Index

Aberth, O. 76
Adam, K. 94
adaptive belief systems 88
adaptive expectations 142–3
    cobweb model 91–2
adaptive learning 87, 99–108
    versus naive expectations 114–15
adiabatic approximation 28
Adjare, S.O. 173
adjustment processes 133–45
    classification 134
agent-based models
    foreign exchange markets 319–20
macroeconomics 248
aggregation and complexity 171–92
Agiza, H.N. 152, 156
Agliari, A. 156–7
Ahmed, E. 314
Al-Nowaihi, A. 146, 158
Albin, P.S. 4
algebraic information theory 403
algorithmic complexity 24, 70–74
Allen, P.M. 331
anagenesis 26
anagenetic moment 27
Anderson, D.R. 156
Angle, J. 241–2
Anglin, P.M. 243
Aoki, M. 218, 248, 383
approximation 46–7
Arifovic, J. 119
Arnol’d, V.I. 5
Arrow, K. 418
Arthur, W.B. 3, 18, 183–4, 319
artificial foreign exchange markets 319–20
asynchronous updating 110
Ausloos, M. 217, 232
Austrian economics 393–5
    and complexity theory 395–406
autocatalysis 327
autopoesis 27
Axtell, R.L. 246–7
Babbage, C. 423–4
Bacry, E. 236
Bak, P. 32, 219, 227
baker’s transformation 196–7
Bar (El Farol) Problem 16–17, 183–4
Barabasi, A. 330
Bartolozzi, M. 224
basins of attraction 125–6, 154–5, 160
Bassler, K.E. 282
BCSS model 57–67
Bertrand, J. 124
Bertrand model 130–33
best-response dynamics 137–8
big tent complexity 4
Binmore, K.G. 354
Bischi, G.I. 147, 152, 153, 154, 156, 157–8
Bishop, E.A. 57
Black, F. 275, 276
Blum, L. 30, 54, 56, 59, 65, 77
Blume, L.E. 4
Bonanno, G. 149–50
border collision bifurcation 157, 159–60
Borwein, J.M. 39
Borwein, P.B. 39
Bouchaud, J.-P. 223, 225, 226, 243
bounded rationality 397–8
    and learning 87–118
Branch, W.A. 99, 115
Brauer, F. 374
Bray, M.M. 99, 119
BRICE economics 397–401
Brock, W.A. 88, 108–9, 110, 160–61, 305, 383
Brunner, H.-P. 327, 331
bubble-and-crash patterns, foreign exchange markets 289, 290
bull and bear markets, foreign exchange markets 301–3
buyer–seller relations 184–91
Caldwell, B. 395, 401
Calvet, L.E. 234–6
Cantor, G. 6
Castañeda, A. 245
causal effect reversal 196
causal structure, decomplexifying 198–201
Cayley, A. 5
CEE see consistent expectations equilibria
centipede games 355–65
four-move 364–5
multi-move 363–4
two-move 359–63
two-move 355–9
central banks and foreign exchange markets 320
Chaitin, G.J. 24, 71, 72, 403
Chakrabarti, B. 242
Chakraborti, A. 242
Champernowne, D.G. 241
Chang, G. 252
chaos and SAC learning dynamics 106–8
chaotic dynamics, hierarchical systems 384
chartist-fundamentalist approach 287–8
see also fundamental analysis; technical analysis
chartists see technical analysis
Chen, S.-H. 220
Chen, Z. 381–2
Chiarella, C. 92, 150, 157, 229, 314
Church, A. 23
Cinotti, S. 224
Clark, C.W. 371, 380
Cleave, J. 65
climatic-economic system 381–3
Clover, R.W. 23
cluster growth and stability 180–83
Cobb, C.W. 201
Cobb-Douglas method 201–2
cobweb model 89–92
and consistent expectations equilibria (CEE) 103
cognition 399–400
Colander, D. 399
Cole, F.N. 45
Colucci, D. 94
*Combinatorial Optimization* 49–50

