Gastronomic Ethnobiology

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Abstract The inextricable link between biodiversity and cultural customs related to the holistic domain of food (gastronomy) represents the very foundation of the human experience and contributes in a variety of ways to the well-being of humans and their *oikos*. The study of the complex interactions between human societies, food, and their environment—what we define here as gastronomic ethnobiology—is nowadays considered "the" crucial pillar for fostering food security and especially food sovereignty. This research area emerged from a broad range of studies encompassing, for example, those concerning folk categorization and uses of wild food plants and mushrooms, uses and management of neglected crops and local landraces, local bio-fermentative processing of food, as well as folk perceptions, uses, and management of animals/ethnoveterinary, nutritional transitions among migrant and diasporic groups, and bio-cultural interactions between *foodscapes* and terroirs.

On the Importance of Documenting Local Foods

Food Biodiversity, Folk/Traditional Knowledge Systems, and Bio-Cultural Refugia

Food biodiversity and *foodscapes* constitute the very foundations of the human experience and contribute in a variety of ways to the holistic well-being of humans. However, biodiversity as such is in a state of decline worldwide and the key factors

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contributing to this loss include industrialization trends, unsustainable farming, fishing and forest practices, and a tremendous hyper-consumption of land.

Moreover, global climate change threatens biodiversity by altering environments and modifying the equilibria of different biota and their *oikos*, while the narrow spectrum of products manufactured from industrial agriculture make ecosystems increasingly vulnerable. In this changing landscape, the dynamic conservation of biodiversity, i.e., the enhancement of the resilience of socio-ecological systems (Berkes and Turner 2006), should become a clear worldwide priority.

In the ethnobiological approach linked to food, in order to consider the entire dimension of socio-ecological systems, the focus must be not only on "natural" environments, but also on place-related history, culture, and philosophy, as well as the spiritual aspect, which occur behind this diversity. Simply, the *holistic* nature of food socio-ecological systems (Berkes et al. 2003) shape what we nowadays call *gastronomy*, referring to the 1825 definition of the French scholar Jean Anthelme Brillat Savarin (Brillat Savarin 1960; Petrini 2007).

Moreover, this "dynamic" conservation strategy of food heritage allows the continuous process of evolution and coadaptation through appropriate and sound management practices.

On the other hand, folk/traditional knowledge systems are reemerging as a priority concern at the global level, as they are increasingly being recognized as constituting not only the tangible but especially the intangible heritage (UNESCO 2003), and what we may describe as *invisible fingerprints* of local communities.

Local communities are experiencing a loss of folk/traditional knowledge and values, which goes hand in hand with a decline in cultural diversity and the dilution of a true sense of community. This process of impoverishment of the social dimension of diversity and social cohesion is reflected in the present global food system which, hinging on the idea that local, small-scale agriculture must also serve the global market, transforms food into a mere commodity and compels people to conform to a single way of producing and consuming it.

In this scenario, cultural, social, and environmental costs are extremely high, and in order to counteract such phenomena, it is fundamental to foster research trajectories aimed at documenting and promoting folk/traditional tangible and intangible food heritage, which can in turn empower local communities in their dynamic understanding and "use" of this heritage.

Moreover, Barthel et al. (2013) introduced the concept of *bio-cultural refugia*, i.e., places retaining specific, dense, social memories related to food security and stewardship of biodiversity.

These hotspots of food bio-cultural heritage have shaped specific landscapes, which have been maintained through a mosaic of management practices that have coevolved in relation to local environmental fluctuation.

Genotypes, specific practices of gathering, harvesting, breeding plants/animals, folk culinary processes and recipes, *sociabilities* attached to traditional consumption frameworks, artifacts, written and oral accounts, as well as embodied rituals, art, and self-organized systems of rules constitute a portfolio of knowledge, practices, and beliefs (what we call traditional environmental knowledge, TEK) that results in specific genetic and social reservoirs related to food and for which

survival inclusive platforms between scientists, farmers, gatherers, shepherds, fishermen, environmentalists, consumers, and the society at large are needed, in order to orient food production towards ecologically and socially sound practices.

