From Bugs to Food: Generation Z and the Perception of Edible Insects

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Preface

Edible insects have attracted attention in recent years as part of the search for sustainable food sources worldwide. With both their nutritional value and environmental benefits, these small creatures have great food potential for humanity. This book, titled "From Insects to Food: Generation Z and the Perception of Edible Insects", includes the characteristics of Generation Z and the consumption trends of Generation Z, the history of edible insects, their use as alternative food, nutritional values, the perspective of religious beliefs on edible insects, the concept of perception and the perception of edible insects. Edible insects are evaluated by taking into account personal differences.

The author of the book has in-depth knowledge of edible insects and presents a comprehensive study that thoroughly examines the research in this field and their use in world cuisines. Edible insects stand out as an important source of solution against the future food crisis. These insects, which are extremely rich in protein, vitamins, minerals and fiber, offer a more environmentally friendly and sustainable alternative to traditional animal husbandry. This book provides information on many topics such as how insects are used as food in different cultures, what the perceptions of these creatures are in different societies, the potential

benefits and negative effects of this food source on human health, and its practical uses. “From Insects to Food: Generation Z and the Perception of Edible Insects” is not only a scientific research, but also a comprehensive guide that examines the historical development of edible insects and examines them from a general perspective. It appeals to every reader who wants to create both academic and social awareness. It will be a valuable reference source for those who want to understand the perceptual transformation of insects and the role of Generation Z in this process. If you want to review your eating habits and discover innovative and healthy options, this book will be exactly the source you are looking for.

CHAPTER 1

1. Generation Z: Characteristics, Scope and Consumption Trends

This section covers the concept of generation, the classification of generations, the characteristics of Generation Z and the consumption trends of Generation Z.

1.1. The Concept of Generation

According to the Turkish Language Association (TDK), a "generation" is defined as a group of people who were born in approximately similar ages and lived the conditions of the same age, therefore sharing similar troubles and destinies and being charged with similar responsibilities (Taş and Kaçar, 2019: 646). Researchers mostly use birth dates to determine generations. Those born between 1946 and 1964 are called Babyboomers, those born between 1965 and 1979 are called Generation X, those born between 1980 and 1998 are called Generation Y, and those born between 1995 and 2009 are called Generation Z (Ayhün, 2013: 39; Goh and Lee, 2018: 21). In another study, Generation Z is considered as those born between 1995-2012 (Kitchen and

Proctor, 2015: 34). There are studies in the literature that classify Generation Z differently. Similarly, as seen in Table 1, there are studies that define Generation Z as those born in 2000 and later (Baran, 2014: 20; Hatipoğlu, 2014: 48; Gümüş, 2020: 384).

1.1.1 Silent generation/War generation

According to the authors, this generation describes people born between 1925 and 1945 (Crampton and Hodge, 2009: 1), 1925 and 1942 (Hill, 2004: 32) or 1922 and 1945 (Weingarten, 2009: 27). During this period, there were intense recessions, wars and crises. For this reason, the childhoods of individuals called the silent generation were generally spent with economic difficulties. The silent generation is defined as loyal, disciplined, hard-working and hard-working people (Terzi and Boylu, 2019: 3283).

When considered in terms of social values, the silent generation is characterized by loyalty, hard work, commitment to social values and respect. When considered in terms of cultural elements, it is seen that this generation consists of extended families and local social groups with intense neighborly relations (Gilbaugh, 2010: 4). Individuals of the silent generation obey the rules and value hard work. In the work environment, a chain of command is applied in superior-subordinate relations; a strict control and supervision mechanism is applied in business processes. Benefiting from the experiences of this generation pleases the generation. Individual interaction is important. This generation prefers formal and written communication (Puybaraud, 2010: 36).

1.1.2. The great baby boomer generation

Baby boomers are defined by some authors as those born between 1946-1964 (Crampton and Hodge, 2009:

1), and by others as those born between 1943-1960 (Hills et al., 2013: 32). This generation is called the baby boomer generation because it refers to approximately one billion children born between 1946-1964 after World War II (Ayhün, 2013: 96).

This generation, called the boom generation or the children of the cold war period, is stated as a generation that longs for prosperity, growth, goods and services (Şenbir, 2004: 24). The characteristic features of the generation covering this period are; adventurous, able to take risks, accept uncertainty, able to work on their own ideas, dislike evaluation, able to introspect and respected (Romanelli and Ryan, 2003: 73). In addition, individual effort is at the forefront for this generation (Ayhün, 2013: 97). At the same time, individuals born in this generation have high feelings of loyalty and these individuals are content. For example, individuals from this generation can work in the same workplace for a long time. However, these individuals cannot fully adopt technology (Mengi, 2009: 8). Since individuals from this generation grew up in a period of prosperity without negative emotions, they expect a lot from life (Polat, 2018: 49).

1.1.3. Generation X

Generation X is used in some sources for people born between 1965-1980 and in some sources for people born between 1961-1981. This generation, also known as the lost generation, defines a period affected by economic crises and emerging social problems (Hill, 2004: 32; Hills et al., 2013: 267; Başgöze and Bayar, 2015: 120). Employees are the children of parents who left their jobs to earn money in different places. They hold on to their jobs because they see unemployment in the family, they do not quit their jobs unless they have to, they do not change jobs. They

are sensitive to social issues. Education is at the forefront for Generation X. This generation, which has access to technology later, uses it out of necessity (Kartal and Tatlı, 2020: 223).

1.1.4. Generation Y

There is no limit to the year of birth for Generation Y. Many experts accept 1980 as the starting year and 2001 as the ending year. Some authors accept 1977, 1980, 1982 as the beginning and 1999, 2000 as the ending (Weingarten, 2009: 27; Crampton and Hodge, 2009: 3; Hutchinson et al., 2012: 444; Hills et al., 2013: 267; Sherman, 2015: 138).

Generation Y is culturally and socially different. They are determined to succeed but also need guidance. Alternatively, they may question management decisions when they feel indecisive (Eyoun, 2020: 3). The most important feature of the Millennial generation (1980-1999); is freedom and technology. People born in this generation do not like to work; on the contrary, they prefer fun. They do not like power and exhibit aggressive behavior. Despite their many demands and dissatisfactions, they draw a profile that values concepts such as sustainability, ethics and social responsibility (Altuntuğ, 2012: 206). Generation Y, which is distinguished from other generations by the favorable conditions of the period in which they grew up, has grown up in a world that is also developing in terms of technological opportunities. Generation Y, which is defined as those born in Turkey after 1980, consists of individuals who are familiar with computer (PC) and mobile phone (GSM) technologies, are technology-friendly, personal, relaxed and embrace globalization (Şenbir, 2004: 25).

1.1.5. Generation Z

Generation Z, born between 2000-2020, is also known as the "crystal generation". This generation, known by names such as the crystal generation, internet generation or Google generation, is referred to as Generation Z (Çetin and Karalar, 2016: 167). Researchers do not agree on a clear denominator regarding the birth year of Generation Z. While some researchers include those born between the mid-1990s and the end of the 2000s in this generation, others define Generation Z as the period from the beginning of the 2000s to the present (Baran, 2014: 20). The fact that generation researchers and sociologists Strauss and Howe predicted that this generation would be the last generation is effective in referring to this generation as Generation Z (Demirel, 2021: 1807). A detailed explanation of Generation Z will be discussed under the title of Generation Z characteristics.

1.1.6. Alpha generation

The first generation born in the 21st century, the alpha generation, is named after the Greek alphabet because it is seen as a symbol of a new beginning (Kayıkçı and Bozkurt, 2018: 55). Although the letter Z is the last in the Latin alphabet, generations and the names to be given to generations continue. The name that will be given to the generation after Generation Z is a matter of curiosity. There is a consensus on the theme of X, Y, Z given to generations by social scientists. Therefore, sociologists decide to use the Greek alphabet as a labeling series. Because they believe that this should represent the generation after Generation Z, a brand new generation and the beginning of a brand new century (McCrindle and Fell, 2020: 5). It is also stated that all generations to be named after this generation will take their names from the Greek alphabet (Schawbell, 2014).

Demographer Mark McCrindle conducted a survey in Austria in 2015 for the generation to be named after Generation Z. According to this survey data, the first letter of the Greek alphabet, "Alpha", was preferred. For this reason, the generation after Generation Z is called Generation Alpha (Nagy and Kölcsey, 2017: 110). Generation Alpha is also called "digital native". This generation consists of individuals with advanced knowledge and skills related to information and information technologies (Prensky, 2001: 1).

1.2. Characteristics of Generation Z

The generation called Generation Z includes individuals born after 2000. The most distinctive feature of this generation is that they are closely attached to the environment and technology in which they grew up since birth and see it as a part of life rather than a tool (Berkup, 2014: 224). Although there are similarities between Generation Z and Generation Y in terms of the technology of the period they live in, the most important feature that distinguishes Generation Z from Generation Y is that Generation Z was born in a different environment. Generation Z discovered a virtual world created by smartphones and social media with the introduction of the internet in the 1990s (Hariadi et al., 2016: 427).

This generation is known as the generation that uses the internet the most with the development of technology (Terzi and Boylu, 2019: 3284). Generation Z individuals also stand out with their sensitivity to technology, especially their efforts to find innovative and permanent changes (Chaney et al., 2017: 182). Individuals of this generation have short-term access to information and see the internet as the main source of information (Terzi and Boylu, 2019: 3284). They constantly use the internet through smartphones

and tablets (Chaney et al., 2017: 182). Therefore, it can be said that this generation is interested in the internet and computers (Terzi and Boylu, 2019: 3284). Generation Z individuals, who prefer written communication to verbal communication, have access to more information than other generations (Chaney et al., 2017: 182). Individuals of this generation are educated by their families during their childhood and complete their development in a short time (Terzi and Boylu, 2019). Therefore, it can be said that their self-confidence and tolerance are very high (Chaney et al., 2017: 182).

According to the research, the common characteristics of Generation Z children are expressed as follows in some studies (Altıntuğ, 2012: 206; Öz, 2015: 16; Çetin and Karalar, 2016: 161; Tuncer and Tuncer, 2016: 215):

- Smartphones, computers and tablets are part of their lives.
- The mental development of Generation Z, which receives education at an earlier age, also progresses rapidly.
- Their ability to interpret information is faster compared to previous generations.
- Their individualism is stronger than other generations.
- They prefer to live alone in life.
- They are ambitious and have a materialistic view.
- They love innovation.
- They are a secure generation but difficult to please.
- They have difficulty making decisions, they are changeable.
- They do not like spending much time outside.

• The most obvious means of socialization is social media.

• They have a profile that wants everything to be fast and consumed instantly.

• It can be said that they love speed and live faster compared to other generations.

• They live purpose-oriented.

• They are not people who get angry easily, are very jealous and get hurt easily.

• It is thought that they are less loyal.

• It is assumed that Generation Z, known as the young generation of the digital age, has the ability to handle more than one subject at the same time.

• They want to learn whenever they want and under the conditions they choose.

• They like productive activities.

• They keep long-term memories in mind not by memorizing them but through animations, stories and dreams.

• Although they are the generation with the highest motor synchronization such as hand, eye and ear coordination in human history, these superior aspects; attention, concentration and difficulty in concentration can turn into weaknesses.

• In addition to using technology better than other generations, Generation Z also incorporates wearable and portable technology products (smart watches, glasses, headphones, bracelets, etc.) into their daily lives.

1.3. Consumption Behaviors of Generation Z

Consumption can be defined as activities aimed at meeting physiologically based needs (eating, drinking, shelter, security, etc.) or psychologically based abstract needs (self-actualization, dignity) that are necessary for humans (Torlak, 2000: 17). In other words, consumption is defined as finding, purchasing, or destroying the product or service needed to meet certain needs (Odabaşı, 2006: 16).

Investigating personal, interpersonal and social behaviors is important in evaluating consumer behavior. With this information, it can be said that it is important to investigate the concept of personality, which is one of the important factors in examining the structure of behaviors (Beyaz, 2020: 55). Recently, scientific and technological developments have brought about changes in the structure of society. It is seen that these changes are more effective on young people (Güler, 2013: 110). Along with this situation, it is seen that some effects and different behaviors emerge in the personalities of young people (Beyaz, 2020: 69). This change, which occurs in the formation process of personality, occurs faster in children and young people than in the elderly (Eroğlu, 2011: 219). Personality is a concept formed by internal and external factors and exists from birth to death. In this process, many factors such as genetic, structural, socio-cultural factors affect personality formation (Güney, 2009: 53).

A study examining whether there is a relationship and interaction between personality traits and conscious consumption tendencies reveals that Generation Z consumers mostly have extroverted, consistent and neurotic personality traits, and that these traits positively affect Generation Z's conscious consumption approaches (Beyaz, 2020: 69). In addition, a different study points out that Generation Z

has less ethnocentric consumption tendencies than other generations (Fettahlioğlu and Sünbül, 2015: 42).

