



REVIEW

From Novelty to Normalcy: Making Entomophagy a Common Diet**Jingjing Tao***

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ABSTRACT

This paper presents an analysis of the future of insect eating in two dimensions: the barriers of making insect eating popular and possible pathways to make entomophagy a common diet. Firstly, the brief introduction is stated to make a clear statement of normalizing insect eating, discuss the topic's relevance with current news regarding COVID-19 and provide a clear thesis statement. Then, the obstacles that prevent many people eating insects are evaluated through the framework of Failure of Diffusion Theory and "Yuck" factors. In the last part, possible solutions are offered accordingly, to help accomplish the goal of making insect food popular. Finally, some end notes and closing thoughts are included in the conclusion.

1. Introduction

The year of 2020 was experiencing a war between human beings and the nature globally, which typically can be demonstrated by the outbreak of COVID-19. People are aware of that corona virus pandemic has a close relation with the wild animals like bats, seafoods and Paguma larvata, which are the original materials of the food in many places around the world ^[1]. Under this special background, sustainable ways of eating are getting more and more attentions and concerns. People at this time are eager to learn about how to live with the earth in harmony by changing their eating habits and chooses. At the same time, over-population with increasing demands for food and serious world hunger are also hot topics within environmental study field.

Considering these contexts above, making eatable insects to become a common food source will be discussed

in this paper. The arguments are provided as follows. Meat production has been questioned for its not pro-environment characteristic for a long time. As a green way of eating, entomophagy, which has a long and profound history in the human civilization, however, still remains unpopular, especially among Europe and North America areas. Meanwhile, eating occupies a big part of human activities and affects the environment to a large degree. To find an effective way of improving the relationship between people and the environment, insect eating is a good target. Therefore, it is worthwhile to investigate a deep research on the topic of insect eating.

In order to understand why a great deal of people are unwilling to accept the idea of eating insects and people only accept eating very few amounts of insects in their lives, it is significant to study the potential barriers of insect eating so as to figure out the most relevant factors that influence people's mindsets and behaviors on eating

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insects. Exploring and examining possible solutions are also very important to produce the most recommended methods in this issue to accomplish the goal of putting insects into people's daily menu. In this part of discussion, the theory of change will be applied mostly.

2. Discussion of Barriers of Insect Eating

2.1 Failure of Diffusion Theory Offers Five Perspective for Unwillingness of Insect Eating

According to the theory of failure of diffusion (Dof), advanced by Rogers (2003), relative advantage, compatibility, low complexity, trialability, and observability are the five key drivers to let innovations succeed in diffusing among the public. Eating insects is not a traditional way of eating for modern citizens in many places. Thus it can be seen as a type of innovation, if making it a common diet. The first discussion of barriers in insect eating presents the connections between the five elements of the theory of failure of diffusion and entomophagy, providing reasons for why entomophagy appears unpopular throughout the world.

To begin with, the low relative advantage of entomophagy is discussed. Firstly, the social status cost of inviting insects into people's table is relatively high. It is still possible to change this idea that insects are dirty and terrible, because the similar situation happens on the example of lobster. Based on the description of Shandrow^[2], lobsters have been successfully entering the food market with its previous background of the food of prisoners. However, insect eating is treated as the symbol of poverty and low living quality. From the view of relative advantage, insects are less competitive than beef, mutton, chicken and other kinds of meat that are considered cleaner and nobler. Consequently, no wonder why insects are not as popular as these types of foods. Secondly, there are various pro-environment alterations other than consuming insects. People can reduce the amount of production and consumption of eating beef and other high environmental costing foods to achieve lower greenhouse gas emissions, higher feed conversion efficiency and lower land use, instead of changing their meals into insects^[3]. Insect eating is not considered as a sole method to cut the carbon footprint, so, it fails to get the most attention. Less attention results in fewer people together with funds to study and advocate the choice of insect eating. Thirdly, the collecting process of insects can be harmful to the environment. According to the Schauff^[4], the equipment and chemicals used during the preserving procedures can damage soils and grass in the long term. As can be seen, the advantage of environmentally friendly trait fails to become extremely attractive when thinking

about the whole process of insect eating. Additionally, when taking the convenience into consideration, insect eating has low accessibility, because only certain shops have insect products, which are usually expensive^[5]. The supply chain in reality is not supportive enough to let insects enter the common food market easily.

