Delicious biophysics
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Biophysics can be defined as an interdisciplinary science using concepts and methods of physics to study biological systems. Cooking is about applying physical and chemical transformation to biological matter. So biophysics naturally helps us to understand the way we cook; on the other hand, using examples from food preparation is usually a good (and concrete) way to introduce key biophysical concepts to students. Food transformation and consumption phenomena provide indeed puzzling questions, suggesting convenient (and appetizing) opportunities to raise interest in science among students as well as more general public audiences.

(Molecular) gastronomy / cooking

Molecular biology, a term coined in 1958 by Warren Weaver, director of National Sciences for the Rockefeller Foundation, began in the 1960s when physicists and chemists took an interest in biology with the hope of understanding life at its most fundamental level. 70 years later, French physicists Nicolas Kurti and French chemist Hervé This laid the foundations for a new scientific discipline, naturally named Molecular gastronomy, dedicated to the study of physical and chemical phenomena occurring during food preparation, hence with the hope of understanding cooking at its most fundamental level.

A historical definition

(quote)

“Gastronomy is in the knowledge and understanding of all that relates to man, as he eats... It pertains to modern science, by the classification of food substances, to physics, by the examination of their compositions and quantities, to chemistry, through the art of preparing food and make it palatable.”
Jean-Nicolas-Adolphe Courtier, Physique du goût, 1802.

A profound remark

“I think it is a sad reflection on our civilization that while we can and do measure the temperatures in the atmosphere of Venus we do not know what goes on inside our walls.”

A perspicacious prediction

“Cooking, without causing it to be an art, will become scientific and subject its formulas, too often empirical, to a method and a precision that will have nothing to chance.”
Georges Auguste Escoffier, Guide culinaire, 1897.

A tentative modern definition

Molecular gastronomy: scientific discipline dedicated to the study of physical and chemical processes that occur during cooking and eating.

Molecular cooking: use of the physical and chemical principles that occur during cooking and eating.

When you make a mayonnaise, you add oil (a liquid) to an egg yolk (also liquid) to get at the end something that is not liquid any more. Why? This process is called emulsification, and is a beautiful example of liquid behavior, as a Chain Rule of molecular gastronomy.

Two different activities

There is unfortunately no such confusion today between molecular gastronomy and molecular cooking. Molecular GASTRONOMY is one thing in scientific activity, aimed at producing knowledge; molecular COOKING is another to technical activity, aimed at producing meals. So, as a science, molecular gastronomy will ever grow (there will always be the need for new knowledge), but as an art, molecular cooking can be appreciated or not, and will always vary, simply because the techniques and recipes it contains will have either abandoned or incorporated into the corpus of existing cooking techniques. This is just the way cooking that always evolves!

Gathering and scientific investigation of culinary practices

Modeling of cooking practices

Introduction of new tools, methods and ingredients in cooking practice

Invention of new dishes

This is molecular gastronomy

This is molecular cooking

A wise advice

“One cannot help being surprised every time we questioned ourselves on objects that are most familiar to us, on the most trivial things. Yet, you can see our ideas are often vague and uncertain, and how, therefore, it is important to clarify them by experiments and facts.”
Antoine Lavoisier, “Mémoires compléts,” 1794.

What is it?

Champagne bubbles are not just good looking: they are also good tasting… and the physics/chemistry tells why.

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