commitment and oligopoly theory 129–30
Compagner, A. 78
competitive species interaction, fish 374
complex dynamics in ecologic-economic systems 369–85
fisheries 371–5
forestry 376–81
in global climatic-economic system 381–3
complex systems modelling and international development 326–48
complexity
and aggregation 171–92
and Austrian economics 393–406
definitions 22, 126, 369
and the economy 12–19
and the history of economic thought 409–25
levels of 3–5
origins 5–6
sources of 195–7
complexity approach to history of economic thought 416–18
complexity approach to science 410–13
complexity science and economics 413–15
compositional method 395
computable economics 23, 398, 402–4
computational complexity 4–5, 23–5, 36–74
history 49–52
and linear programming 52–6
of real numbers and functions 56–67
conjectural variations, oligopoly dynamics 141–2
Conklin, J.E. 373
consistent expectations equilibria (CEE) 88, 100–108
and cobweb model 103
fishery model 103–8
Cont, R. 223
contact bifurcations 154
contrarians 111–13
controlled experimentation 198–9
conventional histories of economic thought 415–16
convergence 46–7
Cook, S.A. 51
Cook’s theorem 45
coordination 176–83
Corchon, L.C. 152
correlation matrices 229–31
Cournot, A. 124, 125, 134–5
Cournot competition 127–9
Crane, E. 173
crashes, market 273–4
foreign exchange markets 289, 290
Cressman, R. 353
criticality 221
Crutchfield, J. 26
da Costa, N.C.A. 63, 68, 402–3
Dacorogna, M. 236
Dana, R.-A. 151
Daniels, M.G. 228
Dawid, H. 156, 158
Day, R.H. 4, 126, 205, 299–300, 369
De Grauwe, P. 115, 306, 308, 314
decision problems 37
classes of 38–9
as optimization problems 43–5
decomposition of salient phenomena 199–200
Delli Gatti, D. 247
Demos, A. 232
deregulation, dangers of 404
deterministic models, foreign exchange markets 295–314
Dewachter, H. 306, 308
Díaz-Giménez, J. 245
Dieci, R. 321
Diener, M. 383
Diks, C.G.H. 115
Dilthey, W. 405
Dindo, P.D.E. 115
Ding, Z. 217, 232
discounted equilibrium supply curve 104
discretization 67, 200
divergence 46–7
division of labour, voluntary heterogeneity 172–4
Dixit, A. 148
Dockner, E. 145
Doria, F.A. 63, 68, 402–3
Dosi, G. 27
Douglas, P.H. 201
Dragulescu, A.A. 242, 244
Durlauf, S.N. 3, 4
Dwyer, G.P. 93
dynamic complexity 22, 25–9
dynamic multi-product oligopolies 147
dynamics of order books 225–9
ecologic-economic systems, complex dynamics 369–85
economic analysis, limits of 401–4
economic hubs 330
economic thought, history of, and complexity 409–25
economics
applications of statistical physics 213–51
and complexity science 413–15
economy and complexity 12–19
econophysics 213–14
Edmonds, J. 50–51
efficient market hypothesis (EMH) 265
and foreign exchange market 287
Eigen, M. 26–7
Einstein, A. 67
El Farol Bar Problem 16–17, 183–4
ellipsoid method 53–5
Ellison, G. 160
Embrechts, M. 308
Embrechts, P. 261
emergence 26
endogenous selection of trading strategies 304–10
Engle, R. 217, 232
Entscheidungsproblem 36–7
equilibria selection, oligopoly models 153–4
equilibria types 181
equilibrium development theory 327–9
equilibrium macroeconomic growth 205–6
Erneux, T. 32
Evans, G.W. 99, 115
evolution, economic 400–401
evolutionary fitness and trading strategy selection 308–10
exchange rate dynamics 287–322
exchange rate model and herding behaviour 316–19
exchange rate volatility 289
expectation formation 137, 138–43
laboratory experiments 92–9
expectations 16–17, 87
financial markets 17–19
see also rational expectations
exploration and exploitation 185–6
extrapolative expectations 143