Foodscouting *for Sustaining Food Sovereignty*

As we have describe above, an important part of current ethnobiological research on biodiversity and TEK focuses on food.

A major role in food ethnobiological research is played by *foodscouting*—the ethnography-based documentation of folk/traditional perceptions, uses, and management of threatened or neglected plant, animal, and microbial food ingredients used within a given cultural setting/community as well as the folk customs attached to them that developed within a certain area as the result of a long socio-ecological coevolution.

On the other hand, food sovereignty (Forum for Food Sovereignty 2007), i.e., the right of local communities to shape their *foodscapes* and to take care of their food bio-cultural diversity and heritage (Nolan and Pieroni 2014), is seen by many international stakeholders as the cornerstone for sustaining safe, good, clean, and fair local foods across the globe (Petrini 2007).

At the heart of the food sovereignty concept lies the idea of the urgent need to truly foster environmental sustainability and social justice in food production and consumption and to promote short food chains based on local foods and conviviality (Biglino et al. 2011). In achieving this goal, *foodscouting* represents a crucial step in obtaining baseline data regarding the food heritage of communities/places.

And this is also why gastronomic ethnobiology is the core of many pursuits well beyond ethnobiology and that from it departs: food rights, public health/nutritional policies, and political ecology as well (Anderson 2010).

Domains of Gastronomic Ethnobiology

Gastronomic ethnobiology deals with a variety of research topics and subjects; however, in the last few decades, the following have emerged as the most crucial ones in the worldwide arena:

- Folk categorization and uses of wild food plants/food ethnobotany (see example below).
- Uses and management of neglected crops and specific local landraces of cultivated plants (plant genetic resources) (see example below).
- Folk perceptions and uses of natural resources during times of famine and war (i.e., Redžić 2010; Redžić and Ferrier 2015).
- Folk perceptions and uses of mushrooms/food ethnomycology (i.e., Alonso-Aguilar et al. 2014; Tibuhwa 2012; Volpato et al. 2013).

- Local bio-fermentative processing of food/food ethnozymology (see example below).
- Folk categorization, perceptions, uses, and "management" of wild animals/food ethnozoology (i.e., Chowdhury et al. 2014; Souza and Alves 2014; Silvano and Begossi 2005).
- Folk management of local animal breeds, veterinary use of curative and fodder plants, and attached traditional animal-based food products/ethnoveterinary medicine (see example below).
- Nutritional transition among migrant or diasporic groups/food ethnobotany of migrants (see example below).
- Bio-cultural interactions in foodscapes and terroirs/food ethnoecology (i.e., Nishida et al. 2006; Orr and Hallmark 2014; Reyes-García et al. 2014).

In the following paragraphs, we will briefly illustrate, for a few of the aforementioned domains, examples of gastronomic ethnobiology—with a focus on Europe and the Middle East.

Wild Food Plant Consumption in Mediterranean Diets

Some rural communities in Mediterranean and Southeast European countries still practice the gathering of wild vegetables, which was and partially continues to be the core of their daily diet for several months each year (generally from November/December up until May/June: Fig. 1) and what nutritionists have described for a few decades as the "Mediterranean diet." Despite the extensive literature on the subject of the nutritional benefits and epidemiology of the Mediterranean diet and populations, very little is still known about this important "hidden" part of the Mediterranean folk daily food (Conforti et al. 2012; Fragopoulou et al. 2012; Local Food-Nutraceuticals Consortium 2005; Marrelli et al. 2014).

A few recent studies have not only confirmed the vast richness and complexity of this food biodiversity but also proposed gastronomic and educational frameworks for re-instilling traditional knowledge on wild food plants as well as sustaining small-scale (famers') markets, through which neglected wild vegetables of Mediterranean cuisines (such as *Sonchus oleraceus*, *Apium nodiflorum*, *Ruscus aculeatus*, *Reichardia picroides*, *Scolymus hispanicus*, *Silene vulgaris*, *Tamus communis*, *Montia fontana*, and others) can continue to be sustainably gathered and traded (Dogan 2012; Parada et al. 2011; Menendez-Baceta et al. 2012).

