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'Unbelievably important'
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New foreword, new insights



'Full of dazzling revelations'
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'A fascinating history of the way humans breathe – and how we've all been doing it wrong'
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Breath

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'Who would have thought something as simple as
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'In the past few years, there have been several potentially
life-changing books, from Matthew Walker's *Why We Sleep*
and Shane O'Mara's *In Praise of Walking*, to Norman Doidge's
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such volumes. Read it, and I guarantee you will want to
change the way you breathe' *Evening Standard*

'A fascinating scientific, cultural, spiritual and evolutionary
history of the way humans breathe – and how we've all been
doing it wrong for a long, long time. I already feel calmer and
healthier just in the last few days, from making a few simple
changes in my breathing, based on what I've read. Our breath
is a beautiful, healing, mysterious gift, and so is this book'
Elizabeth Gilbert, author of *Eat, Pray, Love*

'A wonderful book that reminds and enlightens us about
how breath and mind are intertwined' Rahul Jandial,
author of *Life Lessons from a Brain Surgeon*

'If you want to read a book about the power of the breath,
this is it!' Patrick McKeown, author of *The Oxygen Advantage*

'James Nestor's fascinating new book is playful
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'James Nestor's perfectly timed book looks at what is known through research and what is known by experience – often his own painful experience – as he submits to experiments and breathwork techniques to learn more about something we typically take for granted. Reading this book, I gained both a greater appreciation for my respiratory system and a personal-best long-distance run (breathing through the nose = greater endurance)!' NPR

'With his entertaining, eerily well-timed new book, James Nestor explains the science behind proper breathing and how we can transform our lungs and our lives . . . The book is brisk and detailed . . . A well-written read that is always entertaining, as he melds the personal, the historical and the scientific' *Boston Globe*

'It's a rare popular-science book that keeps a reader up late, eyes glued to the pages. But *Breath* is just that fascinating. It will alarm you. It will gross you out. And it will inspire you. Who knew respiration could be so scintillating?' *Spirituality & Health*

'*Breath* provides a new perspective on modern-day technology and how we've unknowingly abandoned the answers we've always had. James Nestor artfully brings back what modern society has walked away from by combining ancestral techniques and new-age technology in one elegant book' *Scientific Inquirer*

'I would have thought that breathing was pretty simple and well understood. Then I read this book. Now I know it's a hugely complex and wondrous process which we need to understand much better. Fascinating and provocative stuff' Daniel M. Davis, author of *The Beautiful Cure*

'A transformative book that changes how you think about your body and mind' Joshua Foer, author of *Moonwalking with Einstein*

'*Breath* is an utterly fascinating journey into the ways we are wired. No matter who you are, you'll want to read this' Po Bronson, author of *What Should I Do with My Life* and *NutureShock*

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'An eye-opening, epic journey of human devolution that explains why so many of us are sick and tired. A must-read book that exposes what our health care system doesn't see' Dr Steven Y. Park, Albert Einstein College of Medicine and author of *Sleep, Interrupted*

'I don't say this often, but when I do I mean it: this book changed my life. *Breath* is part scientific quest, part historical insight, part Hero's Journey, full of groundbreaking ideas, and a rollicking good read. I had no idea that the simple and intuitive act of inhaling and exhaling has taken such an evolutionary hit. As a result, I figured out why I sleep so badly and why my breathing feels so often out-of-sync. With a few simple tweaks, I fixed my breathing and fixed myself. A transformational book' Caroline Paul, author of *The Gutsy Girl*

'If you breathe, you need this book. When we undervalue anything, including something so basic as breathing, bad things always happen – and Nestor makes it clear how awful it's gotten. But he also provides a clear airway back to better, deeper, stronger respirations' Wallace J. Nichols, PhD, author of *Blue Mind*

'*Breath* shows us just how extraordinary the act of breathing is and why so much depends on how we do it. An enthralling, surprising and often funny adventure into our most overlooked and undervalued function' Bonnie Tsui, author of *Why We Swim* and *American Chinatown*

'We all know that "we are what we eat", but we give little attention to the equally important facet of health, breath and more specifically how (and even why) we breathe. I urge you to read and follow his teachings to improve that underappreciated other pillar of your health: your breath' Steven R. Gundry, author of *The Plant Paradox*, *The Longevity Paradox* and *The Energy Paradox*

