, curiosity into regular practice.

To better understand the dynamics at play, I launched an interdisciplinary, multi-perspective foray into Québec's edible insects landscape. Through the triple disciplinary lens of Food Anthropology, Food Marketing, and Sensory Studies, I conducted interviews with key industry players in the production, processing, and marketing spheres, as well as with potential consumers situated all along the spectrum of interest or consumption, from the "never-evers" to the regular users. My fieldwork also included participant observation in and the organization of multiple activities around the consumption of insects, including trade fairs and industry meet-ups, restaurant work, laboratory-based research and development, and popular outreach events. A small part of these data-gathering activities took place outside of Québec, to provide some context and comparison points from similar cultural backgrounds where insects were also traditionally widely despised yet were gaining traction as a potential food, such as Europe or the United States. This allowed me to investigate the issue of food acceptance within a developmentalist framework, one that could take into account evolving conceptions of edibility in general and in the specific case of insects, and which embraced socio-historical influences, changing political and economic landscapes, and environmental imperatives that shape the evolution of food choice. Moreover, with an industry still in its infancy and experiencing rapid growth, I could not rely on the perspective afforded by the passage of time, and needed to grasp revealing moments that could render a sense of the movement, the process-in-motion, and its multiple competing and synergetic parameters.

In examining the industry in development, some questions emerged to orient my research work: What are some of the barriers preventing behavioural change? Which types of benefits are put forward by advocates to overcome these barriers and how efficient are they at promoting entomophagy? How are they striving to bridge the gap between trial and acceptance? And how are potential consumers responding to these pressures to adopt new behaviours and give insects a try? Finally, how is the industry tackling these challenges and what are some of the strategies and tactics they should be implementing? In short, my work examined how culturally-constructed negative reactions to unusual foods could change over time, and through which types of influences, in order to adopt novel foods such as insects.

Following a thematic organizational scheme structured around the recurring tropes that emerged during my fieldwork, I thus began this thesis by examining the question of edibility and its evolving nature, and of how its boundaries are established. Because of their lack of perceived appropriateness as food, insects generate anxiety and neophobia – the fear of new foods – for the majority of Western eaters unaccustomed to finding them on their plates. I therefore examined how issues of risk mitigation and trust could influence potential acceptance in the case of a food perceived as unsafe or dangerous, as is often the case with insects. I also outlined the crucial notion of categorization, a theme that would resurface throughout my research and fieldwork and that could help shape attitudes and behaviours towards unusual foods.

I then provided a socio-historical contextual background that examined a number of affects related to insects, both as potential foods and more generally as fellow-creatures. As frequent objects of disgust and extermination attempts, insects are kept just about as far away from our kitchens and plates as any potential food could be. Starting from participants' stated feelings towards bugs, I examined the different conceptualizations of disgust, the most widely expressed emotion, and its specific ramifications in the realm of food. Far from being a straightforward disliking, disgust instead hinges on ideational pivots that are shaped by socio-cultural factors and notions of purity and appropriateness. Because its association with insects is so strong, this emotion significantly complicates their acceptance as food. Relatedly, because insects are largely perceived as nuisances and pests, the idea of ingesting them is tainted with perceived physical, psychosomatic, social, and symbolic risks. Such risks are borne in differentiated ways by distinct actors, as demonstrated by the mostly WEIRD (Western, Educated, Industrialized, Rich and Democratic) proponents and industry members promoting insects in North America and Europe, who are able to minimize such risks by leveraging their position of socio-economic power. Drawing on the historic example of the vilification of the housefly, I also showed how notions of dirtiness and danger became embodied in one of the most common insects in our environments, and how this menacing trope also served commercial and political interests, much like the infinitely more nefarious use of insects as an othering metaphor used to dehumanize specific cultural groups throughout recent history. Because of their perceived alienness and their stark opposition to many of humanity's self-defining features, they have been mobilized on numerous occasion to sap particular groups' right to equal treatment, dignity, and even life, culminating in some of history's most destructive acts of genocidal fury. Though such context is stringently and self-servingly evacuated in most discussions surrounding entomophagy, it nonetheless powerfully informs the cultural backdrop against which insect consumption is pitted in European-derived cultures.

