CONTENTS


I INTRODUCTION

1 Theme 1
2 The Irregular and Fragmented in Nature 6
3 Dimension, Symmetry, Divergence 14
4 Variations and Disclaimers 20

II THREE CLASSIC FRACTALS, TAMED

5 How Long is the Coast of Britain? 25
6 Snowflakes and Other Koch Curves 34
7 Harnessing the Peano Monster Curves 58
8 Fractal Events and Cantor Dusts 74

III GALAXIES AND EDDIES

9 Fractal View of Galaxy Clusters 84
10 Geometry of Turbulence; Intermittency 97
11 Fractal Singularities of Differential Equations 106

IV SCALING FRACTALS

12 Length-Area-Volume Relations 109
13 Islands, Clusters, and Percolation; Diameter-Number Relations 116
14 Ramification and Fractal Lattices 131

V NONSCALING FRACTALS

15 Surfaces with Positive Volume, and Flesh 147
16 Trees; Scaling Residues; Nonuniform Fractals 151
17 Trees and the Diameter Exponent 156

VI SELF-MAPPING FRACTALS

18 Self-Inverse Fractals, Apollonian Nets, and Soap 166
19 Cantor and Fatou Dusts; Self-Squared Dragons 180
20 Fractal Attractors and Fractal ("Chaotic") Evolutions 193

VII RANDOMNESS

21 Chance as a Tool in Model Making 200
22 Conditional Stationarity and Cosmographic Principles 205

VIII STRATIFIED RANDOM FRACTALS

23 Random Curds: Contact Clusters and Fractal Percolation 210
24 Random Chains and Squigs 224
25 Brownian Motion and Brown Fractals 232
26 Random Midpoint Displacement Curves 244

IX FRACTIONAL BROWN FRACTALS

27 River Discharges; Scaling Nets and Noises 247
28 Relief and Coastlines 256
29 The Areas of Islands, Lakes, and Cups 272

A BOOK-WITHIN-THE-BOOK, IN COLOR

30 Isothermal Surfaces of Homogeneous Turbulence 277

X RANDOM TREMAS; TEXTURE

31 Interval Tremas; Linear Lévy Dusts 280
32 Subordination; Spatial Lévy Dusts; Ordered Galaxies 288
33 Disc and Sphere Tremas: Moon Craters and Galaxies 301
34 Texture: Gaps and Lacunarity; Cirri and Succolarity 310
35 General Tremas, and the Control of Texture 319

XI MISCELLANY

36 Logic of Fractals in Statistical Lattice Physics 326
37 Price Change and Scaling in Economics 335
38 Scaling and Power Laws Without Geometry 341
39 Mathematical Backup and Addenda 349

XII OF MEN AND IDEAS

40 Biographical Sketches 391
41 Historical Sketches 405
42 Epilog: The Path to Fractals 422

LIST OF REFERENCES 425
ACKNOWLEDGMENTS 445
INDEX OF SELECTED DIMENSIONS 446
INDEX OF NAMES AND SUBJECTS 448
UPDATE ADDED IN THE SECOND PRINTING 458