It is claimed that Generation Z consumers cannot live without technology, tablets and phones and that these materials affect the consumption tendencies of young people (Bayrakdaroğlu and Özbek, 2018: 10). In a study aiming to reveal the effect of attitudes towards Instagram ads on the purchasing behaviors of Generations Y and Z, who use Instagram intensively, Generation Z describes Instagram as both entertaining and disturbing. It is stated that the factors of entertainment and disturbance are effective before and after purchase (İnce and Bozyiğit, 2018: 54).

In the research conducted on the purchasing decisions of Generation Z, it is stated that 50% of Generation Z individuals, who value experience in purchasing decisions, prefer to spend money on experience, and 75% of the participants prefer to shop from retailers that offer in-store experience. In addition, the study emphasizes that members of this generation value cleanliness, use of technology, friendly and knowledgeable staff, and quick response when shopping (Gümüş, 2019: 2180).

In a study examining which factors are effective in the food preferences of Generation X and Z consumers and which consumer groups value which factors the most, it is stated that delicious, affordable and healthy food is the most important factor for both generations. However, it is also noted that there are significant differences between the food preferences of Generations X and Z in terms of some variables. While Generation X is health-oriented in food preferences, Generation Z has a hedonistic approach (Aşık, 2019: 2599). In another study conducted to examine the hedonistic consumption behaviors of Generation Z consumers, it is stated that Generation Z consumers engage

in hedonistic consumption behaviors in order to make others happy, to be value-oriented and relaxing (Gümüş, 2019: 2204). In a study investigating the effect of hedonistic and utilitarian consumption behavior on brand loyalty, the opposite situation was addressed by stating that participants did not buy products they did not need (Ünver, 2019: 45).

Members of Generation Z are seen as individuals who are interested in gastronomic activities and tend to accept different cultures (Kahvecioğlu et al., 2019: 2857). Therefore, gastronomy tourism is defined as individuals experiencing new and different foods and gaining knowledge about different cultures thanks to these foods (Long, 2004: 20). According to a study evaluating the attitudes of Generation Z towards gastronomy tourism as part of their search for innovation, Generation Z's intentions to participate in gastronomy tourism activities are said to be excitement-seeking. Intentions such as the perception of surprise, escape from routine and relief of boredom partially constitute their intentions to participate in gastronomy tourism (Kahvecioğlu et al., 2019: 2855).

In a study conducted to determine the holiday decisions of Generation Z and to examine the factors affecting the holiday preferences of Generation Z, it is stated that the activities for the 4-12 age group are the most effective variable. It is also stated that the technological facilities of the accommodation and the cleanliness of the rooms in the destination are among the main factors affecting the decision to go on holiday (Karadağ and Erkayıran, 2021: 1332).

In a different study, it is stated that Generation Z participants prefer a holiday period of 4 to 6 days and tourism types such as coastal tourism. They prefer hotels as accommodation businesses, cafes and restaurants as food and beverage businesses, and highways as transportation.

Their tendency to go to entertainment businesses on holiday is seen to be quite high (Baran et al., 2020: 927).

Among the travel product preferences of Generation Z individuals, "sea, sand and sun travel, holiday villages, all-inclusive dormitory type, reservations directly from the facility, visiting lesser-known touristic places, and vacationing with friends have an important place (Yalçın and Karaman, 2022: 62). Therefore, it can be said that Generation Z travels more for entertainment purposes than Generation X and Generation Y. Generation Z prefers places with more natural and cultural opportunities than Generation X and Generation Y. Generation Z shows a desire to travel more to relax, seek innovation and discover (Çöp et al., 2020: 2544). It is also stated that Generation Z individuals' interest in vacation and the importance they perceive from the product are higher in those who have planned vacations than in those who have unplanned vacations (Baran et al., 2020: 529).

Today, there is a market structure consisting of consumers who like to choose between different products and companies that have to meet the expectations and needs of these consumers. In these market structures where the real power is in the hands of the customers, if the business does not work to satisfy the customer, it is inevitable that another business will do so. Therefore, businesses need to focus on understanding customers (Karaburgu and Dursun, 2023: 316). Generation Z is becoming a new consumer group as marketers start to include brands in their thoughts from the moment they start shopping with their parents (Uçkan, 2007). This generation, which affects the consumption behaviors of their families, is becoming a special target audience for marketers (Altuntuğ, 2012: 203).

Generation Z is seen as a pure consumer because it tends to have a unique, individual and image-oriented consumption in every subject. Compared to other generations, this generation, which is more equipped in terms of economy and education, can be described as an impatient generation. Because they tend to buy and consume the products they want immediately. This generation, which aims to fit many things into time, wants the products they prefer to be fun, original, imaginative and functional (Düzgün, 2022: 413). Generation Z individuals constitute a significant portion of the consumer market today. As a result of social, cultural, economic and technological changes, they make consumption decisions and behaviors beyond their age. As a result of the specified characteristics, it is predicted that they will change the marketing and consumption habits created by other generations to certain extents and build the consumer profile of the future (Altuntuğ, 2012: 206; Bahar and Villi, 2023: 601).

When consumption trends are compared to other generations, there are significant differences. The consumption trends of Generation Z are expressed as giving importance to quality, enjoying innovations, being interested in and researching different cultures, having a tendency to make unplanned and impulsive purchases, showing low loyalty and brand loyalty, wanting to earn money from their hobbies, spending a lot of time on the internet, researching and comparing (Beyaz, 2020: 56). In another study, it is stated that Generation Z prefers dreamy, highly functional and original products in their consumption preferences (Mercan, 2016: 68). This generation, which is introduced as the consumer generation in society, has been stated to have extroverted, consistent and neurotic personality traits that positively affect conscious consumption tendencies (Beyaz 2020: 56-69). In addition, there are different studies

that Generation Z individuals tend to purchase products that do not harm the environment and give importance to green practices (Dülgeroğlu et al., 2016: 1; Kartal and Tatlı, 2020: 208).

Generation Z consumption behavior trends created in line with the above information are as follows:

- Having a conscious consumption approach
- Having a less ethnocentric consumption tendency compared to other generations
- Adopting an approach that values experience
- Adopting a hedonistic approach in food preferences
- Considering technological possibilities and cleanliness factors in holiday preferences
- Adopting an approach that travels more for entertainment purposes
- Participating in gastronomy tourism activities that tend to seek excitement

CHAPTER 2

2. Edible Insects (Entomophagia)

This section covers edible insects, the history of edible insects, an overview of edible insects, important insect species consumed, nutritional contents of edible insects, and food safety issues in detail.

2.1. History of Edible Insects

Insects, found in agricultural, forest and aquatic ecosystems, are an important global energy source. Insect consumption, which is a part of human history and prehistory, is accepted worldwide as human food (Lange and Nakamura, 2021: 38). Over the last 400 million years, evolution has given rise to many different arthropod species that have adapted to their environments. Of the 1.4 million animal species identified on Earth, approximately 1 million are insects. It is believed that millions more exist. Of the 1 million insect species identified, only 5 thousand can be considered harmful to crops, animals or humans (Van Huis et al., 2013: 5).

The habit of eating insects is an event that dates back to ancient times, has been accepted by various cultures

throughout history, and has continued to this day (Karaman, 2019: 27). Eating insects has had an important place in the eating habits of the most primitive people since the beginning of humanity (Lange and Nakamura, 2021: 38). Cave drawings and other records of ancient civilizations reveal that insects were used as a food source. Since the existence of humanity, insects have been consumed as food, as bait, as medicine in medical treatments, and as figures in religious rituals (Ramos-Elorduy, 1998: 2).

The first information about edible insects in Europe is found in Greek sources. The first modern zoological text that attempted to describe all known animals, Historia Animalium, includes information about cicadas. This information; "When the cicada larva reaches full size in the soil, it becomes a water nymph; before the shell breaks, it tastes best." (Van Huis et al., 2013: 41). Latin America, considered part of the Western world, has an ancient tradition of eating insects. The Aztecs in Mesoamerica (Mexico) consumed insects and insect eggs, which were considered one of the primary sources of protein in their diet. In Brazil, insect eating has been documented among 39 indigenous groups from all over the country (Bisconsin-Junior, 2022: 2). Edible insects are also mentioned in ancient Chinese literature. Materia Medica, a pharmacology of medicinal plants and the drugs that can be obtained from them, contains an impressive record of all foods, including numerous insects. Naturalis Historia, one of the largest works to have survived from the Roman Empire, mentions cossus, a food much loved by the Romans. According to Bodenheimer (1951), cossus is expressed as the larva of the long-horned beetle Cerambyx Cerdo, which lives in oak trees (Van Huis et al., 2013: 41). During the Ottoman period, a paste called Nevruziye was also made. It is seen that the cochineal insect was used in the production of this

paste. The cochineal insect is a type of insect that lives on the red oak tree and from whose larvae red dye is obtained (Gürsoy, 2013: 100).

Edible insects have significant potential as global food in the coming years due to their high protein value, richness in vitamins and minerals, and economic and environmental benefits. Today, Africa, Southeast Asia, Australia and Latin America are known as regions where different types of insects are consumed intensively (Gravel and Doyen, 2020: 1; Lange and Nakamura, 2021: 38; Ribeiro et al., 2022: 1). In Australia, it is said that there are 60 species of insects consumed as a traditional food source by indigenous people. There are also around 62 thousand species of native insects in Australia. The most well-known insect food sources in Australia are the larval stage of the native cossid wood moth, honey ants, scale insects and bogong moths (Hopkins et al., 2022: 2).

2.2. Edible Insects and Religion Relationship

Food consumption practices are influenced by cultures and cultures that have been influenced by religious beliefs in history. Experiences related to eating insects are found in Christian, Jewish and Islamic religious literature. Locusts are mentioned as food in the book of Leviticus. Leviticus is the third book of the Torah, which constitutes the first five books of the Tanakh and the Old Testament. The Bible refers to Schistocerca gregaria, known as the desert locust (Van Huis et al., 2013: 40).

Regarding the eating of locusts, Ibn Abi Awfa (d. 86) said: "We went on a jihad with the Messenger of Allah (pbuh) (six or seven times). During the jihad, we ate locusts together with the Messenger of Allah (pbuh)." (Demirci and Yetim, 2021: 18; Sak and Adabalı, 2023: 357). In another hadith, the Last Prophet Muhammad (pbuh) said,

"The meat of two dead animals is lawful for you; one of them is a fish and the other is a locust" (Demirci and Yetim, 2021: 17). Although edible insects are also included in Jewish literature, it is stated that the eating of locusts was widely accepted in ancient times. They are known as "winged swarming beings" in the Torah. This tradition is known among a significant part of the Jewish diaspora, only among Yemenite Jews and some parts of North Africa (Van Huis et al., 2013: 40).

2.3. Insect Orders Consumed in the World

This section includes some of the most consumed insect orders. These species include Hymenoptera (membrane wings), Coleoptera (beetles), Orthoptera (flat-winged), Lepidoptera (scale-winged), Odonata (dragonflies), Diptera (double-winged) and Hemiptera (half-winged) (Kurgun, 2016: 256). Van Huis et al. (2013) classify the most consumed insects as caterpillars, palm weevil, termites, stink bugs and grasshoppers (Van Huis et al., 2013: 41). According to Muslu (2020), the proportional distribution of the most frequently consumed insect species as food is; Coleoptera (31%), Lepidoptera (18%), Hymenoptera (14%), Orthoptera (13%) and Hemiptera (10%).

2.3.1. Hymenoptera

Hymenoptera insect order: generally includes ants, bees and wasps (Sak and Adabalı, 2023: 350). Ants are the most diverse social insect group. More than 12,500 species have been officially identified and it is thought that there are as many unknown species (Del Toro et al., 2012: 133). Ants are among the delicacies sought in many parts of the world (Del Toro et al., 2012: 134). Ant eggs are consumed in large quantities in Thailand (Sarı and Karaçeper, 2024: 222). Edible black ant (polyrhachis vicina roger) is a traditional

edible insect species in China. It has been used as a functional ingredient in various tonics or health foods. In some ethnic regions of China, such as Yunyang, Guangxi, and Guizhou, edible ants are still used as a common food. It is known that people in some ethnic regions of Mexico and Africa also have the habit of eating edible ants (Shen et al., 2006: 107). Since 1996, the State Food and Drug Administration of China and the State Ministry of Health of China have approved more than 30 health products containing ants (Shen et al., 2006: 107; Del Toro et al., 2012: 134).