Old Landraces in Rural Czech and Slovak Folk Diets

Whereas "old fashioned" concepts of bio-conservation mainly have ex-situ conservation strategies (conservation of biodiversity in its three dimensions: genetic, species, and ecosystem based) as their cornerstone, i.e., in gene banks, botanical

Fig. 1 Woman processing gathered wild vegetables in inland Southern Italy

gardens, eco-museums, and natural parks, nowadays bio-cultural diversity conservation trajectories (i.e., in situ, on-farm conservation projects) are instead seen as fundamental for taking into account the human/social component of food biodiversity.

For example, the White Carpathians, a unique biologically and culturally rich mountain range along the south-east border between the Czech Republic and Slovakia is home to a vast richness of fruit tree landraces (apples, pears and plums). Inventories conducted in the last decade documented 220 old fruit varieties and landraces on the Czech side and nearly 300 fruit varieties on the Slovak side, comprising several hundred folk names. In this mountainous area, fruit landraces are embedded in the local culture; locals have experienced over centuries which varieties are appropriate for direct consumption, food preparation, winter storage, drying, and processing into jams, preserves, juices, alcoholic liqueurs, or distillates. In addition, the second author of this contribution documented a remarkable medicinal importance of wild apples and old pear/apple landraces and the local raw consumption of wild and cultivated varieties of *Cornus mas* and *Sorbus domestica*, as well as their use in preserves and as distillates in high-quality spirits. In the same area, oil was made in the past by pressing plum seeds; moreover, plums along with wild mushrooms and sour cream are the main ingredients of a local Christmas soup ("*Vánoční kyselica*").

Considering the nutritional and health properties of old crop landraces, intraspecific diversity of these aspects has rarely been studied; however, interestingly, Rop et al. (2009) found significantly higher antioxidant activity and nutrient content of local White Carpathian plum cultivars in comparison to modern varieties. As emphasized by Heywood (2011), there is enormous potential for ethnopharmacology and ethnobiology focusing on plants from local agroecological systems and agrobiodiversity, as traditional crop varieties and landraces have been an essential part of local and possibly "healthy" food cultures for many centuries, and they have shaped cultural heritages and local identities. If we continue to lose this diversity, we will not only lose invaluable genetic resources, but also traditional knowledge systems associated with this, as well as tasty and healthy foods.

Ethnozymology in the Balkan Mountains

Ethnobiological knowledge of often neglected fermented food products and processes serves in many areas of the world as an important tool for sustaining local traditional foods and implementing food sovereignty, as these products belong to local bio-cultural heritage, which has evolved through centuries of interactions between local societies and their environment (Nabhan 2010). In other words, the adaptive nature of the fermentation process within a given territory, which arose from long-lasting human relationships with microbial niches in the environment, suggests that the process and products of fermentation are part of a complex socio-ecological system consisting of living and nonliving components and of their interactions (Scott and Sullivan 2008). In this sense, they ultimately contribute to the building of local populations' identities and their gastronomic "sense of place" as well (Evans et al. 2015; Redzepi 2010).

For example, among the Slavic Gorani inhabiting the mountains at the borders of Kosovo, Albania, and Macedonia (Quave and Pieroni 2014), the fruits or roots of a number of local wild plants (i.e., *Cornus mas*, *Rosa canina*, *Prunus cerasifera*, *Gentiana lutea*, *Juniperus communis*) are fermented to produce various nonalcoholic, gassy beverages, all of which are consumed for their refreshing quality and perceived "health" benefits.

The bitter liquid resulting from fermentation of the roots of *Gentiana* in water is used in the treatment of stomachache and as a panacea. Likewise, the fermentation of *Juniperus* galbuli results in the production of a very sour product, which is used in the treatment of kidney problems and as a cold remedy, as in other South-Slavic areas.

The ease of their preparation makes them a common household staple as a source of nutritious, potable beverages (Fig. 2). Moreover, these nonalcoholic or slightly alcoholic beverages are culturally appropriate for the Gorani as the use of alcoholic beverages is not permissible in the Islamic faith.