'This is the best book I've ever read! You won't be able to put it down' John Douillard, author of *Body, Mind and Sport*

'Super interesting' Emma Gannon

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ABOUT THE AUTHOR

James Nestor has written for *Scientific American*, *Outside Magazine*, *Men's Journal*, National Public Radio, *The New York Times* and more. His previous book, *Deep: Freediving, Renegade Science, and What the Ocean Tells Us about Ourselves*, was a finalist for the PEN American Center Best Sports Book of the Year and a BBC Radio 4 Book of the Week. Nestor has appeared on dozens of national radio and television shows, including ABC's *Nightline*, the CBS Morning News and NPR. He lives and breathes in San Francisco. More at mrjamesnestor.com.

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BREATH

The New Science of a Lost Art

James Nestor



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To K.S.

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In transporting the breath, the inhalation must be full. When it is full, it has big capacity. When it has big capacity, it can be extended. When it is extended, it can penetrate downward. When it penetrates downward, it will become calmly settled. When it is calmly settled, it will be strong and firm. When it is strong and firm, it will germinate. When it germinates, it will grow. When it grows, it will retreat upward. When it retreats upward, it will reach the top of the head. The secret power of Providence moves above. The secret power of the Earth moves below.

He who follows this will live. He who acts against this will die.

—500 BCE ZHOU DYNASTY STONE INSCRIPTION

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CONTENTS

Preface xiii

Introduction xxi

Part One – The Experiment

Chapter One The Worst Breathers in the Animal Kingdom 3

Chapter Two Mouthbreathing 21

Part Two – The Lost Art and Science of Breathing

Chapter Three Nose 41

Chapter Four Exhale 59

Chapter Five Slow 77

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Chapter Six Less 101

Chapter Seven Chew 125

Part Three – Breathing+

Chapter Eight More, on Occasion 163

Chapter Nine Hold It 193

Chapter Ten Fast, Slow, and Not at All 215

Epilogue A Last Gasp 235

Acknowledgments 249

Appendix A: Breathing Methods 253

Appendix B: Additional Solutions 269

Notes 277

Index 323

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PREFACE



Forty million breaths ago, I was standing at the center of an art house on Mission Street in San Francisco. Avant-garde videos flickered against the walls and a few of the film directors mulled about, the kind of people you'd expect to see at an underground art installation: moody guys with nose piercings and utilikilts, women with fuchsia hair and faded rose tattoos. But there was something missing: everybody else. Even though the event was sold out, the place was less than half full. I sipped my watered-down drink from a Solo cup, trying to shield my ears from the electro-noise soundtrack, and searched the shadows for familiar faces. I found nobody. Somewhere in the distance, someone coughed—then someone else. I wondered if I should have stayed away, too. I gave the thought five minutes then left, walking home along empty streets.

The next morning, news headlines redoubled their warnings about a flu spreading around China. Outside my living room window I watched a neighbor load bags of canned food from the trunk of his car

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into his garage. A FedEx courier drove by with a bandana around his mouth and nose. I got up, filled another pot of pu-erh tea, and tried to get it all out of my head. I had too much work to do. My little book about breathing needed attention.

The publication date was just two months away, and I was supposed to be mobilizing a speaking tour, radio, podcasts. I'd poured a decade of breath, sweat, and tears into the thing by then. Years on the road interviewing hundreds of people, rewriting a manuscript cover to cover half a dozen times, and trying to make sense of a looks-simple, wildly complicated subject. I'd given the book everything I'd had: physically, emotionally, financially. Now it was time to set it free.

The planet had other plans. By the end of that week, the World Health Organization declared a global emergency. You know what happened next: warehouses closed, printing presses stopped, the studio where I was to record the audiobook canceled all future bookings until further notice. How could anyone read a book that couldn't be printed, shipped, or sold at any store? How could anyone listen to an audiobook that could not be recorded? It looked like ten years of work was to be flushed down the drain.

I was told the best option was to delay publication. Many authors at the time were taking this approach. All this flu stuff would surely pass by next summer, by then the tour could commence as usual. I'd only need to sit tight for twelve months.

There was one wrinkle to this approach: I was out of money.