Honey bees are also among the insects consumed as alternative food (Tekiner et al., 2022: 77). Bees are directly consumed as food in Congo, Australia, Indonesia, Myanmar, Thailand, China, South America, Central and Southern Africa (Topal et al., 2018; 80). Honey bees (Apis mellifera) and hornets are the most important insects consumed as food in northern Thailand (Nonaka et al., 2008; Van Huis et al., 2013: 13). Valuable bee products obtained from bees provide a protective effect on human health. Studies have shown that drone larvae (apilarnil) and queen larvae, which have high nutritional value, can be consumed to support medical treatment and protect health (Tekiner et al., 2022: 77). It is thought that larvae with high nutritional value are sufficient to eliminate malnutrition problems. The use of bee products such as honey, pollen, propolis, royal jelly, bee bread, bee venom, apilarnil and beeswax in apitherapy (bee venom treatment) makes the consumption of larvae important (Topal et al., 2018; 80). When it is predicted that the use of queen and drone larvae used as food and in apitherapy will become widespread, the society should be made aware of the benefits of these products to human health (Tekiner et al., 2022: 77). Bee brood, which is widely used in local foods, is in high demand. In different regions, the profit from bees and products obtained with bees is

more advantageous than other products and is preferred. For example, in Malawi, beekeeping is three times more profitable than growing corn, a staple crop. In Australia, the hive of native stingless bees is called a honey bag or sugar bag. It is a popular source of sugar for the Aborigines. In Japan, the larvae of yellow jacket wasps, locally known as hebo, are widely consumed. During the annual Hebo Festival, food products made from wasp larvae are popular delicacies (Nonaka et al., 2008; Van Huis et al., 2013: 13).

2.3.2. Coleoptera

The order Coleoptera consists of approximately 250,000 known species (Rees, 2018: 1). The insect order Coleoptera: generally includes aquatic plants whose larvae are eaten, tree larvae and dung beetles. The most consumed insect species is the red palm weevil (Van Huis et al., 2013: 11; Anankware et al., 2015: 144). In addition, Bostrichidae, Bruchidae, Cucujidae, Curculionidae, Dermestidae, Silvanidae, Tenebrionidae, Bostrichidae, Bruchidae and Curculionidae members constitute the family members (Rees, 2018: 1). Ramos Elorduy et al. (2009) listed 78 species of edible water bugs, mainly belonging to the families dytiscidae, gyrinidae and hydrophilidae. Only the larvae of these species are edible. The most popular edible insect in tropical regions such as Africa, South Asia and South America is the palm weevil, rynchophorus (Van Huis et al., 2013: 11). One of these insect species, the mealworm, can feed on soybean flour, skimmed milk powder and wheat bran. Therefore, these insects are stated as both carnivorous and herbivorous. It is stated that these insect species are easy to cultivate (Jansson and Bergen, 2015: 17). In the Netherlands, larvae of mealworm species from the family such as yellow mealworm (Tenebrio molitor), small mealworm (Alphitobius diaperinus) and superworm (zophobas morio) are grown as feed for domestic animals

such as reptiles, fish and birds. The popular type, mealworm, is generally considered an easy-to-cultivate edible insect species (Jansson and Bergen, 2015: 17). It is also considered suitable for human consumption. It is offered for sale as human food in specialty stores (Van Huis et al., 2013: 11).

2.3.3. Orthoptera

Orthoptera insect order generally includes grasshoppers, cockroaches, crickets and edible insects from the "Tenebrionidae" family that are widely grown and consumed as food in countries such as Africa and Asia (Van Huis et al., 2013: 13). There are many species of grasshoppers. Many of these grasshopper species are edible (Saeed et al., 1993: 4). Approximately 80 different species are edible worldwide (Kim et al., 2019; 441). Grasshoppers constitute 13% of the total edible insects in the world (Kaymaz and Ulema, 2020: 78). Approximately 76% of the body weight of grasshoppers is protein. There is 8mg/100g iron in the bodies of grasshoppers. This value found in the bodies of locusts is more than the iron in beef (Elhassan et al., 2019: 2; Demirci and Yetim, 2021: 15).

The fact that locusts move in flocks makes it easier for them to gather for food. In Africa, brown locusts, red locusts and migratory locusts are consumed (Saeed et al., 1993: 4). In Africa, the wings and legs of the locusts consumed are separated and fried in oil. When they need to be stored for a long time, they are dried in the sun. In Japan, locusts are consumed by coating them with sugar. In Iraq, locusts (Schistocerca gregaria) are cooked and thrown into salt water and consumed with rice (Bağrıaçık, 2009: 78). In Latin America, the best-known locust species is sapulin. This locust species is consumed in different parts of Mexico (Bradbear, 2009). In the West African country of Niger, locusts are sold in local markets. It is common to find locusts as a snack on the roadside (Van Huis, 2003: 14).

2.3.4. Isoptera

Isoptera is a general name that includes termite species (Demir, 2021: 2430). Termites are also known as small and medium-sized insects that live by nesting in cardboard, wood or soil (Khalilovich, 2022: 101). They feed on wood and other substances in the tropics and subtropics, where there is plenty of rain and hot climate. They complete their feeding at night. There are approximately 3 thousand species of termites in the world. The regions where these creatures are most commonly seen are the African continent (Demir, 2021: 2430).

Local people in Africa pound the ground around termite nests to encourage termites to emerge (Paoletti et al., 2000: 195). There are 700 species of termites in Africa. Termite species that are popularly eaten in Africa are Anacanthotermes ochraceus, Macrotermes. Acanthotermes species are sold more in markets. Because Acanthotermes make their nests close to the ground surface, with low mounds and the entrance covered with leaves, they are easy to collect. They are generally preferred alive and raw for eating. They are also dried for later use. Termite species are also very common in Indonesia. These species are mixed with flour to make cakes (Bağrıaçık, 2009: 78). In the Amazon, Syntermes species are the most commonly eaten termites. They are waited for by entering the hole of a palm leaf nest and the termites that bite the leaf are hunted (Paoletti et al., 2000: 195).

2.3.5. Lepidoptera

Lepidoptera is an insect order that includes butterflies and moths. Approximately 180 thousand species of Lepidoptera have been identified. Lepidoptera is one of the most widespread insect orders. The larvae of this insect group serve as food for many ethnic groups in the world (Ramos-Elorduy et al. 2011: 1). Lepidoptera are also used as human food or

medicine. There are approximately 400 Lepidoptera used for this purpose (Yen, 2015: 102). Butterflies and moths are typically consumed in their larval stages (i.e. as caterpillars), but adult butterflies and moths are also eaten (Van Huis et al., 2013: 11). The reason why butterfly adults are not preferred is that they have very hairy bodies. Therefore, larvae or pupae are generally preferred (Bağrıaçık, 2009: 78). Lepidoptera are usually prepared by frying, mixing with other foods or charring in salt water. They are also a source of high amounts of energy and protein for the local diet (Ramos-Elorduy et al., 2011: 1). In the Laos Democratic People's Republic, it has been observed that hawk moths are consumed after their wings and legs are removed (Van Huis et al., 2013: 11). In Australia, Noctuidae (earthworms), Cossidae (woodworms) and Hepialidae (root borers) are consumed by frying in oil. Butterfly caterpillars are the most important food source for Australian natives (Bağrıaçık, 2009: 78). Additionally, Agrotisinfusa (Bogong moth) moths are consumed by indigenous Australians (Van Huis et al., 2013: 11).

Butterfly caterpillars are also an important food source in Africa. Especially many species of Saturniidae (peacock butterflies) are consumed and dried or smoked. These species are sold in African markets and even exported to other countries. They are also consumed by frying in Indonesia and Siam. The pupae of Bombyx mori (Bombycidae, silkworms) insects used in silk production are consumed in China and India. The cocoons are thrown into boiling water to obtain silk thread. After the threads are wound on the reel, many boiled pupae remain in the water. These are dried and stored for later consumption or sold in markets. The pupae are especially served with rice. Some Pyralidae, Cossidae, Noctuidae species are consumed with pleasure in Mexico (Bağrıaçık, 2009: 78). The larvae of Pantherodes pardalaria and Aegiale hesperiaris were traded by the ancient Mexicans. The locals here know very well where and when

the largest and most delicious larvae will be found (Ramos-Elorduy et al., 2011: 1).

2.3.6. Odonata

Odonata is known by different names such as aeroplanes, dragonflies and damselflies (Önder, 2022: 105). Odonata is a widely distributed, small, well-known insect order (Corbet, 1980: 189). Odonata has a two-phase life cycle with aquatic larvae and terrestrial adult stages (Gerstle et al., 2023: 2). There are more than 115 species of Odonata in Turkey (Önder, 2022: 105).

2.3.7. Diptera

The insect order called Diptera includes all flies (Mankan, 2017: 425; Çelik, 2022: 27). Examples of the insect order Diptera are mosquitoes, midges, houseflies and buveleks (Karaman and Bozok, 2023: 128). The habitats of the insect order Diptera are humid terrestrial, aquatic and semi-aquatic regions (Mankan, 2017; 425, Çelik, 2022: 27). In China, Musca domestica worms (muscidae, houseflies), which are in the Diptera order, are consumed. In Africa, chaoboridae (lake flies) are caught with a net, which is an insect-catching tool. They are collected by hand and thrown into the water. They are consumed after the drying process (Bağrıaçık, 2009: 80). The countries where flies are consumed the most are Mexico, China, Japan, Kenya, Malaysia and East Africa (Mankan, 2017: 425; Çelik, 2022: 27).

2.3.8. Hemiptera

The Hemiptera insect order is the general name given to insects such as aphids, cicadas, and bedbugs (Van Huis et al., 2013: 11). The Hemiptera order, which has a high diversity of species among insects, consists of the suborders Sternorrhyncha (aphids, scale insects, whiteflies,

mealybugs), Auchenorrhyncha (plant fleas, leaf fleas) and Heteroptera (half-anatomized, bedbugs) (Demir and Ünver, 2019: 53). The giant water bug (Belostomatidae), known as the strongest of the Hemiptera order, is known to be 7.5 cm long and weigh 11 g. There are more than 50 thousand species of this order. Cicadas, aphids and bedbugs (True bugs) are the most well-known species (Çelik, 2022: 28).

Malawi, several species of cicadas (Ioba, Platypleura and Pycna) are highly valued as food. Cicadas can be found on the trunks of trees and can be collected using long reeds (Phragmites mauritius) or grasses (Pennisetum purpureum) that have a sticky residue on them, such as latex from the tree (Ficus natalensis). The latex sticks to the cicadas' wings, which are removed before they are consumed (Van Huis et al., 2013: 14). In Thailand and China, they are collected especially for the pleasant odor secreted from their thorax. After being caught with nets, their wings and legs are torn off and cooked. Scorpions and spiders are other insects of this order. The countries that consume these insects the most are China, Thailand, Japan, Congo, Mexico, Indonesia and Venezuela (Çelik, 2022: 28). Some Homoptera yield a bright red pigment, also called carmine dye (E120), derived from the cactus cochineal beetle (Dactylopius coccus), which is commonly used in food products commonly eaten by humans (Van Huis et al., 2013: 14).

2.4. Flavors Reminiscent of Some Edible Insect Species

When the taste characteristics of edible insects are evaluated, it is revealed that they have a taste similar to many commonly eaten foods (Muslu, 2020: 1012). Insects generally emit little or no odor. This is due to the skeletal structure of insects. Little or no odor affects the flavor perception of insects. In addition, the shelled skeletal tissue in the structure of insects gives the feeling of eating crackers. It creates the pleasure of crunchy eating during chewing. In

summary, the taste and flavor perception in insects seems convincing for humans (Altundağ, 2022: 213).

For example, it has been reported that ants and termites taste like hazelnuts, cockroaches like mushrooms, and beetle larvae like whole grain bread (Ramos-Elorduy, 1998; Kourimská and Adámková, 2016: 22; Muslu, 2020: 1011). Table 2.1 lists the tastes evoked by the main insect groups.

Table 2.1: Flavours evoked by some edible insect species.

Type of Insect	Taste It Reminds Me of
Ants	Sweet, nutty
Black witch moth larvae	Herring
Central agave worms	Red kidney beans
Corn earworms	Corn cob
Crickets and locusts	Light
Dragonfly larvae	Fish
Leaf-footed insects	Very sweet zucchini
Nopal worms	Fried potatoes
Red agave worms	Spicy
Filth bugs	Apple
Termites	Walnut-like
Tree pests	Such as fried zucchini with avocado
Woodworms	Roast pork
Wasps	Pine nuts
Water boatmen	Fish (when fresh), shrimp (when dried)
Water boatmen and swimmer eggs	Caviar
White agave worms	Crunches
Yellow mealworm beetle larvae	Whole wheat bread

2.5. Nutrient Contents of Insect Species

It is thought that insects, which are consumed as a traditional food in different populations, may be preferred more in human nutrition in the coming years (Andaç and Tuncel, 2023: 252). In a study, the antioxidant activity of water- and oil-soluble extracts obtained from 12 edible

insects and 2 arthropods was examined in laboratory and artificial conditions (in vitro). As a result of the study, it was found that grasshopper, silkworm and locust extracts had 5 times the antioxidant capacity of fresh orange juice (Di Mattia et al., 2019: 1). Insects are also used to treat many diseases in traditional medicine (Gahukar, 2020: 1). Although the nutritional content of insects has not been studied sufficiently, there are different studies. These studies include many factors such as whether insects are larvae or adults, their size, seasonal processes, where they grow, and their species. Insects are a rich food source because they contain many alternatives in terms of micro and macronutrient content (Muslu, 2020: 1011).

