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# Advances in Food Analysis

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Edited by

Alessandra Gentili and Chiara Fanali

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# Advances in Food Analysis

Topical Collection Editors

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## About the Topical Collection Editors

**Alessandra Gentili** is Associate Professor of Analytical Chemistry at Sapienza Università di Roma, where she received her Master's degree, *Magna cum Laude*, in Industrial Chemistry and her PhD degree in Chemical Sciences. She is also Director of Sapienza's Research Centre HYDRO-ECO, which comprises four departments from the Faculties of Science and Engineering. Her research activity essentially concerns the study of original analytical methodologies aimed at solving problems in different areas of Chemistry, namely Clinical, Food, and Environmental Chemistry. The themes of her research include the development of original extraction procedures based on last-generation sorbent materials or neoteric solvents. The results of her research have been published over 96 publications, including 86 papers in international peer-reviewed journals and 10 chapters in international books. She is a member of the Editorial Board of *Molecules* (Section: Analytical Chemistry), *Current Analytical Chemistry*, and *Journal of Chromatography A* (Advisory Editorial Board).

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## Preface to “Advances in Food Analysis”

The interest in innovative and advanced analytical techniques has been growing in recent years due to the renewed necessity for analyzing complex matrices like foods. Knowing foods means being able to elucidate their constituent composition as well as to control contamination and preserve them from adulteration. Every single food is a very complex matrix whose chemical nature differs greatly with regard to constituents (amino acids, polysaccharides, proteins, lipids, nucleic acids, sterols, etc.) and concentrations, which can range from the micromole to femtomole scale. Besides the importance of nutrient characterization, there is deep interest in the definition of food nutraceutical properties. Another aspect of fundamental importance is the identification and quantification of residues resulting from different processes such as cultivation, fermentation, release from packaging, etc., in order to ensure high standards in quality assurance and process control. For all these reasons, analytical chemistry related to food analysis is a rapidly growing research area. Constant efforts have been devoted to developing more sensitive, fast, and cost-effective analytical methods to guarantee the safety, quality, and traceability of foods in compliance with legislation and consumer demands. Sample preparation is the first critical step of analysis, and innovative extraction techniques such as supercritical fluid extraction (SFE), microwave-assisted extraction (MAE), subcritical water extraction (SWE), QuEChERS (quick, easy, cheap, effective, rugged, and safe) methodology, ultrasound-assisted extraction have also been applied to the extraction of food constituents. Physical techniques employing powerful instrumentation—including spectroscopy, chromatography and electrophoresis, biochemical analysis, and sensory analysis techniques—have replaced the old methods used at the beginning of the 20th century. The advantages and drawbacks of each approach are always taken into consideration. This Topical Collection provides readers with a good overview of the current status and exciting developments in this field. It includes papers focused on modern analytical instrumentation, new methods and their application to food science, as well as works on quality control and safety, nutritional value, processing effects, storage, bioactivity, and so forth. We would like to thank all contributors and colleagues who chose to publish their works here as well as the reviewers who dedicated their time, effort, and expertise in evaluating the submissions and assuring the high quality of the published work. We would also like to thank the publisher, MDPI, and the editorial staff of the journal for their constant and professional support as well as for their invitation to edit this Special Issue.

**Alessandra Gentili, Chiara Fanali**  
*Topical Collection Editors*

## Article

# The Content of Biogenic Amines in Croatian Wines of Different Geographical Origins

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**Abstract:** Samples of white and red wines produced in two different wine-growing regions, coastal (Dalmatia) and continental (Hrvatsko zagorje) of Croatia, were analysed for biogenic amines content. Biogenic amines content was determined, and its concentration levels were associated with the geographical origin of the wine. Due to its high sensitivity, HPLC method with ultraviolet detector was used, including the derivatisation step with dansyl chloride. The method was applied to detect and quantify 11 biogenic amines in 48 red and white wines. It was found that both Dalmatian red and white wines are characterised by tryptamine (0.23–1.22 mg L<sup>−1</sup>), putrescine (0.41–7.5 mg L<sup>−1</sup>) and ethanolamine (2.87–24.32 mg L<sup>−1</sup>). White wines from the Hrvatsko zagorje region are characterised by content of isopentylamine (0.31–1.47 mg L<sup>−1</sup>), putrescine (0.27–1.49 mg L<sup>−1</sup>) and ethanolamine (3.80–17.96 mg L<sup>−1</sup>). In contrast to white wines from the Hrvatsko zagorje region, in the red wines, all biogenic amines except ethylamine, were found and equally presented.

**Keywords:** Croatian wines; biogenic amines; HPLC; geographical origin

## 1. Introduction

Recently, there has been a great interest of scientists to find a way to control the global wine market. There are numerous parameters determining the quality of the wine. These parameters can be classified as chemical and sensory parameters. Wine is a beverage wherein the quality depends on many factors, among which grape variety, origin, vintage, grape growing conditions, winemaking practice and maturation process, physical conditions of production and way of storage, are the most significant, and they also influence sensory characteristics. Over the past century, chemists have played a significant role in the determination of wine chemical composition and its association with wine flavour and sensory attributes. In the global wine market, wine identity (brand, type, vintage and origin) is extremely important and all those characteristics are crucial for the determination of its price. In the past century, chemists had developed powerful tools for detecting adulteration of wine, such as the addition of water, glycerol, alcohol, dyes, sweeteners, flavour substances and a non-authorised addition of sugar or acidity adjustment [1]. Therefore, in the last few years, there has been a great interest from scientists as well as consumers and commercial wine producers, on the geographical origin and authenticity of wines in terms of quality and price determination. In the 19th and early 20th centuries, the focus was on detecting fraud, while more recently the emphasis has been on quantifying trace compounds, especially those that may be related to a grape variety [2]. There is a large number



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