The book, like most books, took too long to write and cost many times more than I had budgeted. I had not anticipated flying to Paris to climb over the bones of thousand-year-old dead people. I had not planned to spend a week in downward dog in São Paulo, Brazil, to uncover the secrets of ancient yogic breathing techniques. I had

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definitely not accounted for the $10,000 mouth-breathing experiment at Stanford University. But that is where this wild and weird story of breathing led me. I'd paid out the nose to follow it.

Bill collectors didn't care. The U.S. Treasury doesn't have a special hotline for overextended authors who can't pay their estimated taxes. The electric company knew I couldn't plug in my laptop without their current. I hadn't received a paycheck in years and had no other prospects. I needed that "on publication" advance from my publisher, and the only way to get it was to release my book at the worst time in the history of publishing to release anything.

"Maybe a breathing book could help people now that we are having so much trouble, you know, just breathing," my editor suggested by phone, trying to prop me up. Grim, but true. I couldn't see her face, but I knew her head was in her hands.

The next day I nailed some blankets to the interior of a backyard shed that was the size of a porta-potty and smelled almost as bad. I bought a $100 microphone off Amazon, hung it from a string, and duct-taped some old dog towels to the windows. This was my new recording studio. I spent hours a day in this little hellhole sweating and swearing as I stumbled through a self-recording of the audiobook. (If you listen very carefully, you can hear the neighbor's dog barking between lines.)

The only people an author really expects to read or listen to his book are, in this order: his mom, his partner, and a guy named Steve who lives in Ohio or thereabouts and preorders every book so he can be the first reviewer on Amazon and *Goodreads*. This is exactly what was going to happen to me. As the publication date approached and the global flu raged on, I expected nothing would happen, and nothing did: no feature interviews, no reviews, no magazine spreads.

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Then, a shocker: two weeks before release we got an interview request from the team at *Fresh Air* with Terry Gross. For those of you unacquainted, Terry Gross is like Barbara Walters, Johnny Carson, Oprah Winfrey, Larry King, and Leslie Stahl wrapped into one. I'd been listening to her interviews since the 1990s. She'd gotten me through innumerable hours of boredom at innumerable debasing jobs earlier in my career.

I hardly slept the night before the interview, and the next morning I was (literally) shaking in my boots when I heard Gross's mellifluous tones crackling through the tangled cords of my earbuds. I tried not to swallow or squeak too loudly. It was the most nerve-racking hour of my life.

Breath was released on May 26, 2020, in the beating, bleeding, and coughing heart of COVID-19. What happened next surprised everyone. It debuted at number six on the *New York Times* bestseller list. Later that week it became a *Wall Street Journal* bestseller and a *Los Angeles Times* bestseller. Two months later *Breath* debuted at number 3 in *The Sunday Times* in the UK. The next week, *Breath* was still riding high, and even higher the week after that. The audiobook that I recorded with a dog towel wrapped around my head in the backyard became one of the top-selling audiobooks of the year.

I started getting a lot of calls. I set up a home video studio by propping an old computer on a shoebox and pushing an heirloom desk against a shelf filled with dusty college books I hadn't looked at in decades. I told the book publicist that I was willing to talk with anyone, anywhere, at any time. (Note to Future Self: never offer this to a publicist.)

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The fact was I had absolutely nothing else to do, nowhere else to go. These were the early days of lockdown. So I sat there in front of that bookshelf for ten interviews the first week, twenty the next, and hundreds after that. I talked with medical schools, banks, business leaders, wellness gurus, gym rats, and some guy named Steve who had just started a podcast in Ohio or thereabouts. I did interviews for listeners in the United Kingdom at 3:00 a.m. and Japan at 9:00 p.m. I explained coherent breathing to a United Arab Emirate sheikha and to the former manager of the Bee Gees. The only time I left the blue glow of my home studio was to drive nonstop down a deserted Interstate 5 with a cooler full of food and water and park in an empty lot outside a warehouse in Woodland Hills to hang out with Joe Rogan for three hours before driving home, stopping from time to time to eat lunch and dinner on the side of the road.

This went on for months. Those months became years. All told, *Breath* would spend 20 weeks on the *New York Times* bestseller lists, chart in a half dozen countries around the world, and be published in 44 languages.

As COVID faded, I left the shoebox and bookshelf behind and hit the road. I wanted to meet readers in faraway lands. Flipping through foreign editions of *Breath* at airports, I couldn't help but wonder how someone would translate, or even relate to, phrases like "Jerry Lewis bangs" and "apeshit" in Marathi and Mongolian.