Insects, which are rich in proteins, fats and dietary fibers, provide approximately 400-500 kcal of energy per 100 grams, depending on their species (Rumpold and Schlüter, 2015: 20-24). The main component after protein in edible insects is fat, which is found in 7-77% of dry matter (Elhassan et al., 2019: 95). The carbohydrate content in edible insects is mostly low (6.71-15.98%). It is mainly in the form of chitin (De Carvalho et al., 2020: 3642). In addition to their high-quality proteins, edible insects also attract attention with their high mineral content (Gabaza et al., 2018: 390-398). Edible insects are also a source of some vitamins. Eating edible insects provides significant amounts of copper, iron, magnesium, manganese, phosphorus, selenium and zinc. They usually contain high levels of riboflavin (B2), pantothenic acid (B5), folic acid (B9) and biotin (B7). According to FAO, insects help meet the daily recommended amount of minerals and vitamins (Ordoñez-Araque and Egas-Montenegro, 2021: 1). The average nutritional values of edible insects and the amount of energy they provide are given in Table 2.2 (De Castro et al., 2018: 85; Muslu, 2020: 1011).

Table 2.2: Nutrient contents of insect orders.

Insect Squad	Protein (g/100g)	Oil (g/100g)	Carbohydrate (g/100g)	Mineral (g/100g)	Energy (kcal/100g)
Coleoptera	3.7-54	3.7-52	12-34	1-2	126-574
Diptera	17.5-67	4.2-31	8.4-23	1.24-8	199-460
Hemiptera	33-65	7-54	7-19	1-19	329-622
Hymenoptera	1-81	1.3-62	5-94	0-6	234-593
Lepidoptera	13.2-69.6	7-77	3-41	2-8	126-762
Orthoptera	13-77	2.4-25.1	16-30	2-27	117-436

In their study, Rumpold and Schluter (2015) evaluated the nutritional contents of edible insects as protein (%), fat (%), dietary fiber (%), ash (%), and energy (kcal/100g) (Rumpold and Schluter, 2015: 802-823). These values are given in detail in Table 2.3.

Table 2.3: Nutrient contents of insect orders.

Insect Squad	Protein (%)	Fat (%)	Dietary Fiber (%)	Ash (%)	Energy (kcal/100g)
Grasshoppers and crickets *(Orthoptera)*	61.32	13.41	9.55	3.85	426.25
Cockroaches *(Blattodea)*	57.30	29.90	5.31	2.94	-
Damselflies *(Odonata)*	55.23	19.83	11.79	8.53	431.33
Flies *(Diptera)*	49.48	22.75	13.56	10.31	409.78
Half-winged *(Hemiptera)*	48.33	30.26	12.40	5.03	478.99
Bees, wasps and ants *(Hymenoptera)*	46.47	25.09	5.71	3.51	484.45
Caterpillars *(Lepidoptera)*	45.38	27.66	6.6	4.51	508.89
Beetles *(Coleoptera)*	40.69	33.40	10.74	5.07	490.30
Termites *(Isoptera)*	35.34	32.74	5.06	5.88	-

Due to the variety of insect species, the nutritional values of edible insects vary. Insects are a highly nutritious food source in terms of fiber, minerals, high fat and protein. Even within the same species groups, the metamorphosis stage, habitat and nutritional value of insects can vary. For example, when worms are compared with cattle and pigs, the unsaturated fatty acid in worms is similar to fish. However, the vitamin, mineral and protein contents of worms are similar to meat and fish (Van Huis et al., 2013: 18). Insects can provide the energy required for the organism. The energy content can vary depending on the type of insect and the region it is located in. Holometabolism is a form of insect development that includes four life stages. Holometabolous insects have a high amount of polyunsaturated fat in their immature stages. Insects known as Coleoptera and Lepidoptera species provide more energy. When edible insects and insects grown in organic waste are examined, edible insects provide 217-777 kcal/100g, while insects in organic waste provide 288-575 kcal/100g of energy. When the same ratios are considered, this value is 165-705 kcal/100g in animal products and 308-352 kcal/100g in vegetables. In addition, the cost of edible insects is seen to be lower than vertebrates (Ramos-Elorduy, 2008: 285).

Duran (2024) evaluated the benefits and harms of edible insects as an alternative food source, and the opportunities and threats they may contain. The study indicates that the strengths of edible insects are nutritional value, sustainability, fast production and diversity. The weaknesses are listed as difficulty in marketing, lack of a distribution network and deficiencies in legal regulations. The opportunities that can be evaluated are stated as increase in food demand, innovation, sustainable food alternatives and international markets. The threats that can be encountered are listed as health concerns, climate change, emotional state and competition. Are listed in detail below.

STRENGTHS

Low production costs

Providing ecological services

Effective in waste biodegradation

Supporting the natural resistance of agricultural ecosystems

Using in controlling harmful pest species

Having many insect species

Using as animal feed

Lower carbon emissions

Less water consumption compared to other animals

Taking up less space compared to other animals

Using in medical treatments

Using insect products in alternative medicine (probolis, royal jelly, poison, etc.)

Tasting of insects is similar to consumed foods

Many insect species do not have an odor

Containing macro and micro nutrients (copper, iron, magnesium, manganese, phosphorus, selenium and zinc)

Using in religious rituals

Being consumed traditionally in different countries

Insects contributing to cultural (language, literature, art, religion, etc.) development

WEAKNESS

- Insect consumption can be affected by cultural differences
- There is an ethnocentric perspective towards insect consumption
- Insect consumption can be affected by social norms
- Some religious beliefs forbid eating insects
- The supply chain process (transportation, storage, customs clearance, etc.) is difficult
- There are legal deficiencies regarding food safety and regulations
- Lack of interest
- Lack of experience

OPPORTUNİES

- Referred to as an alternative food source by the Food and Agriculture Organization
- Approved by the European Union for some insect species as edible
- Considered as a global energy source
- Considered as a sustainable source
- Increased interest by Western cultures
- Extensive areas of use
- Insects are suitable for different processing methods
- High potential to reach new consumer classes in global markets
- Considered as a source of innovation in developing new products and business models

THREATS

- It can cause allergic reactions
- It can cause food poisoning
- It can contain pathogenic microorganisms
- It can contain mycotoxins
- It can contain natural or synthetic compounds that prevent the absorption of nutrients
- It can contain heavy metals
- It can contain parasites
- It can disrupt the socio-cultural structure
- In case of uncontrolled increase, natural areas can be destroyed
- Food safety laws and regulations can restrict market areas
- Lack of information can make insect consumption difficult
- Fraud can occur due to lack of sufficient information about the production and marketing of insects
- Excessive consumption can cause a decrease in biodiversity
- The increase in alternative protein sources (artificial meat, plant protein, etc.) can negatively affect the competitive environment
- Incorrect information about edible insects can develop negative feelings towards insects

2.6. Countries Where Edible Insects Are Most Preferred

In many cultures around the world, dishes containing edible insects are preferred (Hartmann et al., 2015: 148; Tan et al., 2016: 222; Verneau et al., 2016: 30-36; Ruby and Rozin, 2019: 155; Videbæk and Grunert, 2020: 1; Onwezen, Verain and Davegos, 2022: 1; Valerón et al., 2022: 1). Insects are not preferred much as human food in Turkey. There is only one enterprise (Mira live feed insect farming) in Antalya that produces insects. Insects are ordered for human consumption (Selçuk and Gencal, 2023: 20). Güneş et al. (2018) studied the recipes of edible insect dishes containing grasshoppers and their nutritional values, taking into account the halal status. The visuals of these dishes are given below. (Figure 2.1)

Figure 2.1. Recipes containing edible insects and the nutritional values of these dishes (Güneş et al., 2018: 165).

When Table 2.4 is examined, it is seen that the countries where edible insects are most liked are South Africa, Malaysia, China, Thailand, India, Northern and Central Australia, Papua New Guinea, Ecuador, Congo, Zaire, Sudan, Philippines, Colombia, Ecuador, Japan, Angola, Nigeria, South Africa, Congo, Sudan, Zaire, Malaysia, Zimbabwe, Ghana and Malawi (Saruhan and Tuncer, 2010: 25; Güneş et al., 2017: 66).

Table 2.4: The most preferred edible insects in the world.

Type of Insect	Team or Type	Country of Use
Worms	*Scyphophorus acupunctatus, Omphisa fuscidentalis, Tenebrio, Gonimbrasia belina, Zophobas*	Mexico, Thailand, China, South Africa, Venezuela
Cactus pests	*Metamasius*	Ecuador, Mexico, Venezuela
Christmas bugs	*Anoplognathus viridiaeneus*	Australia
Cicadas	*Magicicada*	United States, China, Japan, Thailand, Malaysia, Mexico, India
Cochineal	*Dactylopius coccus*	merica, China, Canary Islands and many countries
Cockroach	Blattodea	Australian, Chinese, Indian, Thai, Malay, Mexican, Brazilian
Cricket	*Gymnogryllus lucens*	Canada, North America, Thailand
Hornest	*Vespidae*	China, Japan, Southeast Asia
Jewel beetles	-	Africa, Southeast Asia, China
Beetles	*Cerambycidae*	Africa, Southeast Asia, China
Palm weevil	*Rhynchophorus*	China, Central and West Africa, Southeast Asia, South America, Papua New Guinea, Malaysia
Silkworm	*Bombyx mori*	South Korea, China, Japan
Ground beetles	*Lucanidae*	Mexico, Ecuador, India, Malaysia, Japan, Papua New Guinea, Madagascar
Walking stick insect	*Phasmatodea*	Malaysia, Papua New Guinea
Tiger beetle	*Cicindelinae*	Mexican
Aquatic insects	*Corixidae*	Mexican
Giant water bugs	-	Mexico, Venezuela, China, Japan, Congo, Thailand
Diving beetle	*Dytiscidae*	East and Southeast Asia, China
Aphids	*Aphididae*	Mexico, Middle East
Moths and maggots	*Pyralidae*	China, Japan, Mexico, Brazil

Baggy worm moth	*Psychidae*	Mexico, Ecuador, Africa, Madagasca
Emperorbutterflies	*Saturniidae*	Africa, Mexico
Bees	*Apis, Bombus., Xylocopa, Trigona, Vespa*	Asia, Central and Southern Africa, South America, China, Thailand, Myanmar, Indonesia, Australia, Congo
Flies	Musca*, Ephemeroptera, Culicidae*	Kenya, Malawi, China, Japan, East Africa, Mexico
Fly maggot moth	*Manducasexta*	North America
Dragonfly	*Anisoptera*	Central Africa, South America, Asia, Papua New Guinea, Indonesia
Spiders	*Nephilidae, Sparassidae, Theraphosidae*	Indonesia, Venezuela, Cambodia
Grasshopper	*Schisocercagregaria, Sphenarium, Tettigoniidae*	Mexico, Africa, South America, East and Southeast Asia, India, Papua New Guinea
Ant	*Camponotus, Oecophylla, Atta, Myrmelachistaschumanni, Macrotermes bellicocus*	Australia, Thailand, China, Indonesia, Colombia, Brazil, Amazon, Africa, Southeast Asia

There are 250 species of edible insects found worldwide in Africa. These insects are sold in many local markets on this continent. The size and type of insects are effective in determining the sales price. In addition, the type of insects consumed varies between regions. For example, when looking at the African continent and the Kwango Region, 38 species of insects are consumed in Northern Angola and 30 species in Kwango (Amevoin et al., 2015: 10). Nigeria is also a rich country in terms of edible insects. The orders Hymenoptera, Hemiptera, Isoptera, Orthoptera, Coloeptera and Lepidoptera constitute the insect species consumed in the country. Crickets and caterpillars, long-horned grasshoppers, termites, and African palm weevil species are the insect species consumed by the Ghanaian society (Raheem et al., 2019: 2169). According to a

study conducted in Northern Angola, insects are collected from the wild and consumed as a seasonal food product. Caterpillars are the most preferred insects. After the caterpillars are collected and washed, they are cooked. Since the Anaphe panda caterpillar has a hairy structure, its hairs are cleaned before cooking (Mbahin et al, 2010: 1). Foods obtained from insects are a part of the food culture in China. In fact, China hosts gastronomy tourism activities. Bamboo caterpillars, ants, cicadas, dragonflies and wasps are the insect species consumed in the destination. Insect eating festivals are traditionally held in the Dai, Hani, Yi and Gelao regions of China. People living in these regions act within the scope of sustainability when collecting insects. In fact, they do not prefer to collect colonies where insects can reproduce and they carry out the collection process in a controlled manner. Steaming, frying and stewing are preferred cooking methods (Feng et al., 2018: 184). Consumption of edible insects has decreased in Japan. It is consumed especially in mountainous areas in the autumn season. Grasshoppers are the most consumed insect species. The areas where grasshoppers are collected are usually rice fields. Another most consumed food is wasp larvae. Japan imports larvae from Australia and Vietnam. The Hebo Festival is held in Japan every year and the amount of larvae produced is insufficient. Due to the imbalance in supply and demand, larvae are imported (Raheem et al., 2019: 2169).