I then examined the varying approaches mobilized to promote insects as a potential food, first through rational argumentation and, conversely, through sensory approaches. In the first case, a cognitive-based rhetoric strives to confront the negative perceptions that surround insects by vaunting their purported sustainability, nutritional, or food security benefits. Problematically, all three of these arguments, with the two former being nearly systematically leveraged in promotional discourses, rest on uncertain or even dubious evidence. In the case of environmental benefits, the promise of a lower impact through reduced feed and water usage seems probable in comparison to beef, but less evident in many other instances; in any case, the lack of trustworthy quantitative data and the inconsistencies across the industry run the risk of seriously harming a nascent market that needs to establish unshakeable consumer confidence. Nutritional appeals, meanwhile, mostly emphasize insects' considerable protein content, surfing on the protein-craze wave that has been sweeping across North America in recent years; yet not only is protein a highly resource-intensive nutrient to produce, it is also one that we consume in overabundance, with potentially deleterious effects on our health. Indeed, *replacing* current animal protein with insects on a semi-regular basis would likely provide nutritional and sustainability benefits. However, the current industry is instead geared towards *adding* insects to our already crowded plates, potentially worsening our diets' environmental and health impacts. Less often mobilized, the food security argument similarly relies on rational levers to promote consumption, claiming that changing our own attitudes towards edible insects can help maintain and enliven existing practices in the Global South which are crucial to food security in many locales. However, in addition to its problematic underpinnings in white-saviour tropes, such a discourse also lacks sufficient proof to justify its use to sell energy bars to well-fed, affluent Western triathletes. In all of these cases, it remains unclear whether rational arguments can suffice to convert large swaths of the population, beyond the narrow consumer segments most invested in these specific domains such as athletes or the environmentally conscious. It seems such arguments are strongly contagious in terms of discursive staying power, as demonstrated by participants' high level of awareness of such claims. Yet with purported benefits being either very hard to perceive or spatio-temporally distant from the consumption behaviour, such arguments appear to be less effective in terms of actual behavioural change. They nonetheless continue to be consistently and uncritically used to promote insect consumption.

In reaction to this inconclusive approach, a growing number of advocates are instead focussing on sensory benefits to render insects desirable, rather than merely utilitarian. Researchers at the Nordic Food Lab, for instance, tackled a three-year project to enhance bugs' gastronomic appeal by investigating their organoleptic profile and developing recipes to showcase their unique characteristics. However, while sensory appeal remains a paramount concern in the adoption of food, some proponents' stringent emphasis on deliciousness has somewhat neglected ideational barriers to adoption and discounted the importance of perceived appropriateness. Participants in a workshop I organized to investigate pathways to increase perceived appropriateness suggested creative approaches to tackle this issue, such as anchoring insect foods in culturally-appropriate consumption contexts or integrating them to already-known and beloved culinary preparations to ease the uncertainty surrounding the novelty factor. Finally, I examined another approach to the sensory-based discourse, one that seeks to discount or negate insects' sensory perceptibleness, claiming that their utilitarian benefits can be delivered without perturbing the gustatory appreciation of a given product. In short, the gains without the pains of overcoming sensory barriers. Interviews with potential consumers and participants, as well as a critically informed take on both rational and sensory promotional strategies, demonstrated that both are in fact

irremediably intertwined, and that advocates should tailor their discourses and develop products that appeal to both gastronomic and ideational imperatives.