Fama, E. 215, 264
Farmer, J.D. 226
fast and easy verifiability 45–6
fat tails
financial power laws 214–18
foreign exchange markets 289
Fatal Conceit, The 395–6
Faustmann. M. 376
Feichtinger, G. 152
Feigenbaum, J. 252
Feynman, R.P. 66–7
finance applications of statistical physics 213–51
finance function 23
finance market models 276
financial downturns, forecasting 237–9
financial markets, expectations 17–19
financial power laws 214–24
firm size distribution 246–8
Fisher, A. 234–6
Fisher, F.M. 145
fishery dynamics 371–5
chaotic CEE 103–8
Focardi, S. 224
forecasting
financial downturns 237–9
volatility 231–7
foreign exchange markets 287–322
characteristics 289–93
herding behaviour 314–19
interaction between markets 310–13
linear model 295–7
nonlinear price impact function 297–9
nonlinear trading rules 299–304
trader behaviour 293–5
trading strategy selection 304–10
forestry, complex dynamics 376–81
Foundations of Constructive Analysis 57
Foundations of Economic Analysis 200
four C’s 4
four-move centipede game 364–5
fractional Brownian motion 271–3
Frankel, J. 304–5
Franzén, T. 70
frequency entrainment 28–9
Friedman, D. 93
Friedman, M. 87, 400–401
Froot, K. 304–5
fundamental analysis 288–9, 294–5
decreasing impact, foreign exchange markets 304
exchange rate models 295–314
foreign exchange markets 294–5
and herding model 315–19
nonlinear trading rule 301
fundamentalists versus naive expectation 111
Furth, D. 148
Gabaix, X. 218
Gadamer, H.-G. 405
Gal-Or, E. 130
Gale, J. 354
Gallegati, M. 157–8
Galluccio, S. 282
Gardini, L. 152, 156–7
Gause, G.J. 374
General Treatise on Sociology 172
Ghashghaie, S. 232
Giardina, I. 223
Gibrat’s law of proportional effect 246
given real numbers 41
global dynamics, oligopoly models 154, 159
Gödel, K. 23, 49
Goldreich, O. 39
Goodwin, R.M. 31, 62
Gopikrishnan, P. 227
gradient adjustment 144, 147–8
oligopoly models 157
Grandmont, J.-M. 99, 192–3
Granger, C. 217, 232
Grimaldi, M. 314
growth of functions 47–8
growth rate and firm size 246–9
Gu, M. 298
Gunaratne, G.H. 282
Hadar, J. 146
Hahn, F.H. 145
Index 431