In a study conducted in the Manipur Region of India, it was reported that the insect species consumed in India mostly live in wetlands and are preferred by the locals because they are delicious and have high nutritional value (Shantibala et al., 2014: 2-10). There are approximately 194 different species known as edible insects in Thailand. Insect nutrition has become important especially in Northern and North-Eastern Thailand. The emergence of this situation has been

affected by the fact that poultry consumption has become difficult due to economic difficulties and socio-cultural facts. The species "Omphisa fuscidentalis" (bamboo worm) is a production activity supported and promoted by the Thai Ministry of Agriculture (Raheem et al., 2019: 2169).

2.7. Renewable Insects and Food Safety Issues

The use of edible insects as a food source is receiving increasing attention worldwide, with a slight increase in Western countries, raising concerns about food safety issues and the potential hazards of consuming insects (Murefu et al., 2019: 229). Edible insects are regularly ingested in large quantities as dietary and nutritional supplements by people in various rural areas of Southeast Asia, the Pacific, Sub-Saharan Africa, Central and South America (Gahukar, 2020: 1). Edible insects, like other animal and plant foods, can be associated with various risk factors that threaten human health, including chemical and biological hazards and allergens (Imathiu, 2020: 1). Food problems related to edible insects include allergens, pesticide residues, pathogenic microorganisms, mycotoxins, anti-nutritional compounds, heavy metals, and parasites (Johansson et al., 2004: 832; Van Huis et al., 2013: 564; Tasleem et al., 2015: 2959).

2.7.1. Allergens associated with edible insects

An unwanted immune response to an allergen, food, is called food allergy. This can lead to serious illness and even death (Johansson et al., 2004: 832). Some proteins found in edible insects, such as arginine kinase, α-amylase and tropomyosin, are considered allergens (EFSA Scientific Committee, 2015: 39). It is stated that European adults and children suffer from food allergies (Nwaru et al., 2014: 992).

Some insect proteins can cause allergic problems such as eczema, dermatitis, rhinitis, conjunctivitis, congestion, bronchial asthma and edema in humans (Van Huis et al., 2013: 563; Barre et al., 2014: 315). According to Murefu et al., since insects are also closely related to crustaceans, it is suggested that insects can cause food allergies (Francis et al., 2019: 224).

2.7.2. Pesticides associated with edible insects

The reasons why edible insects are exposed to pesticides include being in the area during pesticide use or coming into contact with pesticide plants or eating them (Tekiner et al., 2022: 23). In Thailand, it has been reported that pesticide-contaminated insects cause food poisoning in people who eat insects (DeFoliart, 1999: 21). In particular, it is necessary to consider the risks that may develop due to various diseases and zoological infections as a result of consumption of insects treated or contaminated with pesticides or feeding on detritivores that feed on garbage, improper preparation or cooking (Güneş et al., 2017: 70).

2.7.3. Edible insects and some pathogenic microorganisms

Edible insects can carry pathogenic microorganisms. The extent to which edible insects are contaminated and pose a health risk to the consumer depends on the type of insect, the collection method (wild vs. domestic insects), hygiene practices, and the handling and transportation procedures involved in preparing the insects (Rumpold and Schlüter, 2013: 802). For example, to collect and process small yellow mealworms and locusts, they should be emptied on a polyethylene-based substrate, the stomach and intestines should be closed immediately, boiled for at least 30 minutes, and consumed within 2 hours (Van Huis et al., 2013: 564).

A study examining the microbiota diversity of edible insects processed and marketed in Thailand found that several genera potentially pathogenic to humans were identified and the presence of bacteria was evident, including Vibrio, Streptococcus, Staphylococcus, Clostridia, and Bacillus. Several pathogenic bacterial genera, including Escherichia coli, Staphylococcus, and Bacilli, are known to infect both humans and invertebrates (including insects) (Grabowski and Klein, 2017: 17). In the available literature, the most frequently isolated pathogenic bacterial species from edible insects belong to the genera Staphylococcus, Micrococcus, Bacillus, Salmonella, Shigella, and Clostridium (Amadi and Kiin-Kabari, 2016: 1; Mezes, 2018: 513; Ssepuuya et al., 2019: 106).

2.7.4. Edible insects and mycotoxins

Mycotoxins are considered to be the most important food contaminants due to their negative effects on public health and food safety, and are a secondary metabolite produced by many phytopathogenic molds and food spoilage fungi, especially Fusarium, Aspergillus and Penicillium (Smith et al., 1994: 22). According to FAO, mycotoxins detected and quantified in edible insects may be due to contamination of the feed substrate by the three molds mentioned above and production of mycotoxins in the insect gut (Van Huis et al., 2013: 59).

Mycotoxins are important food contaminants that have acute and chronic adverse effects on human health (Smith et al., 1994: 22). Some insects produce toxins. However, the mineral content can also be toxic. In this case, it is believed that insects can be destroyed by constantly changing the water and hot water in the food during cooking or by refreshing the water during cooking (Morris, 2004: 20). It is

also stated that aflatoxin exposure causes growth retardation in children (Gong et al., 2004: 1334).

2.7.5. Some compounds in edible insects

Some edible insect species have been reported to contain antinutrients (natural or synthetic compounds that inhibit the absorption of nutrients) such as alkaloids, saponins, tannins, oxalates, phytates and hydrogen cyanide (Musundire et al., 2016: 1). Antinutrients, also called antinutritional factors, are substances naturally present in food that inhibit the uptake, digestion, absorption or utilization of nutrients (both macronutrients and micronutrients) (Akande et al., 2010: 827). Four antinutrients (tannins, oxalates, cyanides and phytates) were detected and quantified in four species of insects in Nigeria. Insect species found to contain phytates and tannins include horn beetles, locusts, termites, mealybugs and termites (Musundire et al., 2016: 16). Other antinutrients identified and quantified in edible insects are saponins and alkaloids (Musundire et al., 2014: 223).

2.7.6. Some heavy metals in edible insects

Heavy metals considered as systemic toxins include metallic elements such as lead (Pb), mercury (Hg), arsenic (As) and cadmium (Cd) that can be toxic at low exposure levels (Tasleem et al., 2015: 29592). Heavy metals detected and/or quantified in some edible insects include Cd, Pb and Hg. The two heavy metals of greatest concern are Cd and As, which can accumulate in the larvae of the black soldier fly and the famous beetle, respectively. These two important insect species are of great importance, especially for western countries. They are used as food and feed in these countries (Van der et al., 2018: 1172).

2.7.7. Edible insects and parasites

According to Chai et al., analysis of various insect and human anatomy studies in areas where edible insects are applied suggests the possibility of parasitic food poisoning by some edible insects (Chai et al., 2009: 62). Dicrocoelium dendriticum is a zoonotic parasite that easily infects humans by eating edible insects such as ants (Boye et al., 2012: 798). Chagas disease, also known as American Trypanosomiasis, is a potentially life-threatening disease caused by the protozoan parasite Trypanosoma cruzi. It is estimated that 6 to 7 million people worldwide are infected with Trypanosoma cruzi. Chagas disease occurs primarily in endemic areas of 21 countries in Latin America. It is transmitted through human contact with the feces and urine of infected blood-sucking triatomine bugs (vector-borne infection) (WHO, 2020). Despite these life-threatening risks to human life, more detailed analyses of parasitic food safety issues in edible insects are lacking. Wild-harvested insects are more likely to transmit parasitic diseases to humans than farmed insects due to their uncontrolled feeding habits (Lange and Nakamura, 2021: 38).

CHAPTER 3

3. Evaluation of Edible Insect Perception

In this section, the subject of perception will be discussed conceptually and edible insects will be evaluated based on individual factors affecting perception.

3.1. Perception Conceptual Framework

Perception, in its most general sense, is expressed as the process of creating harmony and unity of matter reaching the human being through the sense organs and therefore having physical, physiological and neurological components (Cevizci, 2010: 62). When the literature is examined, there are different definitions related to perception (Kanca, 2012: 4). In short, perception can be defined as making the stimuli meaningful in the cognitive process with the effects of the experiences possessed and lived through the five sense organs.

Humans have the ability to understand their environment by perceiving events happening around them through their

sense organs. Past experiences also contribute to this ability (Bakan and Kefe, 2012: 19). Everything a person sees, feels, hears, smells and tastes in their environment is the result of a series of actions that take place in the brain. Emotions and actions develop from birth depending on the abilities and thoughts of each individual (Godlewski, 2010: 1).

The relationship that humans establish with the outside world is fundamentally the relationship between sensation and perception. Because human knowledge initially emerged on the basis of sensation and perception. Knowledge is the result of an activity that depends on one side being the subject and the other being the object. On the knowledge side that looks at the object, there is sensation and perception (Can, 2021: 93). Perception and sensation constitute the basic components of human experiences (Bilgin and Cengiz, 2019: 27). Sensation and perception are the windows that open to the outside world. Humanity's relationship with reality has been based on sensation and perception since the beginning (Can, 2021: 93). It is difficult to draw a clear line between sensation and perception (Bilgin and Cengiz, 2019: 27). Sensation can be defined as a direct mental product resulting from the transmission of an external stimulus that activates the sense organs to the nerve center via the nerves (Budak, 2000: 235). Perception, on the one hand, differs from the senses in that it interprets and gives meaning to the sensations originating from the sense organs, and on the other hand, it differs from higher mental processes such as imagination, memorization, concept formation, and reasoning (Cevizci, 2010: 62). It is also believed that perception is based on learning, while sensation is dependent on innate physiological mechanisms (Bilgin and Cengiz, 2019: 27). Therefore, sensory processes must occur in order for the perceptual process to begin. In this case, every perceptual event is a bridge established with

the outside world based on the data obtained from the senses (Cüceloğlu, 2014: 98). The difference between sensation and perception can be explained as follows: When a person smells something with a smell, what he experiences is a sensation. However, if he establishes a relationship between the smell and the object that causes this smell, what he experiences is a perception (Budak, 2003: 235). A sensory event must occur in order for perception to occur. Because a person cannot perceive things that he does not sense. At the same time, it is not correct to say that perception can occur after sensation (Can, 2021: 93).

In terms of mental capacity, it is not possible to assimilate everything we see and hear. Moreover, it is not possible for us to understand everything that happens around us. The human brain is only sensitive to certain stimuli and can process certain events directed by sensitivity (Top, 2017: 8). Human behaviors are actually shaped not by the reality of the real world itself (concrete), but rather by understanding what is real (abstract). In real life, the real world is the perceived world (Robbins and Timothy, 2012: 169). In short, an important way to understand behavior is to understand the perceived world. The importance of perception begins when the senses transform the physical and chemical energy they receive from the external environment into neural energy. These energies are processed in the processing section of the brain and a cognitive product emerges as a result of this process. The resulting product is the perceived world, which is a reflection of the real world (Cüceloğlu, 2014: 98). For these reasons, perception is also important as a mental shortcut to understanding the environment. Since not everything observed can be assimilated, it is often difficult to digest observed facts (Top, 2017: 8). It is possible to collect the factors affecting the perception process in four groups (Eren, 2010: 70; Top, 2017: 13). They are grouped

as Person-related factors, Target-related factors, Situation-related factors, Cognitive factors (Top, 2017: 16).

3.2. Factors Affecting Perception

It is possible to collect the factors affecting the perception process in four groups (Figure 4.1) (Eren, 2010: 70; Top, 2017: 13).

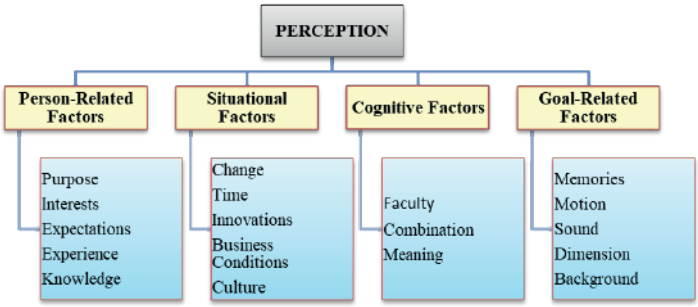

Figure 3.1: Factors affecting perception

The fact that people perceive events differently even when they look at the same thing can be explained by many different factors. In addition to our past experiences and what we have learned, factors such as our values, expectations, the prejudices of the culture we belong to, our cognitive style, and our impulses can also affect our perceptual experience (Edgü, 2021: 220). The individual tries to combine, or organize, these stimuli that they selectively perceive from the environment in a meaningful way. While the things perceived may be different, their interpretation can also be quite different from person to person (Can vd., 2015: 40).