Then, the perspective of compatibility in popularizing insect menus is discussed in the following. Unsatisfactory past experiences affect people's impressions on insects. For example, when talking about insects, people tend to relate them to contaminants and inedibility, worrying the sanitary condition of this kind of food. Even worse, a great deal of people refuse to see insects as real food^[6]. The fear in their minds stops their attempts to accept insects as a daily food option. Besides, bad sensory appeal of insects plays a vital role on people's determination of selecting foods. D'Costa^[7] argues that the physical appearance of insects is not consistent with people's notion of normal foods. Namely, people hardly accept insects when they have a large difference from their expectations of eatable foods. Moreover, conservationists' disagreements give more resistances to the diffusion of insect eating. Some environmentalists say that many insects are facing endangered situations and expanding food choices on them will put new threats on original ecological circles and ecosystem balances (Shelomi, 2015). In a sense, not all the pro-environmental group favor the idea of insect eating. Furthermore, the current insect eating movement is incompatible with the public needs. Statistics indicate that the majority of western people don't need to worry about low-priced protein since most of them are not in the position requiring putting heavily thoughts on the prices of protein^[8]. Specifically, the green insect market in the West is not big enough, and the market is only restricted to an educated and youthful subset of the potential consumer pool.

Next, the complexity of the issue of insect eating is discussed. A different recipe request is needed if insects are putted into the food market. Unlike other foods, the insect has its own characteristics: small size and crust adding the complexity of insect food cleaning and cooking process. These traits will lead to higher costs and difficulties in monitoring food safety. However, a good point is put forwarded by Mai^[9] that the cooking practices of some insects are particularly like seafoods, so people have some similar experiences and skills to deal with insects.

In addition, the ineffective trialability of insect eating is worth mentioning. Nowadays, there are multiple ways to promote the idea of insect eating, such as exhibition and try-eating activities^[10]. Yet the problem is that the conducts are far from enough to have actual impacts on

people's behavior changing. The low degree of trialability prevents people from implementing insect eating in their normal eating habits.

Last but not least, observability of entomophagy is small. Even though a number of evidence suggest the benefits of eating insects, it is not easy to observe these advantages by normal people. Dunning^[11] says that people often view the act of eating insects as a symbol of bravery attempt, rather than an environmentally friendly action. The novelty of insect eating overshadows its normalization. The insect foods should have fewer bizarre eats look, since the world now is lack of familiar environment to show accessibility of eatable insects, which is essential to help normalize the diet of insect eating. In the meantime, expanding insect supply lines is an important way to defeat the obstacle regarding the goal of diffusing insect eating.

2.2 Power of “Yuck” Factors on Preventing Eating Insects

Yuck emotion generates huge influences, and people usually underestimate its power. Yuck factors play an important role in people's decision on food choosing. The first reason for its strong impact is that the disgust feeling is embedded in human's origin and genes. “One only has to look again at our own look of disgust: it is a shadow of its origins, the gag reflex of animals, with lips pulled back and eyes squinting”^[12]. This tells us that the yuck factor is a longstanding element on stopping people from tasting insects, which is inborn, not absolutely cultivated by society and culture. Under this circumstance, the difficulty of getting rid of some parts of drivers in people's genes are extremely high.

An experiment conducted by Pizarro and his research groups reveals the profound power of disgust with data and observing facts^[13]. This finding manifests that the disgust emotion is a much more potent trigger for people's choices and behaviors than people's previous thoughts. Specifically, the study shows the great impacts of yuck factors are closely related to people's decisions that reduces their chances of choosing insects as foods. This tendency can prevent people from accepting eating insects for a long time.

3. Explorations of Effective Diffusion of Insect Eating

3.1 Introducing More Insects to Medicine Industry

One gradual way to let insects enter people's food market is to let them become a common medicine material first. This method is to give people time to get used to the

existence of insects in their daily life^[14]. People get sick from time to time, so medicine is necessary to be taken. Thus, making more insect pills will help people feel more comfortable when they come across eating insect meals. They have already had the environment to consume insects, and they will not feel it quite weird to put insects into their mouths. It is also worthwhile to mention that produced insect chemicals have a large room to explore in the field of antibacterial and anticancer drugs. The recent medicine industry does not give enough value on it, but people should further encourage the insect collection and commercialization in medicine world (Lehman, et al., 2006). Lehman and his groups suggest more research and studies on this field, which can be quite effective for letting more people accept the idea of eating insects.

3.2 Tapping the Potentials in Insect Business

Another great breakthrough point is tapping the potentials in insect business. Wong (2016) points out that there is still a big gap in insect economy to let companies to investigate. The promising future in insect business means that the opportunities for diffusing insect eating are enough and worthwhile to invest. Also, Shelomi (2015) implies that tackle the issue of inadequate supply of insect market is a more effective way to change insects' social value.