People sent me things: books, pamphlets, vintage Oleg Cassini shirts, chocolate-covered marionberries, a dozen Harry & David pears, Christmas cards, Valentine's Day cards, Italian postcards, wildflower honey, dental contraptions. But they mostly sent letters about how they used simple, science-based breathing techniques to reduce or resolve asthma, anxiety, and aggression.

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They told me about how breathing through the nose in a slow and rhythmic pattern significantly bolstered athletic and work performance. Some shared data from wearable devices showing how even small changes to our breathing can have staggering effects on cardiovascular, metabolic, and neurological functions. I read every letter and responded to as many as I could.

Not everyone was a fan. One guy lambasted me for promoting "hack theories" and reminded me that the effects of breathing were nothing more than "placebos." Then he went on to mansplain the placebo effect (incorrectly). A few others (~~mostly older doctors~~ *always older doctors*) scolded me for claiming that breathing techniques could actually lower blood pressure, improve sleep quality, reduce blood sugar spikes, and even help straighten crooked spines. "I've never heard of any of this," they'd say, and then they'd remind me that they were doctors, inserting how many decades they've practiced medicine.

I genuinely enjoy a good debate, but these readers hadn't bothered to look at the more than 500 scientific studies in the endnotes of the book, or do even a cursory search through the medical literature. Even stranger, the research they questioned was often conducted by their colleagues, sometimes at the same institutions, sometimes just down the hall from where they practiced. I tried to engage them as best as I could, hoping I'd learn something in the process. I'd forward copious studies and offer to connect them to the experts in the field. But I'd never hear from them again.

The grumbles, luckily, were few and far between. What I heard from most doctors, respiratory therapists, dentists, psychologists, pulmonologists, and medical professionals wasn't crankiness: it was confirmation. These were scientists working at the top of their game at some of the world's most renowned research institutions, and they

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saw, day after day, how their patients were transforming health by adopting better breathing habits. Several doctors adopted these practices themselves. Some even launched their own breathwork companies to rehabilitate patients with COVID, sleep apnea, chronic anxiety, and more. I now call some of these people friends. I learn new things every time we chat. I always take notes.

For this new edition of *Breath*, I've added some of those notes. I've included a new section about the deleterious effects of breathing stale air in hotels, offices, and other public spaces—and what to do about it. Another new section covers how overbreathing affects muscle function, and I've added tips on how to better control asthma and help parents improve sleep for children. There's also some more esoteric findings about the ways in which Jesus respired, why Shakespeare might have written in iambic pentameter, and how your breath can synchronize your blood pressure waves to the same frequency of ocean swells.

By popular and persistent request, I've recorded a dozen of the most impactful techniques (in a real recording studio this time) that you can breathe along with anytime, anywhere. (These tracks are available at www.mrjamesnestor.com/audio.)

It's been half a decade since the publication of *Breath*. I'm still doing interviews; still giving presentations; still running weeklong Breath Retreats in tropical locales, where attendees gather from all over the world to experience the power of controlled respiration.

I still get asked the same questions: *Why is breathing correctly so essential? How does it affect our bodies and brains? When is the best time to practice it? What is the difference between the air we take in*

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through our noses versus our mouths? My answers haven't changed. And on my tired days I start to feel the way Jimmy Buffett must have felt singing "Margaritaville" for the 10,000th time, and wonder if I, too, am wasting away again blowing out flip-flops in Breathville.

And then I walk outside and see someone who looks like Colonel Sanders hunched on a park bench hyperventilating as he tries to catch his breath. I see a woman wheel by with an oxygen tube beneath her nose. I pass a jogger huffing and puffing through an open mouth, an asthmatic inhaling from a bronchodilator, a cashier suddenly freezing in a panic attack. I get a call from another parent of another kid who has dark circles under her eyes and crooked teeth, who is unable to focus or think properly because she's been choking on herself every night for years and nobody has bothered to pay attention.

In those moments, I realize there is more work to be done, and no amount of repeating is too much.

So where do I start? I get asked that question a lot, too. Try this: take a slow, deep inhale through the nose all the way down to your belly, and then slowly let it fall out. Make the next inhale slower, even softer, deeper. Repeat. You don't need yoga pants or a headband to do this. You don't need crystals or a soundtrack of fake lutes. You don't need a doctor's prescription or a pricey medical device.