3.2.1. Person-related factors

When people make comments about others, they are more affected by internal factors such as personality,

learning, and motivation that affect their own perceptions. Many factors such as an individual's own personality traits, values, attitudes, current mental state, and past experiences significantly affect how that person perceives another person (Can vd., 2015: 52). From time to time, people perceive objects, events and people as they think (Top, 2017: 14). In addition, culture also affects people's perception of others. For example, it is almost difficult for those who do not have knowledge of the culture of that country to accurately predict the personality of someone who comes from a different culture. These people will not be able to make an adequate and accurate assessment because they will evaluate the personality traits of employees who grew up in that culture in light of their own cultural experiences, attitudes and values (Can vd., 2015: 52). How people perceive themselves and others differently is primarily linked to the differences in their identities, cultures and lifestyles (Top, 2017: 14).

3.2.2. Target-related factors

The target is another important factor that affects people's perceptions. The characteristics of the target can also affect people's perceptions. When people look at the target, they look at it in isolation (singularly), the target's relationship with the background, and the tendency to group nearby or similar objects also affect perception (Top, 2017: 16). When evaluating a person we have just met, we can take into consideration everything that gives us clues about him/her, such as facial expressions, general physical appearance, skin color, eye color, age, gender, hometown, tone of voice, personality traits, attitudes and behaviors. While some of these provide really important clues, others can mislead the person (Can vd., 2015: 51). Another classification made in this field is a dual classification as internal and external

factors. Internal factors are personality, purpose, past experience, needs and expectations. External factors are the relative differences between stimuli, the intensity of the stimulus, the familiarity of the stimulus, the mobility of the stimulus, the repetition of the stimulus, status and general appearance (Top, 2017: 16).

3.2.3. Situational factors

The environment and conditions in which perception takes place affect the person's perception (Can vd., 2015: 52). The human brain is greatly affected by the situation and environment in which the individual is located during the perception process. Because it includes the individual's expectations, past experiences, other messages coming from other sense organs, social and cultural factors. The position and situation in which the individual is located during the perception process is important in this respect. Physical spaces such as offices, places, factors such as lighting, ventilation, heating, and social arrangements such as time and work conditions also affect perception. Even the stimuli related to the moment when the individual sees the object or phenomenon also affect how the object or phenomenon is perceived (Top, 2017: 15). For example, you may automatically think positive things about a person who is introduced to you by someone you admire and respect. In the opposite case, you may have negative thoughts. Your thoughts about the person you just met may change as you get to know him/her. However, it is usually difficult to change the first impression and later perceptions are greatly affected by the first impression (Can vd., 2015: 52).

3.2.4. Cognitive factors

Social cognition is defined as a way of learning developed through a type of perception, comprehension and

understanding. Social cognition, which operates cognitive processes such as an attribution style towards stimuli coming from the environment, planning fallacy, counterfactual thinking, and self-justification, is an important process of cognition and can be used to explain why and when questions (Baron and Markman, 2000:1). When individuals use their cognitive abilities, it is also important for them to take their own capacities and abilities into consideration in terms of shaping their self-perception. There are four types of cognitive levels (perception) that affect and are affected by personal behavior. These levels are: Receptive and perceptive ability, Memory-recall-learning skills, Thinking, Expressing (Top, 2017: 17).

3.3. Insect Consumption Perception

Insect consumption perception may differ according to gender, education level, income level and personality traits (demographic variables). Insect consumption perception is positive in men compared to women, in those with higher education levels compared to those with lower education levels, in those with higher income levels compared to those with lower income levels and in individuals with a personality trait of being open to experience (Bozok and Karaman, 2023: 147). In a different study, it was stated that there was no relationship between students' personality traits and their perceptions of insects, and that individuals with the same characteristics towards insects may have different attitudes towards insects (Sarı and Karaçeper, 2024: 2024). In addition, food consumption situations may also differ in the perception of insect consumption. Individuals who do not consume ethnic food have a negative perception of insect consumption compared to those who do. In addition, it is stated that individuals' perceptions of insect consumption may be important in food product choices due to the price

factor (Okutan, 2024: 96). People who are educated in the field of gastronomy and culinary arts or who practice such professions, who have traveled abroad before and experienced insects have a more positive approach towards insect consumption (Payas and Tüker, 2021: 355). In general, it is stated that different test conditions, different survey formats and gender differences can significantly affect consumer perception towards insect-based food products (Gao, 2021: 4). The perception of edible insects may differ depending on the regions individuals live in. It has been determined that the perceptions of the society living in the Republic of Cyprus towards edible insects are predominantly positive compared to the societies living in the Turkish Republic of Northern Cyprus (Demir, 2021: 75). In the study, which aimed to determine the perceptions and preferred product features of German consumers regarding insect-based bars, it was stated that insect-based bars are of high quality but low attractiveness, and the preferred product is hazelnut-based, chocolate-based and priced at 1.69 euros. Consumers' perception is generally distinguished by disgust but also by quality, healthiness and sustainability. It is stated that there is low or no perception due to the lack of information about insect-based foods, their benefits and their unavailability in retail stores (Kampmann et al., 2023: 1). A study that took a methodical approach to understanding US consumers' perceptions of insects as food, particularly products made with cricket powder, examined the effects of these on individuals' perceptions of snack crackers (color, texture, flavor, and overall perceptions). Disgust and fear are common reactions. It is stated that Western consumers are hesitant to accept insects as food (Ardoin, 2021: 4). It is stated that the amount of protein contained in food products is not an influential factor in the perception of edible insects in individuals' food consumption patterns (Demir,

2021: 75). In a study conducted on Turkish consumers, if insects are used in medicine production, participants have a positive view of using medicines or consuming insects for treatment purposes. Likewise, the inclusion of insects in the production of some foods is not seen as an obstacle to the consumption of the food (Payas and Tüker, 2021: 355). nother study states that individuals may consider insects as alternative food. However, it is stated that they will not eat insects even if they are halal (Özkan, 2019: 3).

A study conducted in Greece on Generation Z revealed that 41.4% of participants knew what insect consumption was and none of the participants had eaten edible insects before. Neophobia was not seen as a determining factor in trying edible insects in Generation Z participants. However, a general reluctance was determined. It is thought that increasing awareness of edible insects may be effective in eliminating this reluctance (Kamenidou et al., 2023: 525).

Platta et al. (2024) aimed to determine whether health and environmental concerns, attitudes and intentions to purchase edible insects and foods containing edible insects among young consumers (Generation Z) in Poland are associated with the desire to consume edible insects and foods containing edible insects. Based on the surveys conducted among Generation Z in Poland, it is stated that health and environmental concerns determine the desire to consume selected products containing edible insects. It is also stated that the more positive the participants' attitudes towards health and environmental concerns, the greater their desire to consume foods containing edible insects. Attitudes and intentions to purchase foods containing edible insects were found to be positively associated with the desire to purchase and consume such foods.

Sarı and Karaçeper (2024) aimed to determine the attitudes and preferences of Gastronomy and Culinary Arts department students towards insect consumption in their study. According to the findings obtained in the study, it was determined that the students' attitudes and behaviors towards edible insect consumption were negative and they did not have a tendency to consume insects. In the analyses made for demographic characteristics, the positive perceptions of the students towards insect consumption showed a significant difference according to gender. In addition, there were significant differences between the income level and the negative perception towards insect consumption. In addition, it was stated that the perceptions of individuals who consume ethnic food towards insect consumption were positive.

Özkan (2019) aimed to "evaluate the perspectives of individuals with and without nutritional knowledge (2 groups and control) from Necmettin Erbakan University students on the use of alternative food sources (insects)" in the 2017-2018 academic year. As a result of the research, it was found that edible insect awareness was insufficient. It was stated that although the participants could consider insects as alternative food, they stated that they would not eat them even if they were halal.

3.4. Evaluation of Edible Insects Based on Individual Differences

Why do two people approach the same thing differently? The main reason for this is personal differences. Personal differences indicate that people are different from each other in many ways, such as their personalities, perceptions, attitudes, emotions, values, thoughts, behaviors, intelligence, and physical skills (Can et al., 2015: 71). The fact that people perceive events differently from each other, even when they

look at the same thing, can be explained by many different factors. In addition to our past experiences and what we have learned, factors such as our values, expectations, the prejudices of the culture we belong to, our cognitive style, and our impulses can also affect our perceptual experience (Edgü, 2021: 220). For example, if guests are expected, the footsteps in the hallway are given importance, but the noise made by those sitting upstairs is ignored. Such selective perceptions of individuals are determined by internal and external factors. The individual tries to combine, or organize, these stimuli that he selectively perceives from the environment in a meaningful way. While the things perceived may be different, their interpretation may also be quite different from person to person (Can et al., 2015: 40).

Individual differences also affect people's food and beverage preferences. Therefore, in this section, the subject of edible insects will be discussed in terms of individual differences.

3.4.1. Personality and edible insects relationship

Many theories have been developed to explain personality development (Özdemir et al., 2012: 566). Personality is a process that begins to form at an early age and continues to develop and change throughout life (Can et al., 2015: 71). Personality is the totality of innate and acquired characteristics that distinguish an individual from others. Personality includes the permanent aspects of an individual's mental, emotional, social and physical characteristics (Özdemir et al., 2012: 566). After the age of personality formation, the pace of change gradually decreases. After a certain age, radical changes no longer occur in personality formation (Can et al., 2015: 71).

When people make comments about others, they are more affected by internal factors such as personality, learning, and motivation that affect their own perceptions. Many factors such as an individual's own personality traits, values, attitudes, current mental state, and past experiences significantly affect how that person perceives another person. The expression "A person knows his own business" actually describes this situation (Can et al., 2015: 52). From time to time, people perceive objects, events and people as they think (Top, 2017: 14). For example, a person who thinks insects are scary and consuming insects is disgusting will also perceive them in this way in a personal context.

In addition, culture also affects people's perception of others. For example, it is almost impossible for those who do not have knowledge of the culture of that country to accurately predict the personality of someone who comes from a different culture. These people will not be able to make an adequate and accurate assessment because they will evaluate the personality traits of employees who grew up in that culture in light of their own cultural experiences, attitudes and values (Can et al., 2015: 52). How people perceive themselves and others differently is primarily linked to the differences in their identities, cultures and lifestyles (Top, 2017: 14).

Personality traits are divided into five groups: extrovert, responsible, open to experience, docile and neurotic. They are often called the big five or OCEAN personality traits (Muiruri, 2024: 5). Personality traits are seen as important and common predictors of different characteristic features in individuals' attitudes and behaviors towards edible insects. This explains the individual differences observed in behaviors towards edible insects (Verneau et al., 2016: 30). It is stated that personality traits affect individuals' food preferences, especially for new foods (Lin et al., 2019: 10). Consumers

who encounter new and unfamiliar foods such as edible insects may exhibit neophobia or neophilia reactions depending on their personality traits (Karaman, 2019: 42). For example, some people may be skeptical about the potential benefits of edible insects and instinctively refuse to consume insects (Verneau et al., 2016: 30). It is said that individuals with extroverted, docile and open-to-experience personality traits are positively correlated with their willingness to try insects (Bates et al., 2023: 1). People who are extroverted and open to experience are associated with a greater willingness to consume insects (Russell and Knott, 2021: 1). It is also said that there is almost no relationship between individuals who taste insects and those who do not in terms of personality traits (Padulo et al., 2022: 1157). Wang and Park (2024) aimed to investigate the relationships between personality traits and attitudes (disgust and interest) towards edible insects in their study. The study result indicates that personality traits affect consumers' attitudes towards edible insects. Among consumers in the United Kingdom, it is stated that people who are more extroverted and open to experience show a higher willingness to consume insects (Russell and Knott, 2021: 8). In another study, it is stated that people who are open to experience are more open to edible insects and responsible, extroverted and agreeable people are more reluctant (Muiruri, 2024: 8). Family, culture and experiences are effective in shaping personality (Can et al., 2015: 71). Therefore, the relationship between edible insects and personality will be evaluated through family, culture and experience.

