

Padova, 18 luglio 2024

THE FIRST “FAMILY TREE” OF ITALIAN FILLED PASTA

Research team led by the University of Padua investigates for the first time with a scientific method the origins of one of the most iconic dishes on the Italian table

The great richness of Italian culinary culture is closely intertwined with the history, geography, and biology of our country. Pasta, in particular, is a central element in Italian culture, and often the historical or geographical origin of traditional dishes is the subject of passionate discussions.

A study led by a group of researchers from the Department of Biology at the University of Padua, recently published in the journal “*Discover Food*,” investigates the origins of one of the most iconic elements of Italian culture – filled pasta (*pasta ripiena*) – using a scientific method to reconstruct the origins and evolution of the wide variety of *pasta ripiena* existing in our country, an example of Italy’s biocultural diversity.



Vazrick Nazari

As Vazrick Nazari, a researcher at the Department of Biology at the University of Padua, explains, “Northern Italy is a hotspot of diversity for *pasta ripiena*, with each town and village proudly brandishing their own unique variety of the sacred dish whose recipe has often been passed down generations in local families. This study is the first interdisciplinary approach that has applied a methodology commonly used in Biological Sciences to shed light on questions that are in the domain of Food Sciences: Where did this incredible diversity in Italian *pasta ripiena* come from, and how are these varieties related to one another?”.

To create the dataset, the authors relied on both scientific literature on the subject and some foundational texts of Italian cuisine, such as Pellegrino Artusi’s legendary volume “*La scienza in cucina e l’arte di mangiar bene*” (“Science in the kitchen and the art of eating well”) (1891). They separated Eurasian filled pasta formats (such as gyoza, maultaschen, pierogi, pelmeni, etc.), grouped as an out-group and used for comparison, from those specifically from Italy. The authors selected 28 formats, representing a variety from all over the country, from Sardinian culurgiones to Friulian cjarsons, from Bolognese tortellini to Romagna cappelletti.

By analyzing the various characteristics of this “family” of pasta (ingredients of the dough and filling, cooking methods, size, folding, etc.) and the geographical distribution of recipes, the researchers developed a phylogenetic tree that reconstructs the probable origin and spread of *pasta ripiena* in Italy, as well as its progressive differentiation into various regional and local forms. Antonella Pasqualone, co-author of the article and professor at the University of Bari, explains: “The observed differences are linked to the climatic and agri-food specificities of the Italian regions, as well as to the shape of the pasta. Each type of pasta has its own

unique geometry, with different volume, roughness, and alternation of voids and solids. The shape influences cooking behavior, sauce retention, and texture, but it also has a clear communicative function related to cultural identity. In this case, it is true that 'form is substance'!".

As Telmo Pievani, coordinator of the research group and professor at the University of Padua, explains, “Where biological diversity is high, usually cultural diversity is high as well. This is called biocultural diversity, and Italy is rich in it. Food is precisely at the intersection between biology and culture. With this study, we show that an evolutionary approach can reconstruct not only the genealogical tree of species but sometimes also that of cultural artifacts. Even *pasta ripiena*.”

Indeed, the results of the phylogenetic analysis suggest that *pasta ripiena*, originating in Eurasia, first arrived in Northern Italy and then spread to the rest of the Peninsula following an initial reduction in morphological variability (i.e., the variety of recipes) due to a likely “founder effect.”

The phylogenetic tree also enabled the authors to reconstruct the relationships between different forms of *pasta ripiena*. A broad distinction appears between two large “families,” the *tortellini* (more three-dimensional) and the *ravioli* (flatter). Both groups seem to originate from Northern Italy, where most of the formats considered in the analysis are located. It is interesting to note that, in all the analyses conducted, a single type of Italian *pasta ripiena* is always recognized as distinct from these two large families, and clustering with the out-group: the Sardinian *culurgiones*. This suggests that, in Sardinia, the cultural practice of making *pasta ripiena* may have originated independently of Northern Italy. Valentina Todisco, co-author of the study and researcher at the University of Salzburg, emphasises this point: “The inseparable connection between humans, culture, and environment is clearly evident in this work, where analyses typically used to study the evolution of living beings are applied to one of the world's most famous Italian foods, *pasta ripiena*. Sardinian *culurgiones* are markedly different from everything else, highlighting the peculiarities of this island, which stands out as one of the regions with the greatest environmental and cultural diversity in the Mediterranean area.”

This study is the first to apply a scientific method to the classification of Italian *pasta ripiena*. The researchers plan to replicate this approach to expand knowledge on the biocultural diversity of Italy. Andrea Pieroni, co-author of the study and professor at the University of Gastronomic Sciences in Pollenzo, comments, “In Italy, pasta, like every ingredient, product, and dish of our cuisines, is an ever-evolving ethno-ecological web where ecological and socio-cultural aspects continuously intertwine. This work applies a well-known biological method to the evolution of the *pasta ripiena* food system. It has been a pioneering journey that we imagine can be applied to other culinary trajectories and bring unexpected surprises, that cannot be revealed through historical investigation alone.”

“The cultural and biological dimensions are inextricably intertwined, especially in a country rich in history and nature like Italy. Knowing and protecting the various cultural manifestations that form the biocultural heritage of a place is essential to preserve local biodiversity as well,” says Sofia Belardinelli, a researcher at the Department of Biology at the University of Padua.

Link to the research: Vazrick Nazari, Antonella Pasqualone, Andrea Pieroni, Valentina Todisco, Sofia Belardinelli, Telmo Pievani (2024) *Evolution of the Italian pasta ripiena: the first steps toward a scientific classification*. Discover Food 4, 57. <https://doi.org/10.1007/s44187-024-00136-1>