Breathing better is less about learning new tricks and more about reminding your body what it is naturally designed to do. It isn't magic. Well, maybe a little magic.

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INTRODUCTION



The place looked like something out of Amityville: all paint-chipped walls, dusty windows, and menacing shadows cast by moonlight. I walked through a gate, up a flight of creaking steps, and knocked on the door.

When it swung open, a woman in her 30s with woolly eyebrows and oversize white teeth welcomed me inside. She asked me to take off my shoes, then led me to a cavernous living room, its ceiling painted sky blue with wispy clouds. I took a seat beside a window that rattled in the breeze and watched through jaundiced streetlight as others walked in. A guy with prisoner eyes. A stern-faced man with Jerry Lewis bangs. A blond woman with an off-center bindi on her forehead. Through the rustle of shuffling feet and whispered hellos, a truck rumbled down the street blasting "Paper Planes," the inescapable anthem of the day. I removed my belt, loosened the top button on my jeans, and settled in.

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I'd come here on the recommendation of my doctor, who'd told

me, "A breathing class could help." It could help strengthen my failing lungs, calm my frazzled mind, maybe give me perspective.

For the past few months, I'd been going through a rough patch. My job was stressing me out and my 130-year-old house was falling apart. I'd just recovered from pneumonia, which I'd also had the year before and the year before that. I was spending most of my time at home wheezing, working, and eating three meals a day out of the same bowl while hunched over week-old newspapers on the couch. I was in a rut—physically, mentally, and otherwise. After a few months of living this way, I took my doctor's advice and signed up for an introductory course in breathing to learn a technique called Sudarshan Kriya.

At 7:00 p.m., the bushy-browed woman locked the front door, sat in the middle of the group, inserted a cassette tape into a beat-up boom box, and pressed play. She told us to close our eyes. Through hissing static, the voice of a man with an Indian accent flowed from the speakers. It was squeaky, lilting, and too melodious to sound natural, as if it had been taken from a cartoon. The voice instructed us to inhale slowly through our noses, then to exhale slowly. To focus on our breath.

We repeated this process for a few minutes. I reached over to a pile of blankets and wrapped one around my legs to keep my stocking feet warm beneath the drafty window. I kept breathing but nothing happened. No calmness swept over me; no tension released from my tight muscles. Nothing.

Ten, maybe 20 minutes passed. I started getting annoyed and a bit resentful that I'd chosen to spend my evening inhaling dusty air on the floor of an old Victorian. I opened my eyes and looked around. Everyone had the same somber, bored look. Prisoner Eyes appeared to be sleeping. Jerry Lewis looked like he was relieving himself. Bindi sat

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frozen with a Cheshire Cat smile on her face. I thought about getting up and leaving, but I didn't want to be rude. The session was free; the instructor wasn't paid to be here. I needed to respect her charity. So I closed my eyes again, wrapped the blanket a little tighter, and kept breathing.

Then something happened. I wasn't conscious of any transformation taking place. I never felt myself relax or the swarm of nagging thoughts leave my head. But it was as if I'd been taken from one place and deposited somewhere else. It happened in an instant.

The tape came to an end and I opened my eyes. There was something wet on my head. I lifted my hand to wipe it off and noticed my hair was sopping. I ran my hand down my face, felt the sting of sweat in my eyes, and tasted salt. I looked down at my torso and noticed sweat blotches on my sweater and jeans. The temperature in the room was about 68 degrees—much cooler beneath the drafty window. Everyone had been covered in jackets and hoodies to keep warm. But I had somehow sweated through my clothes as if I'd just run a marathon.

The instructor approached and asked if I was OK, if I'd been sick or had a fever. I told her I felt perfectly fine. Then she said something about the body's heat, and how each inhaled breath provides us with new energy and each exhale releases old, stale energy. I tried to take it in but was having trouble focusing. I was preoccupied with how I was going to ride my bike three miles home from the Haight-Ashbury in sweat-soaked clothes.

The next day I felt even better. As advertised, there was a feeling of calm and quiet that I hadn't experienced in a long time. I slept well. The little things in life didn't bother me as much. The tension was gone from my shoulders and neck. This lasted a few days before the feeling faded out.

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What exactly had happened? How did sitting cross-legged in a funky house and breathing for an hour trigger such a profound reaction?