3.4.1.1. Family and edible insects

There are studies that show that personality is acquired as a result of individuals' interaction with the environment (Can et al., 2015: 72). The family is at the forefront of

environmental influences. Family structure and interactions within the family have both character and power in creating and solving problems (Dereli, 2006: 12). Everyone is born as a member of a family, socializes within this family and then becomes a member of larger communities. Behaviors develop in accordance with the cultural values within the family and the immediate environment (Can et al., 2015: 72). Individuals forming a family are parts of a functional whole that complement each other (Dereli, 2006: 12). Factors such as the values, size, economic status, education level, political views and religious beliefs of the family initiate the formation of personality (Can et al., 2015: 72).

Family is the most fundamental bond and continues to form the closest social environment in every society. Nutrition is a family activity. Family members generally have the same diet and consume the same amount of salt, calories, cholesterol and fat (Dereli, 2006: 12). The genetic characteristics, eating habits and lifestyle of parents also affect the eating habits of their children (Erdem, 2017: 9).

In many parts of the world, edible insects play an important role in meeting the nutritional needs of people (Kourimska and Adamkova, 2016: 22). Traditionally, more than 2,000 species of insects have been consumed by humans at some stage in their life cycle. These insects are of great importance as a food source for many people (Anankware et al., 2015: 143). Crickets are among the insects frequently consumed in America. Snacks such as protein bars and cookies are made from these insects (Ryu, 2016: 76). In Thailand, crickets, locusts, woodworms and white ants are commonly found on the streets and in markets (Mankan, 2017: 433). Insects are used by turning them into flour in many European countries (such as France, England, Belgium and the Netherlands). In addition, crackers made with insect flour are consumed in the USA and Canada (Huis, 2013:

572). Although insect consumption in Turkey is limited to marine insects, consumption of other land insects is almost negligible (Erdem, 2017: 2). In addition, in Turkey, insects are generally preferred as animal feed, and insect species such as locusts, mealworms and crickets are consumed as food, albeit in small amounts (Okutan, 2024: 87).

Eating is not seen as just a biological action (Beşerli, 2010: 159). Reasons such as providing the nutrients required for nutrition, putting them in a suitable form for consumption and the process of consumption behaviors are effective in perceiving it as a cultural phenomenon (Mcintosh, 2013: 1). The different social associations and rituals that emerge in the production, transportation, storage and consumption of food emphasize the importance of culture in nutrition (Beşerli, 2010: 159). The connection between culture and food is expressed as follows: Culture is a learned behavior and food habits are also learned at an early age. It is culture that shapes what we eat and what we will not eat, and it makes food a part of culture (Tezcan, 2000: 1).

It is thought that the most socializing time among families is during meal times (Mcintosh, 2013: 64). In addition, many families have a meal ritual and culture (Beşerli, 2010: 167). Considering the above information, it can be said that edible insects are consumed in many families. At the same time, it can be generalized that these insects are a part of socialization and meal rituals.

3.4.1.2. Culture and edible insects

Another environmental factor affecting the development of personality is culture (Arslantaş, 2008: 105). The values in the cultural environment in which an individual is born and raised contribute to the development of his/her personality. For example, the fact that individual values are

more important in western cultures and social values are more important in eastern cultures affects whether a person is selfish or sharing (Can et al., 2015: 72).

Food is a cultural element that has many effects in addition to personal and social dimensions. While humans are directly interested in food due to their physiological structure, they also have an understanding of food that is affected by the culture and society they live in. In short, physical and cultural geography affects food culture (Beşirli, 2010: 161). Changes in lifestyle also lead to changes in culinary culture. In this respect, there are differences between the eating and drinking habits of nomads and settlers. This difference also significantly affects culinary culture (Çetin, 2006: 108).

Culture is defined as the main factor determining what people consume as food (Kurgun and Özşeker, 2016: 1). Evaluating insects as food leads to two main reactions in the individual. Insects are considered a valuable source of protein in countries where they are traditionally consumed, while in Western cultures where they are not traditionally consumed, they are considered dirty, disgusting and dangerous (Jensen and Lieberoth, 2019: 2278). Considering the geographical distribution of edible insect consumption, it can be said that consumption is heavily influenced by cultural characteristics (Grabowski et al., 2022: 1). Especially in developing countries, the social status of edible insects as "food of the poor" leads to negative perceptions about consumption (Murefu et al., 2019: 209).

Edible insects are a phenomenon influenced by cultural and religious practices. Insects are considered traditional foods in approximately 130 countries, especially in Asia, Africa and South America. Among these countries, Mexico, China, Thailand and India stand out in terms of

consumption and diversity (Liceaga, 2021: 32; Ordoñez-Araque and Egas-Montenegro, 2021).

The fundamental differences between edible and inedible insects around the world are determined by cultural realities (Şavkay, 2000: 11; Beşirli, 2010: 160). Therefore, whether insects are edible or inedible also varies from culture to culture (Özer, 2018: 307). Almost every cuisine in the world has its own unique characteristics that can be considered basic. These are explained as the features that make this cuisine different from other cuisines. Mostly, these features are limited by religious and religious restrictions, the existence of animals and plants specific to the region (Şavkay, 2000: 11; Beşirli, 2010: 160). In fact, insects, which are hated and disgusted in some cultures, are considered a very delicious food in some cultures (Özer, 2018: 308). Therefore, since the consumption of insects as food is also culturally linked, people from non-insect-eating cultures can evaluate the consumption of insects and insect-eating cultures from an ethnocentric perspective (Payas and Türker, 2021: 336). For the Far East, edible insects, in addition to providing dietary diversity, have a very important place in their economy and culture. So much so that in some Far Eastern countries, insect consumption has become a status indicator (Bağrıaçık, 2009: 78). In addition, in another cross-cultural comparison, the Chinese evaluate processed and unprocessed insect-based foods more positively than the Germans in terms of taste, nutritional value, familiarity and social acceptance (Mishyna et al., 2020: 148). In addition to the cultural factors that determine our food consumption, different conditions in society also have a great impact on what we consume. For example, the threat of depletion of basic food resources has brought the idea of alternative food sources to the agenda. Among the measures suggested for understanding rational and moderate food

consumption are the idea that the efficiency of the food chain should be increased and a diet that requires less space in food production should be directed. According to this suggestion, the production and consumption of insects for nutritional purposes seems to be a conceivable and viable market (Kurgun and Özşeker, 2016: 1).

Consumption of edible insects varies from culture to culture. The variables that may be the cause of these differences were determined as follows, considering the above information:

- Physical and cultural geography
- Differences in culinary culture
- Traditional food consumption
- Social status
- Ethnocentric perspective
- Status indicator
- Social conditions

3.4.1.3. Experience and edible insects

Another environmental factor that affects the development of personality is the experiences a person has (Can et al., 2015: 72). According to Oh and his friends, experiences are defined as interesting, enjoyable and unforgettable consumption memories when evaluated from the customer perspective (Oh et al., 2007: 128).

Although there are various definitions in the literature, it cannot be said that there is a clear definition of experience (Demir and Demirel, 2019: 663). The personality of an individual is shaped by the events experienced since childhood affecting the individual. An example of this is a

person who is constantly deceived by people being skeptical (Can et al., 2015: 72). It can be said that it is not possible to give a clear definition since each person's experience of an event is different (emotions are involved) (Demir and Demirel, 2019: 663).

Dewey argues that the experiences of different races are also different. Since he evaluates experience as a time-object relationship, he attributes the fact that people have different psychological distinctions to the fact that people are connected to different races and historical developments. This causes experiences to be different. Thus, it ensures that the experiences of different races are different. While the experience of a single individual is different, the perspective of individuals from different races on life and the world, and therefore their experiences, are different (Eroğlu, 2017: 830). It is seen that the consumption of edible insects has been adopted by different cultures from past to present (Kourimska and Adamkova, 2016: 22). Edible insects are accepted as nutritious and delicious food in countries such as Latin America, Africa and Asia. In addition to being consumed raw, these insects have also been consumed using techniques such as drying, frying and canning (Schlup and Brauner, 2018: 36).

In the Middle East, until the 8th century BC, servants carried locusts strung on sticks to royal banquets. In the 1550s, locusts were cooked and consumed by the nomads of Arabia and Libya by boiling. They were also dried in the sun and turned into flour for later consumption. By the 1730s, locusts were widely consumed by most African, Asian and Arab societies by roasting or grilling. They were also salted and stored in warehouses and kept on ships as a sweet dish or to be served with coffee (Van Huis et al., 2013: 41).

Insects are an excellent dietary supplement, especially for children and pregnant women who have protein and iron deficiencies. In Central and South America, fatty, fleshy agave worms that live among agave leaves and turn into butterflies are a sought-after food. Butterflies are very common in African countries. Indigenous peoples in Asia, Africa, Australia, South America and Mexico regularly eat immature bees. In Mexico, dried water bug eggs (caviar) are eaten. People living in the Amazon basin, parts of Africa and in densely forested, tropical and temperate regions consume many insects that can be easily found in trees, fallen logs and forests (Holland, 2013).

When we look at the Chinese consumption of edible insects, it is seen that this dates back 2000 years. An estimated 178 species of insects are still widely consumed in China. Insects such as locusts, silkworm pupae and wasps are seen to be very common in restaurants. The Chinese Ministry of Health's introduction of silkworm pupae as a new food has increased the interest in edible insects in China (Costa-Neto and Dunkel, 2016: 29; Sogari et al., 2019: 2).

In addition to grasshoppers, shrimp is also a widely consumed arthropod. Shrimp is one of the most delicious marine insects and is a part of the traditional cuisine of almost every country. Fresh, clean shrimp can be eaten cooked or raw with a dip. Nutritionally, shrimp is high in protein, low in saturated fat and calories, and has a neutral taste. Due to these features, shrimp is used as a natural additive to salads, pasta, soups, and fried foods (Elshopakey et al., 2018: 26; Karaman and Girgin, 2020: 5). In a study conducted among the local people of Cyprus, it was reported that participants had experience with mollusks, crustaceans, termites and grasshoppers (Demir and Altun, 2021: 2443). In addition, people who travel abroad and have experience with insects have a more positive approach to eating insects (Payas and

Türker, 2021: 354). In addition, taste, appearance, safety and quality are factors that may affect consumers' willingness to try edible insects (Wilkinson et al., 2018: 11).

Today, many people do not look favorably on the idea of eating insects. Insects have never been seen as a popular food in the Western world; they have never been preferred as human food (Van Huis, 2016: 205). However, today insects are served as a special dish in many luxury restaurants in Paris and London. Insect eaters in different countries of the world say that insects are delicious and recommend everyone to eat them (Saruhan and Tuncer, 2009: 27).

Experiences regarding the consumption of edible insects vary from person to person. The variables that may be the cause of these differences were determined as follows, considering the above information:

- Breed differences
- Cooking techniques
- Nutritional supplements
- Storage methods
- Guidelines from authorized institutions
- Light calories
- Tourist trips and travels
- Taste, appearance and quality

3.4.2. Relationship between attitude and edible insects

According to researchers, the concept of attitude is a general concept that expresses positive and negative feelings towards certain people, objects and subjects (Kalkan, 2011: 194). Attitude is attributed to the individual and is his/her

evaluations about people, objects and events (Can et al., 2015: 87).

Attitude is considered a precursor to human behavior. Because it precedes behavior and contributes to its formation (Kalkan, 2011: 194). For example, when someone we love gives us an ordinary glove as a gift, it transforms it from an ordinary object into a valuable object with psychological value for us. Because of this attitude we develop towards gloves, we even avoid them (Can et al., 2015: 87). Individuals show a tendency to behave because of attitudes. In other words, there is a tendency to behave behind every attitude. At the same time, the feelings, thoughts and behavioral tendencies created by attitudes are integrated with each other. Attitudes cannot be observed, but by evaluating people's behaviors, it can be understood in which direction and what kind of quality they have (Kalkan, 2011: 194).

There are three basic elements that can be defined as the ABC of attitudes. A (affect) indicates the emotional; B (behavior) indicates the behavioral; and C (cognition) indicates the cognitive element (Can et al., 2015: 88). For example, being in favor of or against eating edible insects is having a positive or negative attitude towards edible insects. The information we have on this subject constitutes the cognitive element of the attitude. In addition to positive views such as eating edible insects can be an alternative protein source, reduce carbon emissions and contribute to global warming, all negative information such as weakening the traditional understanding of food and causing cultural erosion belong to the cognitive element of the attitude. Feelings such as liking this situation, feeling more attached, getting angry and irritable when the subject of eating edible insects is brought up constitute the emotional element of the attitude. Actions such as attending meetings and panel discussions about edible insects, attending invitations

made about edible insects and trying them, or opposing the consumption of edible insects and booing and stone people who eat them constitute the behavioral element of the attitude.

Attitudes towards eating insects are determined by many factors such as psychological, social, religious, anthropological, etc. Food preferences are formed in childhood and become more difficult to change as we get older. However, it may be possible to encourage insect eating, and the only question is how quickly this process can occur (Govorushko, 2019: 436). With education campaigns, people can be encouraged to adopt insect eating. Thus, they can be helped to overcome the dissatisfaction felt about eating insects (Hamerman, 2016: 319). In fact, it has been determined that participants who are educated in the field of gastronomy and cuisine, have a background in kitchen and cooking, or work in these professions have more positive attitudes towards insect consumption than members of other professions (Payas and Türker, 2021: 354).