Fig. 2 Lacto-fermented gentian beverage from Northeast Albania

Folk Veterinary Plants in Lesser Himalayan Pastoralism

Pakistan is the home of different types of pastoralist and nomadic groups, which inhabit the mountains and the desert lands of the country. In the Lesser Himalayan range, ethnoveterinary remedies represent the health care for livestock used by most shepherds, who cannot afford modern drugs. The third author of this contribution, for example, recorded among pastoralists in this area the use of *Verbascum thapsus* (*gidar tambaku*) and *Foeniculum vulgare* (*saunf*) for treating diarrhea in their herds, while *Zanthoxylum armatum* (*timbar*) is used for treating fever and *Saussurea costus* (*kuth*) for treating stomach disorders in goats. Moreover, the fresh roots of *Salvia moorcroftiana* (*kalijiri*) are ground into a powder and given to buffalos for treating abdominal pains and fever, a macerate obtained from the fresh leaves of *Cissampelos pareira* (*ghorasum*) is given to sheep as a tonic, and *Grewia optiva* (*dhmarn*) bark is peeled off branches and given to cattle as a galactagogue.

This immense pastoralist traditional knowledge on remedies used for improving the overall health of animals has a substantial impact on both the well-being of the animals and the quality of their dairy products—and ultimately the quality of the resulting *foodscape*. However, aged shepherds retain more traditional knowledge compared to younger ones, as intergenerational transmission of these crucial practices is in jeopardy.

Food Ethnobotany of Migrants

Dietary habits change rapidly among migrant communities in Western countries, and these changes can cause major concerns for public-health policymakers because they frequently lead to increases in diet-related diseases like diabetes. Such is the case in most South Asian communities in Northern England, where several food plants are perceived as having high medicinal value and thus widely used within households in the host country, with a predominant role of *karela* (*Momordica charantia*) to treat diabetes (Pieroni et al. 2007). Similar trends have also been found among Caribbean people living in New York (Vandebroek and Balick 2012) and Polish diaspora in South America (Kujawska and Pieroni 2015).

In another, unpublished, study on Albanian migrants in Italy, we found that the majority of community members daily use *plant cultural markers*, which are considered distinctive signs of *Albanianness* and identity, i.e., the use of *caj mali* (*Origanum vulgare* and *Sideritis* spp.) in teas.

However, original plant uses often "change" in the new context, as plants are substituted with similar ones and original dishes may be rearranged, and the consumption of traditional plant-based dishes is inextricably embedded in cultural heritage, fluctuant representations of identity (Pieroni and Gray 2008), and health-seeking strategies among migrants. All this should inform, in our opinion, the way institutional stakeholders shape culturally appropriate management of public health/nutritional policies devoted to newcomers.

Relevance of Gastronomic Ethnobiological Research

From the aforementioned examples, we can easily identify the areas in which gastronomic ethnobiological research may be most relevant today; there are in fact diverse trajectories, which make this field of ethnobiology research of great interest to various stakeholders:

- Niche and specialty food (and farmers') markets
- Artisanal entrepreneurships based on traditional food products
- Local food-based and avant-garde restaurants/cuisines
- Sustainable, rural development
- Ecotourism
- Community-based bio-conservation strategies (i.e., natural protected areas)
- Educational frameworks on sustainable gastronomy
- Bio-cultural heritage, cultural landscapes, and eco-museums
- Food security and sovereignty-driven policies
- Public health/nutrition policies
- Culturally sensitive approaches devoted to migrant groups

The next few years, and decades, will surely demonstrate the importance of these horizons for promoting the holistic well-being of both the environment and local communities.

We strongly believe that food lens will become more and more central in all future discourses related to the interaction between natural resources and human societies, not only because "we are what we eat" (as the philosopher Lukas Andreas Feuerbach wrote in 1863), but especially because food represents in every community, in every corner of the globe, a central pillar of the *ethnoecological web*, as its essence is ultimately experiential and relational.

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