I returned to the breathing class the next week: same experience, fewer waterworks. I didn't mention any of it to family members or friends. But I worked to understand what had happened, and I spent the next several years trying to figure it out.

Over that span of time, I fixed up my house, got out of my funk, and caught a lead that might answer some of my questions about breathing. I went to Greece to write a story on freediving, the ancient practice of diving hundreds of feet below the water's surface on a single breath of air. Between dives, I interviewed dozens of experts, hoping to gain some perspective on what they did and why. I wanted to know how these unassuming-looking people—software engineers, advertising executives, biologists, and physicians—had trained their bodies to go without air for 12 minutes at a time, diving to depths far beyond what scientists thought possible.

When most people go underwater in a pool they bail out at ten feet after just a few seconds, ears screaming. The freedivers told me they'd previously been "most people." Their transformation was a matter of training; they'd coaxed their lungs to work harder, to tap the pulmonary capabilities that the rest of us ignore. They insisted they weren't special. Anyone in reasonable health willing to put in the hours could dive to 100, 200, even 300 feet. It didn't matter how old you were, how much you weighed, or what your genetic makeup was. To freedive, they said, all anyone had to do was master the art of breathing.

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To them breathing wasn't an unconscious act; it wasn't something

they just did. It was a force, a medicine, and a mechanism through which they could gain an almost superhuman power.

"There are as many ways to breathe as there are foods to eat," said one female instructor who had held her breath for more than eight minutes and once dived below 300 feet. "And each way we breathe will affect our bodies in different ways." Another diver told me that some methods of breathing will nourish our brains, while others will kill neurons; some will make us healthy, while others will hasten our death.

They told crazy stories, about how they'd breathed in ways that expanded the size of their lungs by 30 percent or more. They told me about an Indian doctor who lost several pounds by simply changing the way he inhaled, and about another man who was injected with the bacterial endotoxin *E. coli*, then breathed in a rhythmic pattern to stimulate his immune system so that he suffered no symptoms. They told me about women who put their cancers into remission and monks who could melt circles in the snow around their bare bodies over a period of several hours. It all sounded nuts.

During my off-hours from doing underwater research, usually late at night, I read through reams of literature on the subject. Surely someone had studied the effects of this conscious breathing on landlubbers? Surely someone had corroborated the freedivers' fantastic stories of using breathing for weight loss, health, and longevity?

I found a library's worth of material. The problem was, the sources were hundreds, sometimes thousands, of years old.

A dozen books of the Chinese Tao dating back to around 400 BCE focused entirely on breathing, how it could kill us or heal us, depending on how we used it. These manuscripts included detailed instructions on how to regulate the breath, slow it, hold it, and swallow it.

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Even earlier, Hindus considered breath and spirit the same thing, and described elaborate practices that were meant to balance breathing and preserve both physical and mental health. Then there were the Buddhists, who used breathing not only to lengthen their lives but to reach higher planes of consciousness. Breathing, for all these people, for all these cultures, was powerful medicine.

"Therefore, the scholar who nourishes his life refines the form and nourishes his breath," says an ancient Tao text. "Isn't this evident?"

Not so much. I looked for some kind of verification of these claims in more recent research in pulmonology, the medical discipline that deals with the lungs and the respiratory tract, but found next to nothing. According to what I did find, breathing technique wasn't important. Many doctors, researchers, and scientists I interviewed confirmed this position. Twenty times a minute, ten times, through the mouth, nose, or breathing tube, it's all the same. The point is to get air in and let the body do the rest.

To get a sense of how breathing is regarded by modern medical professionals, think back to your last checkup. Chances are your doctor took your blood pressure, pulse, and temperature, then placed a stethoscope to your chest to assess the health of your heart and lungs. Maybe she discussed diet, taking vitamins, stresses at work. Any issues digesting food? How about sleep? Were the seasonal allergies getting worse? Asthma? What about those headaches?

But she likely never checked your respiratory rate. She never checked the balance of oxygen and carbon dioxide in your bloodstream. How you breathe and the quality of each breath were not on the menu.

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Even so, if the freedivers and the ancient texts were to be believed,

how we breathe affects all things. How could it be so important and unimportant at the same time?

