



# INTRODUCTION

Champagne has launched thousands of ships, toasted countless weddings, and inaugurated billions of New Year's parties throughout the world. Almost everyone—certainly everyone reading this book—has an interesting story to tell that includes a bottle of champagne. So it seems best to start this book with a story of my own.

I'm a physicist. What's a physicist doing writing about champagne? Well, the story begins on a summer afternoon when I was a student in the midst of finals and thought it would be a good plan before getting on with studying to stop somewhere on the way home to have a beer. Now keep in mind that this is a *physics* student stopping somewhere to have a beer, and besides, I had a predilection for



fluid dynamics and, on the side, photography. The sunlight, the hot day, the alcohol, my studies, and the thought of actually trying to study more later on all helped to focus my attention on the golden bubbles rising up through the beer and along the sides of the glass in front of me. . . . I sat, mesmerized. I thought, Effervescence really belongs to that category of daily phenomena that naturally engage the imagination; I could just as well be watching the clouds in the sky, flames popping in a fireplace, or waves breaking on a beach. I suppose that I could have just left it at that, but I wanted to know more. I wanted to see closer, get my camera. I suddenly realized, in a flash of free association (and slight intoxication), that I wanted to study carbonated beverages.

A year later I had a master's degree in fundamental physics and was still a bubbles addict. I bought a secondhand macrophotographic lens and, over the holidays, started taking photographs of bubbles rising in a glass filled with soda. I spent whole nights developing film and enlarging pictures in my bathroom, which—to



my girlfriend's chagrin—I had transformed into a makeshift dark-room. Six months and many sleepless nights later, I mailed some of my best shots to the research department of Champagne Moët & Chandon, along with some initial scientific observations describing what was occurring in the photographs.

My grand plan was this: Champagne makers such as Moët & Chandon sold 262.6 million bottles in 2001—the equivalent of about \$3 billion in sales. For an industry that banks so much on bubbles, finding ways to better understand the bubbling process and eventually to improve the beverage's hallmark fizz seemed like a smart idea. Department head Bruno Duteurtre asked me to come to Moët & Chandon's headquarters in Epernay (the capital of Champagne wines) to lay out my photographs, thoughts, and research plans. The people I met with were captivated by the idea of this research, and a few weeks later I moved from Paris to Reims to begin my dissertation in the Laboratory of Enology at the University of Reims. With colleagues from both the university and Moët &

Chandon, I started my official investigation into the physical chemistry of champagne bubbles.

As Dr. Harold Edgerton, a revolutionary in the development of high-speed and stop-motion photography, once said, “The experience of seeing the unseen has provided me with insights and questions my entire life.” This sentiment exactly captures the heart of the matter, the reason for this book, and the answer to my earlier question. Champagne is a wonderful drink, one that mysteriously manages to capture an incredible amount of festivity, elegance, and sensuality in every glass. A lover of champagne—either a guest at your next New Year’s party or a connoisseur at a banquet—certainly can drink a glass and enjoy it with great pleasure. These two lovers of champagne may have different vocabularies to describe what they find pleasurable about the wine, but it’s very likely that neither knows nor can even begin to imagine all that is happening inside the flute in his or her hand. Mainly, this is so because some of the most interesting and beautiful events in a glass of champagne



are invisible to the unaided eye. With a special lens on a camera, however, we can capture photographs of the bubbles in champagne. We can study those photographs, and with the help of a little physics know-how, understand how the bubbles act as the vehicles for taste, scent, that lovely popping sensation on your tongue and the tip of your nose—in general, the pleasure we all know, love, and have come to expect from a glass of champagne.

Like music, like poetry, and like the personalities of people, our physical environment—animate or inanimate, natural or manufactured, wild or civilized—has beauty to be appreciated both on a superficial level and at a deeper level of structural understanding. It behooves an admirer to examine an object of beauty closely so as to enrich his or her experience and appreciation of its charm. As a physicist—not a connoisseur, not a poet—I obviously have a different vocabulary and level of expertise to make use of than others might employ in the enthusiasts' literature when they describe the experience of drinking a glass of champagne. However,

I hope to go beyond vocabulary and offer a unique experience to you, regardless of your background or expertise: to see what the unaided eye cannot see and to observe closely some of the building blocks of beauty—the physics and the chemistry of that which gives champagne its charm and gives us our pleasure. I hope that your enjoyment of champagne is only enhanced by this guide that a scientist has created to the lovely physics of the bubbles that sparkle within it.