Finally, I surveyed the current state of the Québec edible market and interviewed key actors from the farm to the finished product to uncover some of the fundamental challenges and opportunities across the industry. Drawing on the consumer decision journey model, I examined the potential touch points where marketers could strengthen their key messages and promote actual adoption, beyond mere trial. I also underlined some of the most pressing barriers that needed to be addressed for the market to grow more smoothly, specifically inclusion in the consideration set, active rejection, and low availability. Coherently with the appropriateness imperative previously outlined, I suggested some pathways to enhance normalization, including usability, accessibility, availability and affordability. I also examined some of the discursive and terminological pitfalls that could impede acceptance, confining bugs to a "fun food" category with little potential to foster durable adoption.

The edible insects market has been experiencing strong growth over the past years, and projections indicate there is still at lot of room for additional expansion. Consumer awareness and interest has skyrocketed from almost null to a sizeable penetration, at least in terms of knowledge of the issues at play. On the business side, many farmers and processors state they are unable to meet demand, and agribusiness and venture capital funds have joined the fray to finance expansion of the largest firms. Yet many uncertainties remain: will insects outlast the hype period that has so far buoyed their success? Will trial – still a large share of current activities, due to the product's novelty – turn into actual adoption in order to uphold a more sustainable business model? Will the purported environmental, health, food security, and sensory benefits materialize, or will insects come up short in some or all of these categories? Will they be superseded by competing foods with clearer advantages and less ideational barriers to overcome such as, for instance, plant-based protein or algae, or by other highly funded ventures like lab-grown meat? Of course, questions about product viability and fluctuating consumer interest are not unique to the edible insects industry. Yet it seems clear, based on the extensive research I conducted in the field, that overcoming negative attitudes towards their consumption is a particularly complex task due to cultural perceptions of them as undesirable, disgusting pests, and to an utter lack of perceived appropriateness as food. Moreover, the rational-benefits approach used by most proponents has not yielded the expected results, partly because it neglects crucial drivers of food choice such as sensory appreciation, but also because the flaunted benefits still rest on shaky grounds. To promote durable adoption, advocates will need to develop products that present clear usage benefits for the consumer, rather than abstract or spatio-temporally remote ones. From an industry point of view, it will also prove imperative to conduct research and development activities to systematize production and lower costs, and to start moving beyond the mere awareness strategy to engage consumers in a loyalty loop. Finally, it is absolutely crucial to diversify products on offer and think of other ways, apart from utilitarian product enhancement, in which insects can find their way into the food chain.

One particular avenue seems particularly promising in this regard. For reasons of scope, I did not investigate the use of insects as *feed* rather than food, yet numerous producers in North America and Europe have decided to raise bugs to feed animals we eat, rather than aiming directly for our plates. In 2016, the Canadian Food Inspection Agency granted Enterra Feed Corporation, based

in Langley, British Columbia, permits to market black soldier fly larvae as a feed addition for poultry broilers. Allowances for farmed salmon, tilapia, and trout soon followed, as did those for pet feed. Firms such Oreka, based in Cambridge, Ontario, or Enterra have invested heavily in research and development to not only streamline production but highlight the specific benefits delivered by insects for livestock health and growth. Because the critters are not eaten directly by consumers, who are rarely aware of or interested in the feed provided to farm animals, this avenue raises considerably less cultural backlash, with insects even seeming a rather "natural", and more appropriate, food for fish and fowl. If the environmental benefits associated to insect rearing – a lower carbon footprint, reduced input requirements – can be systematically established, this could prove extremely promising in terms of sustainability, with black soldier fly for instance thriving on food waste whose nutritional potential would otherwise be lost or diminished (in compost or biomethanisation for instance).