I kept digging, and slowly a story began to unfold. As I found out, I was not the only person who'd recently started asking these questions. While I was paging through texts and interviewing freedivers and super-breathers, scientists at Harvard, Stanford, and other renowned institutions were confirming some of the wildest stories I'd been hearing. But their work wasn't happening in the pulmonology labs. Pulmonologists, I learned, work mainly on specific maladies of the lungs—collapse, cancer, emphysema. "We're dealing with emergencies," one veteran pulmonologist told me. "That's how the system works."

No, this breathing research has been taking place elsewhere: in the muddy digs of ancient burial sites, the easy chairs of dental offices, and the rubber rooms of mental hospitals. Not the kinds of places where you'd expect to find cutting-edge research into a biological function.

Few of these scientists set out to study breathing. But, somehow, in some way, breathing kept finding them. They discovered that our capacity to breathe has changed throughout the long processes of human evolution, and that the way we breathe has gotten markedly worse since the dawn of the Industrial Age. They discovered that 90 percent of us—very likely me, you, and almost everyone you know—is breathing incorrectly and that this failure is either causing or aggravating a laundry list of chronic diseases.

On a more inspiring note, some of these researchers were also showing that many modern maladies—asthma, anxiety, attention

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deficit hyperactivity disorder, psoriasis, and more—could either be reduced or reversed simply by changing the way we inhale and exhale.

This work was upending long-held beliefs in Western medical science. Yes, breathing in different patterns really can influence our body weight. Yes, how we breathe really does affect the size and function of our lungs. Yes, breathing allows us to hack into our own nervous system, control our immune response, and restore our health. Yes, changing how we breathe will help us live longer.

No matter what we eat, how much we exercise, how resilient our genes are, how skinny or young or wise we are—none of it will matter unless we're breathing correctly. That's what these researchers discovered. The missing pillar in health is breath. It all starts there.

. . .

This book is a scientific adventure into the lost art and science of breathing. It explores the transformation that occurs inside our bodies every 3.3 seconds, the time it takes the average person to inhale and exhale. It explains how the billions and billions of molecules you bring in with each breath have built your bones, sheaths of muscle, blood, brains, and organs, and the emerging science of how these microscopic bits will influence your health and happiness tomorrow, next week, next month, next year, and decades from now.

I call this a "lost art" because so many of these new discoveries aren't new at all. Most of the techniques I'll be exploring have been around for hundreds, sometimes thousands, of years. They were created, documented, forgotten, and discovered in another culture at another time, then forgotten again. This went on for centuries.

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Many early pioneers in this discipline weren't scientists. They were

tinkerers, a kind of rogue group I call "pulmonauts," who stumbled on the powers of breathing because nothing else could help them. They were Civil War surgeons, French hairdressers, anarchist opera singers, Indian mystics, irritable swim coaches, stern-faced Ukrainian cardiologists, Czechoslovakian Olympians, and North Carolina choral conductors.

Few of these pulmonauts achieved much fame or respect when they were alive, and when they died their research was buried and scattered. It was even more fascinating to learn that, during the past few years, their techniques were being rediscovered and scientifically tested and proven. The fruits of this once-fringe, often forgotten research are now redefining the potential of the human body.

But why do I need to learn how to breathe? I've been breathing my whole life.

This question, which you may be asking now, has been popping up ever since I began my research. We assume, at our peril, that breathing is a passive action, just something that we do: breathe, live; stop breathing, die. But breathing is not binary. And the more I immersed myself in this subject, the more personally invested I felt about sharing this basic truth.

Like most adults, I too have suffered from a host of respiratory problems in my life. That's what landed me at the breathing class years ago. And like most people, I found that no allergy drug, inhaler, mix of supplements, or diet did much good. In the end, it was a new generation of pulmonauts who offered me a cure, and then they offered so much more.

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It will take the average reader about 10,000 breaths to read from

here to the end of the book. If I've done my job correctly, starting now, with every breath you take, you'll have a deeper understanding of breathing and how best to do it. Twenty times a minute, ten times, through the mouth, nose, tracheostomy, or breathing tube—it's not all the same. How we breathe really matters.

By your 1,000th breath, you'll understand why modern humans are the only species with chronically crooked teeth, and why that's relevant to breathing. You'll know how our ability to breathe has deteriorated over the ages, and why our cavemen ancestors didn't snore. You'll have followed two middle-aged men as they struggle through a pioneering and masochistic 20-day study at Stanford University to test the long-held belief that the pathway through which we breathe—nose or mouth—is inconsequential. Some of what you'll learn will ruin your days and nights, especially if you snore. But in your next breaths, you'll find remedies.