Apart from business workers, many economists are interested in the economic prospect of insect eating. On May 30, 2020, I interviewed my economics professor in person at the Pacific Coffee with a few questions about the possibilities of inviting insects into food market from the microeconomic angle of view. Bruce McFarling is a highly-experienced expert in the field of microeconomics and regional food economics. He spent the several years in Africa, where he got the access to eat many insect species and obtained the insect business experiences from there. Dr. McFarling was asked to give some advice on introducing insects into the world food market. He mentioned that “one thing should be noticed in insect business is that the companies and businessmen ought to set up a new, exclusive label name for eatable insects” (B. McFarling, personal communication, May 30, 2020). From his point of view, the first thing people will recognize the food is by its label. If the eatable insects be given a delicious-sounding name, people will be less likely to connect the dirty raw look of it with the insect product. Therefore, creating a brand-new name, exclusively for certain insect products is vital.

3.3 Application of Change Theory in Insect Eating

The theory of change offers a picture of important destinations and guides people on what to look for on

the journey to ensure they are on the right pathway. The theory of change narrative is composed of three parts: ultimate outcomes, intermediate outcomes and activities. According to Krasny (2020), a professor in Cornell Civic Ecology Lab, the theory claims a more effective way to change people's environmental behavior. That is achieved by firstly setting up ultimate outcomes, and be supported by several intermediate outcomes and specific activities.

Some ecological professors are interested in the application of change theory in insect eating. My environmental science course professor, Maxim Titushin is one of them. On June 5, 2020, I had an online interview with him to ask a few questions about his suggestions on practicing the theory into insect eating educational courses. Maxim Titushin is a well-experienced expert in the field of environmental science and biology, and he is currently teaching International College Beijing of China Agricultural University. Dr. Titushin was asked to give some instructions on enlightening students' awareness of eating insects. "As an environmental science teacher, I would stress the smaller carbon footprint of the insect-based food. Many data and research prove that plant-based food is absolutely sufficient, more environmentally friendly and is the ultimate diet goal of the humanity. Being aware of the power of habit and it would be unwise to promote insect eating as an alternative to red meat only to struggle to eradicate this habit in the future" (M. Titushin, personal communication, June 5, 2020). As can be seen, the emphasis on the actual environmental effect of insect eating is the most important thing in an environmental science course.

Also, apart from the course designing suggestions, Dr. Titushin commons on useful ways to achieve the target of making entomophagy a common diet. A good way to promote entomophagy is to keep people ignorant about the source of their food. This strategy has proved efficient with meat consumption. Many people maintain an unreasonably high level of meat consumption with being unaware of arguably inhumane practices of meat manufacturing as well as their devastating environmental impacts. A problem with entomophagy, however, is that one can't put a smiling face on a food label — insect larvae prove to be rather non-photogenic, but a butterfly image may work and sell better as well. Ironically, education can also promote entomophagy along the same environmental line. Insect protein is much less expensive for the environment than red meat protein. When the yuck effect is avoided and a new tradition is established, insect protein may find its own way into protein additives, broth cubes, or athlete formulas. What he said can be summarized into three key phrases: appearance overlook, label effect and environ-

mental education (M. Titushin, personal communication, June 5, 2020).

4. Conclusions

In the world today, there is an increasing interest in edible insects, but the reality of insect industry still remains unpopular. Insects as common food of human beings are proved to have a large potential. After evaluating the barriers of insect eating normalization, we know that there are a lot of efforts need to be done in the future to overcome these obstacles, because as mentioned above, most of them are embedded in cultures, genes and have instructional inadequacy. Among these factors, the consumer attitude is a major issue in the Western world. Lastly, research pathways to make insects a common diet has been explored accordingly: introducing more insects to medicine industry, digging out the potentials in insect business and practicing the theory of change in the matter of encouraging people to try eating insects.

In the end, some final thoughts are stated as follows. The current scholar field lacks published studies concerning factors that affect the oxidation of insect fat and protein during storage. The emphasis on insects' nutritional value can be the main factor that justifies the use of insects as a common human food. On the other hand, the key to insects being valued as a pleasurable component of a meal is its sensory appeals. Edible insects need to be processed and turned into palatable dishes. Therefore, the cooking insect methods are significant to be studied and promoted among the public, together with the innovation of insect label, which are essential elements to commercialize insects as a common human food. Many people are worried about the food safety, which may be affected by toxicity of insects, contamination with pathogens, spoilage during conservation and allergies. This concern should be dealt with as the first priority. More studies like production economics, sensory properties, optimum storage, and potential toxicity are needed to be done in the future.

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