Haken, H. 26, 28, 395
halting problem 23
Hamilton, J. 130
Hardy, G.H. 46
Hart, S. 353–4
Hartman, R. 376
Hartmann, G. 314
Hathaway, N.J. 149
He, X.-Z. 300, 314
Heckscher-Ohlin model 329
Henderson-Sellars, A. 381
herding model 314–16
foreign exchange markets 316–19
hermeneutics 405
Herreiner, D. 188
heterogeneity 172–6
and contribution to public goods 174–6
voluntary 172–4
heterogeneous agent models 88
heterogeneous expectations 98, 108–15
Hey, J.D. 93
Hicks, J. 418
Hidden Order 402
hierarchies, ecological-economic 383–4
higher recursion theory 49
Hilbert, D. 36–7, 73, 79
History of England, The 404
Holden, L. 32
Holland, J.H. 18, 400, 401–2
Holling, C.S. 370, 379, 385
honeybees, division of labour 173
Honkapohja, S. 99
Horgan, J. 4, 22, 412
Hosomatsu, Y. 147
Howitt, P.W. 23
Howroyd, T.D. 146, 149
Huang, W. 299–300
Huggett, M. 245
Hume, D. 404
Hurst exponent scaling 261–3
hypercyclic morphogenesis 27
imperfect information and oligopoly models 157
Inaba, T. 382
income distribution 239–45
incompleteness and complexity 72–3
increasing returns and positive feedback 14–16
industrial organization and macroeconomics 245–9
inequality of wealth 241–2
information content, Shannon measure of 24
institutions 399
intensity of choice 110
international development and complex systems modelling 326–48
Iori, G. 224, 229
Israel, G. 22, 26, 31
Ito processes 268
scaling 269–71
Jaffe, A. 36
Jeffreys, H. 46–7
Joseph exponent 261
Kahneman, D. 293
Kaizoji, T. 313
Kaneko, K. 384
Karp, R.M. 51, 52, 74
Kauffman, S. 400
Kelley, H. 93
Keynes, J.M. 75, 201, 202–3, 423
Khachiyan, L.G. 52, 54–5
Kim, G. 219
Kirman, A. 147, 172, 182, 188, 220, 250, 314–19
Klee, V. 52
Koch, K. 172
Kohlberg, W.C. 373
Kolmogorov, A.N. 24, 66, 70–71, 73, 403
Kolmogorov complexity 24, 70–71
Kolmogorov entropy 70–71
Kopel, M. 151–2, 153, 154, 156, 157, 158
Koppl, R. 398, 402, 405
Kozhemyak, A. 236
Krelle, W. 146, 148–9
Krusell, P. 245
Kydland, F. 202
laboratory experiments, foreign exchange markets 293–4
Lamantia, F. 158
Lane, D.A. 3
Launhardt-Hotelling oligopolies 149
Lawrenz, C. 320
learning to believe in chaos 106
LeBaron, B. 18, 319
Leonard, D. 157
levels of complexity 3–5
Levin, D. 130
Levine, P.L. 146, 158
Levy, H. 219
Levy, M. 219
Li, H. 313–14
Li, M. 71, 77–8
Li, W. 147
Lindgren, K. 13–14
linear exchange rate models 295–7
linear forecasting rules 109–11
linear programming 52–6
linearization 200
liquidity 273–4
Liu, Y. 217
Lloyd, S. 4, 22
Lloyd Morgan, C. 26
log return 259–60
long-term dependence 217
Lorenz, E.N. 24, 383
Lotka-Volterra predator-prey cycle 370
Lucas, R. 202
Lux, T. 220–22, 222–3, 236, 243, 305
Lyapounov, A.N. 6
Marchesi, M. 220–22, 224, 305
Marimon, R. 94
market crashes 273–4
market-makers 297–8
market relations 184–91
market value, dynamic definition 274–5
markets
as algorithms 30
interaction between 310–13
Markose, S.M. 397, 398
Markiewicz, A. 115
Markov markets 265
Markov processes 267–8
Markov-switching multifractal process (MSM) 235
Markowitz, H. 219
Marshall, A. 15, 422
martingale condition 266, 268
Marx, K. 421–2
Mas-Colell, A. 152
Maslov, S. 228
mathematical origins of complexity 5–6
Matia, K. 227
Matsumoto, A. 152, 382
Matutinovic, I. 326
McCall, J.J. 403
McCauley, J.L. 22, 26, 32, 282
McDonald, S.W. 161
McGuffie, K. 381
McManus, M. 145
McMillan, J. 146
Menger, C. 393, 395
Merton, R.C. 276
meta-complexity 4–5
Mézard, M. 226, 243
Mill, J.S. 421
Miller, W. 65
minimum description length 24
Minty, G.J. 52
Mirowski, P. 5, 22, 30
misalignment and selection of trading strategy 305–8
Mises, L. von 394, 404
modelling causal interaction 199
Models of Business Cycles 202
Montrucchio, L. 151
Moore, C. 65
Index 433

morphogenesis 27
Moschovakis, Y. 70
Moscow tradition 71
Mosekilde, E. 27
Mount, K.R. 77
multi-level causality 195–6
multi-level measurement of complexity 197–8
multi-move centipede games 363–4
multi-phase causality 196–7
multi-product oligopolies 147
multifractal models 231–7
Muradian, R. 380
Murphy, G.I. 374
Muzy, J.-F. 236
Myran, N.M. 156