By your 3,000th breath, you'll know the basics of restorative breathing. These slow and long techniques are open to everyone—old and young, sick and healthy, rich and poor. They've been practiced in Hinduism, Buddhism, Christianity, and other religions for thousands of years, but only recently have we learned how they can reduce blood pressure, boost athletic performance, and balance the nervous system.

By your 6,000th breath, you will have moved into the land of serious, conscious breathing. You'll travel past the mouth and nose, deeper into the lungs, and you'll meet a midcentury pulmonaut who healed World War II veterans of emphysema and trained Olympic sprinters to win gold medals, all by harnessing the power of the exhale.

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By your 8,000th breath, you'll have pushed even deeper into the body to tap, of all things, the nervous system. You'll discover the

power of overbreathing. You'll meet with pulmonauts who have used breathing to straighten scoliotic spines, blunt autoimmune diseases, and superheat themselves in subzero temperatures. None of this should be possible, and yet, as you will see, it is. Along the way, I'll be learning, too, trying to understand what happened to me in that Victorian house a decade ago.

By your 10,000th breath, and the close of this book, you will know how the air that enters your lungs affects every moment of your life and how to harness it to its full potential until your final breath.

This book will explore many things: evolution, medical history, biochemistry, physiology, physics, athletic endurance, and more. But mostly it will explore *you*.

By the law of averages, you will take 670 million breaths in your lifetime. Maybe you've already taken half of those. Maybe you're on breath 669,000,000. Maybe you'd like to take a few million more.

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Part One



THE EXPERIMENT

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One

THE WORST BREATHERS IN THE ANIMAL KINGDOM



The patient arrived, pale and torpid, at 9:32 a.m. Male, middle-aged, 175 pounds. Talkative and friendly but visibly anxious. Pain: none. Fatigue: a little. Level of anxiety: moderate. Fears about progression and future symptoms: high.

Patient reported that he was raised in a modern suburban environment, bottle-fed at six months, and weaned onto jarred commercial foods. The lack of chewing associated with this soft diet stunted bone development in his dental arches and sinus cavity, leading to chronic nasal congestion.

By age 15, patient was subsisting on even softer, highly processed foods consisting mostly of white bread, sweetened fruit juices, canned vegetables, Steak-umms, Velveeta sandwiches, microwave taquitos, Hostess Sno Balls, and Reggie! bars. His mouth had become so underdeveloped it could not accommodate 32 permanent teeth; incisors and canines grew in crooked, requiring extractions, braces, retainers, and

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headgear to straighten. Three years of orthodontics made his small mouth even smaller, so his tongue no longer properly fit between his teeth. When he stuck it out, which he did often, visible imprints laced its sides, a precursor to snoring.

At 17, four impacted wisdom teeth were removed, which further decreased the size of his mouth while increasing his chances of developing the chronic nocturnal choking known as sleep apnea. As he aged into his 20s and 30s, his breathing became more labored and dysfunctional and his airways became more obstructed. His face would continue a vertical growth pattern that led to sagging eyes, doughy cheeks, a sloping forehead, and a protruding nose.

This atrophied, underdeveloped mouth, throat, and skull, unfortunately, belongs to me.

I'm lying on the examination chair in the Stanford Department of Otolaryngology Head and Neck Surgery Center looking at myself, looking into myself. For the past several minutes, Dr. Jayakar Nayak, a nasal and sinus surgeon, has been gingerly coaxing an endoscope camera through my nose. He's gone so deep into my head that it's come out the other side, into my throat.

"Say *eeee*," he says. Nayak has a halo of black hair, square glasses, cushioned running shoes, and a white coat. But I'm not looking at his clothes, or his face. I'm wearing a pair of video goggles that are streaming a live feed of the journey through the rolling dunes, swampy marshes, and stalactites inside my severely damaged sinuses. I'm trying not to cough or choke or gag as that endoscope squirms a little farther down.

"Say *eeee*," Nayak repeats. I say it and watch as the soft tissue around my larynx, pink and fleshy and coated in slime, opens and closes like a stop-motion Georgia O'Keeffe flower.

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