Another major obstacle to the popularity of insect foods is their cultural inappropriateness. In many religions, the terms "kosher", "halal" and "vegan" are emphasized and insects are not considered food (Tan et al., 2016: 293-302). However, it is stated that this attitude is prejudice. Because over the years, many unusual dishes have become traditional. For example, frog legs, which were originally a French dish, have become so popular worldwide that a large industry has emerged in the cultivation of these amphibians. Lobster, which was considered "junk food" in the 17th and 18th centuries, was once a food given to servants and prisoners as punishment, but today it is considered a delicious food (Govorushko, 2019: 436).

The perception of grasshoppers as disgusting insects and neophobia among people have a negative effect on grasshopper consumption. The best example of this is a study conducted by Kraig (2004). When Kraig asked his students what the problem with grasshoppers was, he received answers from the students that they thought grasshoppers were ugly, disgusting creatures and that all those insect eyes and legs were disturbing. Reminding that lobsters and shrimps actually have disgusting faces, shells and legs, Kraig points out that the reason these insects are considered edible is that they live in water and that the idea that water cleans these creatures is symbolically settled in the consciousness. In their study, Taşpınar and Türkmen (2020) stated that consumers' neophobic attitudes have a significant and negative effect on behavioral intentions towards edible insect consumption. They concluded that food neophobia negatively affects behavioral intentions.

Gómez-Corona and Valentin (2023) examined attitudes and motivations towards insect consumption in a country where insect consumption is common. A survey was conducted with 462 Mexicans living in regions where insects are regularly consumed. The study revealed four main attitude dimensions. These dimensions are; past habit, tradition, snack and special occasions, fashion.

Attitudes towards the consumption of edible insects vary from person to person. The variables that may be the cause of these differences were determined as follows, considering the above information:

- Education
- Belief
- Modernization
- Appearance of insects

- Fashion
- Past habits
- Tradition

3.4.3. The relationship between emotion and edible insects

Emotions are strong feelings that have physical and cognitive elements and affect behavior (Sarp and Tosun, 2011; 448). Emotions are an inseparable part of the psychic world. When emotions lose their connection with the object they are associated with, they turn into moods. For example, the anger felt by a student whose bus breaks down and who barely makes it to the exam is an emotion. Emotions are in many different styles, ranging from loving to hating (Can et al., 2015: 90).

We can classify emotions as positive and negative. People are much more affected by negative emotions and have a much harder time forgetting them (Sarp and Tosun, 2011; 448). Some studies claim that there are six basic emotions and that other emotions are derived from them. These are; fear, anger, sadness, happiness, hatred and surprise (Can et al., 2015: 90).

Sensory properties are important criteria for the consumption of edible insects (Kourimská and Adámková, 2016: 22). Consumption patterns and sensory properties affect the acceptability of edible insects (Baiano, 2020: 50). Insects vary in taste and aroma (Kourimská and Adámková, 2016: 22). Sensory properties of insects are affected by the environment, nutrition and cooking methods. Edible insects can be eaten raw, fried, boiled, roasted or ground at different stages of their life cycle (Baiano, 2020: 50). Flavor is mainly affected by pheromones (chemical substances that regulate social relationships between members of the

same species) formed on the surface of the insect's body. This also depends on the environment in which the insect lives and the food it eats. The choice of bait can also be adjusted according to the desired taste to the insect. When boiled or washed, the insects become almost tasteless, as the pheromones disappear (Kourimská and Adámková, 2016: 22). In addition, the state of the substance (liquid, solid), temperature (ambient temperature, hot, cold, etc.), appearance (amount, distribution, color, appearance, etc.), odor (light/thick, pleasant/disgusting, etc.) and touch (thick/low consistency, solid/liquid, etc.) affect the sensory perception of new foods. However, this depends on the nature of the new food. Since the senses of touch, smell, sight and taste all affect perception, sensory perception is based on the senses (Martins et al., 2022: 7186).

Insects are also consumed raw by processing methods such as drying, grinding, texturing, milling, cooking (e.g. boiling, frying, roasting, extrusion and canning). For example, in Mexico, chapulin (a type of grasshopper) is a national dish, usually eaten with beef and beans (Aksoy et al., 2021: 892). In general, there are many ways to turn insects into delicious food products. The best method depends on the type of insect and the food being prepared (Gravel and Doyen, 2020: 10).

Megido et al. (2016) conducted a study on insect food perception and hedonic tests to evaluate the sensory liking of burgers prepared with insect flour. As a result, insect eaters gave higher scores to the burgers and reported no problems with taste and appearance. They also concluded that it is possible to include insects in the human diet through non-sensory means (such as pizza or cookies made with insect flour) and to switch to familiar tastes (such as insect-covered chocolate).

Disgust and neophobia emerge as the main psychological factors that prevent the adoption of insects in nutrition (Van Huis et al., 2013; La Barbera et al., 2020: 1). Tan et al. (2019) report that consumers with high fear of new foods will be reluctant to try new functional foods, which will reduce their purchase intentions (Chang et al., 2019: 1). Objects thought to be inedible, such as insects, elicit heightened emotional responses when people imagine swallowing them, which is explained by disgust. The appearance of food can also lead to food rejection based on disgust. For example, a survey of visitors to an insect house in Belgium found that insects prepared with familiar flavors such as paprika or chocolate were preferred over cooked worms or crickets or boiled ones (Hartmann et al., 2015: 148).

Edible insects are eaten by billions of people worldwide, mostly in low-income countries. The need to supplement nutritionally poor diets has led to the inclusion of insects in diets since ancient times. Eating insects is relatively new to the Western world, as they have access to other food sources. Although products such as lobster, shrimp and crab are popular, the psychological state of disgust refuses to consider the scary reptiles as edible (Menozzi et al., 2017: 27-34). Chang et al. (2019) stated in their study that when consumers have a high level of food phobia, negative emotions emerge more strongly, they refuse to eat certain foods, and their purchase intention will decrease. This shows that edible insects significantly and negatively affect purchase intention. This shows that if consumers believe that they can easily purchase foods containing insects, their purchase intentions will increase.

When the taste characteristics of edible insects were evaluated, it was determined that they had a taste similar to many foods consumed on a daily basis. For example, it was stated that ants and termites tasted similar to hazelnuts,

cockroaches tasted similar to mushrooms, and black beetle larvae tasted similar to whole grain bread (Muslu, 2020). It is worth noting that these results are based on people who are already interested in insects. However, it has been seen that adding familiar spices or flavors to a new food helps reduce fear reactions and increase feelings of appetite (Hartmann et al., 2015: 148).

Castro and Chambers (2019) have provided a better understanding of why consumers do not consider eating insect-containing foods. Appearance is an important issue and a top priority for consumers. The very idea of insect parts or pieces being present in the final product is described as disgusting. The emotional and psychological issues that these statements represent and the potential misconception that "eating insects is not safe" are as important as the visual factor.

From the literature, it can be concluded that the experience is affected by texture, smell and taste as well as appearance. Although it is somewhat easier to try insects in powder form (or another food product), people generally find it more difficult to taste food when insects are visible. It can be served in the form of flour, cooked insect products or another industrial product such as protein bars (Martins et al., 2022: 7186).

Today, worms are widely used in food products such as bread, pasta, cakes, cookies, confectionery and spices by processing. For example, crackers, cakes, meatballs, sausages and insect-based snack products have global potential. The variety of products that meet consumer needs can also be increased (Dossey et al., 2016: 150). Insects can be boiled, sun-dried, frozen, grilled, soaked, fermented, roasted, ground or fried, among other processing methods (Soi and Doyen, 2020: 102272). Consumers are hesitant to choose foods

that they are unfamiliar with, have never eaten, or are afraid to try. Fear or uncertainty about consuming edible insect products can also be reduced through product experience. It is said that as consumers become more informed about edible insect foods, they will be more willing to purchase edible insects (Chang et al., 2019: 11).

In addition, insect consumption is often associated with concepts such as "pest, disease, pathogen, waste, decay, pain, fear, disgust and humiliation" among urban consumers (Penedo et al., 2022: 1). The presence of negatively valued emotions such as disgust is the most important factor affecting the desire to consume insects (Da Silva et al., 2023: 9). Familiarity with foods containing edible insects and communication about insects can increase the acceptance of insects and help combat rejection, disgust and insect hostility (Mishyna et al., 2020: 146).

There are also differences in views on the effect of gender on neophobic behavior. It is stated that male individuals are more willing to eat insect foods than female individuals (Ruby et al., 2015: 225). It is also stated that consumers' desire to consume insects stems from a sense of curiosity. However, consumers also value high protein content and sustainability and see insect-based foods as nutritious. It is reported that consumers who prefer local and national foods are more likely to refuse to eat insects (Kasza et al., 2023: 1).

Emotions regarding the consumption of edible insects vary from person to person. The variables that may be the cause of these differences were determined as follows, considering the above information:

- Sensory characteristics (taste, touch, appearance, hearing, smell)

- Processing methods
- Psychological factors (disgust, neophobia)
- Food accessibility
- Taste familiarity
- Product information
- Negative emotion
- Curiosity
- Nationalistic consumption behavior

3.4.4. Value and edible insect relationship

Values are another source of individual differences. Values are deeper, more general and more fundamental than attitudes. They serve the function of evaluating both the individual's own attitudes and behaviors and the attitudes and behaviors of others. Values are the result of our beliefs that determine our personal preferences for behaving or not behaving, living or not living in a certain way, and they are continuous. They enable a person to distinguish between good and bad, right and wrong. Since good and bad, right and wrong are value judgments, they vary from person to person (Can et al., 2015: 99).

It is widely known that social influence on food consumption is very strong (Vartanian et al., 2015: 119; Higgs and Thomas, 2016: 277). When people are not sure what is appropriate, they may tend to treat others in a similar way. In fact, although social norms continue to influence food consumption, this effect is less when the food is familiar and participants feel comfortable (Gümüşsoy and Rogers, 2023: 2). Additionally, social norms tend to be more effective when individuals feel uncertain (Smith et al., 2007: 819).

Although there are negative attitudes towards the use of insects as food due to social prejudices, edible insects are still considered as an alternative protein and food source (Van Huis and Oonincx, 2017: 1-14). For example, Italian and American consumers are attracted by environmental and nutritional benefits (Menozzi et al., 2017; Woolf et al., 2019), while German and Chinese consumers seem to consider insects to be more socially acceptable (López et al., 2023: 7). The results of the study conducted by Gümüşsoy and Rogers (2023) show that changing social norms affect thinking. This leads to positive thinking such as "other people like me eat these snacks and enjoy them" by providing information about people who frequently eat snacks. Thinking can translate into an increase in curiosity and self-reported excitement before tasting the cricket. This translates into excitement, increased liking (i.e. thoughts that have the effect of reducing appreciation) (Gümuşsoy and Rogers, 2023: 8).

Culture, religion and beliefs are factors that affect consumers' food consumption (Van Huis and Oonincx, 2017: 1). Some ethnic communities have ethno/magical beliefs about the presence of insects in and around them. In some communities, it is traditionally believed that the presence of praying mantises, stick insects and praying mantises are considered ghosts and spread boils and diseases to people. Similarly, locusts are considered messengers of evil spirits that cause various mild diseases; fireflies are considered the eyes of the devil. It is also said that the presence of moths brings good luck (Megu et al., 2018: 34). The Arawak Indians of Guyana believe that the bites of local black ants will encourage newborns to walk early, and indigenous groups in south-central California eat pogonomyrmexcalifornicus to gain visions and support shamanic goals (Devi et al., 2023: 1).

It is known that edible insects have positive effects in healing diseases. However, there are still prejudices in society about food safety. In order to break these stereotypes, it is important to understand the nutritional benefits of edible insects (Seyhan and Nakilcioğlu, 2022: 1184). Fischer and Steenbekkers (2018), who showed that the level of acceptance varies significantly among different insect species, found that popular insect foods are preferred in the market through promotional activities. In a study conducted in Japan, it is stated that what increases recognition is not promotion but tradition. The results show that traditional insect-based foods can be compatible with local culinary cultures. However, this does not mean that new insect-based foods are also compatible with local culinary cultures. Some caution is needed in the cultural classification of insect species, especially considering the similarity between the two most consumed insects in Japan, grasshoppers and crickets (Sato and Ishizuka, 2023: 8).

The values related to the consumption of edible insects vary from person to person. The variables that may be the cause of these differences were determined as follows, considering the above information:

- Social norms
- Social prejudice
- Belief
- Food safety
- Tradition
- Fash

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