In Québec, a recent project – unfortunately launched after I had completed my fieldwork - suggests other interesting alternatives to mass-farmed insects. TriCycle is a collaborative effort by scientists and researchers to develop hyperlocal 'entotechnologies' that use insects to revalue or upcycle specific food waste streams. Following some promising experiments that showed how mealworms could thrive on mycelium of mushrooms grown in Montreal on spent coffee grounds salvaged from local cafés, the team has been investigating insect growth rates and nutritional profiles with a variety of waste mediums. Rather than focussing on edible insects as an end in and of themselves, TriCycle is fundamentally interested in issues of waste management and valorization, to show how such management can produce valuable outcomes such as nutritious insects (for food or feed) and frass (mealworm dejections that are used as natural fertilizer). Another objective is to develop a technological showcase to demonstrate the effectiveness of such processes and their capacity to integrate particular waste streams. Such a stringent focus on demonstrable environmental benefits and on developing educational, highly tailored and localized waste management solutions with the added benefit of protein and fertilizer seems like a promising avenue. While it remains less glitzy than many start-ups marketing nutrition-enhanced snacks with an unexpected ingredient, TriCycle's concept seems poised for manageable and steady growth thanks to the abundance of its primary input (waste), its adaptability, and the variety of potential markets for its output (animal or human consumers and agricultural operations).

As the industry continues to mature, it will need to investigate new and alternative avenues to reach wider consumer segments and expand its appeal. Insects will remain, and for quite some time due to their enduring novelty, a rich and revealing case study to analyse patterns of food acceptance and avoidance, and to examine how food preference can be influenced to evolve over time. I am confident that additional research will shed a light on many of the abundant nascent projects, such as the ones outlined above, that are aiming to diversify the playing field and propose new avenues for growth.

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Annex 1 - Cited interviews

Interview reference number	Name (where allowed)	Age	Gender	Date	Interview type
1	Anjali Wildgen	20-40	F	21-11-18	Consumer
2	Anna Krahotin	40-60	F	13-11-18	Consumer
3	Isabelle Morin	40-60	F	20-10-18	Consumer
4	José Audet	20-40	M	08-11-18	Consumer
5	LN	60+	F	13-11-18	Consumer
6	Lucie Bednarova	20-40	F	08-11-18	Consumer
7	Marie-Hélène Lévesque	20-40	F	12-11-18	Consumer
8	Martin Chayer	40-60	M	20-10-18	Consumer
9	Mylène Désilets	20-40	F	21-10-18	Consumer
10	Simon Martin	20-40	M	20-10-18	Consumer
11	Andrew Afelskie	20-40	M	08-12-15	Producer (GrowHop)
12	Brenda Plant	40-60	F	12-06-19	Producer (Umamize)
13	Jérôme Fortin-Légaré	20-40	M	21-03-19	Producer (Neoxis)
14	Bastien Rabastens	20-40	M	13-08-15	Processor (Jimini's)
15	David Faure	40-60	M	11-08-15	Processor (Aphrodite)
16	Minh-Anh Pham William Walker	20-40 20-40	M M	13-05-19 13-05-19	Processor (Naäk) Processor (Naäk)
17	Josh Evans	20-40	M	21-07-15	Researcher (Nordic Food Lab)

Annex 2 – Interview guidelines – sample questions

1. **Food consumption habits**

Firmly anchored or not?
Constantly looking for new foods?
Refusals, avoidance, specificities… ?
What did you eat yesterday?

New product: what is interesting/attractive?
How do you evaluate a new product? What makes you want to try?

Define edible:

2a. **Entomophagy, general:**
General knowledge :
- What? Who, where, when, how, why?
- Here vs. there ?
- Advantages / disadvantages?
- What does it evoke?
- Why are bugs consumed?

2b. **Entomophagy, personal:**

First contact: context? First impressions? Has it changed? Conclusions – like, dislike

How does it fit into your diet? What types of products, how frequently?
If non-consumer, interested or not? why?

Personal advantages/disadvantages?
Would adopt or not ? Conditions, factors, motivations, criteria…
- → senses: taste, texture, visual…
- → context, accessibility…
- → social factors…

How do you evaluate an unknown product? What makes you want to try?

Ideal/dreamt product (needs, wants…) :

3. **Insects :**

Associations…. When I say insects, you think of… First words, ideas
Friends, ennemies…
Contexts for contact/interaction
Popular culture

Has it changed since idea that they are considered edible?