Nagatani, K. 146
Naimzada, A. 147, 157–8
naive expectations 138–41
cobweb dynamics 90–91
versus adaptive learning 114–15
versus contrarians 111–13
versus fundamentalists 111
Nash equilibria, subgames 353
Ness, J.W. van 261, 272
Neumann, J. von 423–4
Newtonian vision 65–7
Nicolis, G. 28–9
Nicolis, J.S. 383
Nishimura, K. 157
noise, effect on SAC learning dynamics 106–8
noise traders 273–4
nomography 79
non-equilibrium spatial model, West Bengal 332–44
Nonaka, Y. 152
nonlinear fundamental trading rule 300–301
nonlinear price impact function, exchange rate models 297–9
nonlinear trading rules, foreign exchange markets 299–304
nonlinearity as source of complexity 196
nonstationary increments 264–7
nonstationary processes 263–4
Normann, H.-T. 138

Oechssler, J. 138
Okuyama, R. 246
Okuguchi, K. 146, 147, 149
oligopoly dynamics 124–62
oligopoly theory, core models 127–33
Onnela, J.-P. 230
optimization problems, decision problems as 43–5
order book dynamics 225–9
orders of growth 47–8
Orsenigo, L. 27
out-of-equilibrium growth 206–8

Paczuski, M. 219, 227
Palmer, R. 18, 319
Pancs, R. 178
Papadimitriou, C.H. 54
Pareto, V. 172, 239–40
Parks, P.J. 377
partial adjustment to the best response 138
Pavlov, O. 205
Penrose, R. 67
percolation models 223–4
perpetual novelty 13–14
Peterson, S.P. 93
physics simulation of 66–7
Plerou, V. 227, 230
Poincaré, H. 5
Polya, G. 39
Ponti, G. 354
positive feedbacks 14–16
Post, E. 49
Poston, T. 383
Potters, M. 225, 226
Potts, J. 327–8
power laws in financial markets 214–24
Prescott, E.C. 202
price competition oligopoly models 130–33, 149–50
price impact functions
linear 295–7
nonlinear 297–9
Prigogine, I. 28–9, 395
Principles of Economics 393
Problems of Economics and Sociology 395
Puu, T. 149, 151, 152, 156–7
Quandt, R.E. 145, 149, 246
quantity-setting oligopoly models 127–9, 145–8
type 1-complexity 151
type 2-complexity 156
quantizing 67

Ramanujan, S. 39, 75
Ramsey, F. 201
Ramsey, J. 250
Rand, D. 151
randomness 403
Rasmussen, S. 27
Rassenti, S. 147
rational expectations 16, 87, 108–9
cobweb model 91
rational route to randomness 109
real business cycle (RBC) theory 202
real functions, computational complexity 56–67
real numbers 41
computational complexity 56–67
reducible of systems 200
Reiter, S.R. 77
Reitz, S. 304
representative agent benchmarks 87, 98
restricted perception equilibria 99
Ricardo, D. 421
Richman, F. 56
Richter, H. 152
Rickard, J.A. 146, 149
Rickles, D. 264
riddled basins 160
Ríos-Rull, J.-V. 245
Rissanen, J.-V. 245
Road to Reality, The 67
Robinson, R.M. 73
Rosenberg, N. 423
Rosenow, B. 230
Rössler, O.E. 5, 63–4
Rubel’s theorem 64
rule following 398–9
Russell, A. 146

SAC-learning see sample autocorrelation learning
salience 198
sample autocorrelation (SAC) learning 99–100, 102–3, 105
effect of noise 106–8
Samuelson, L. 354
Samuelson, P.A. 200
Santa Fe approach to price formation 319
Santa Fe complexity 3–4
Sargent, T.J. 99
Sato, A.-H. 219
Sato, R. 146
Savin, N.E. 99, 119
Sbragia, L. 147
scaling 261–3
Ito processes 269–71
scaling laws 214–18
Schechter, E. 58
Schelling model 176–83
Schlag, K. 353
Schmalensee, R. 93
Scholes, M. 276
Schönofer, M. 119
Schoonbeek, L. 148, 149
Schornstein, S. 222–3
Schrijver, A. 49–50, 54, 56
Schumpeter, J. 30–31, 418
Schuster, P. 26–7
Schwartz, J. 69
Seade, J. 146
self-organization 26
self-similarity 261–2
Sensory Order, The 398, 399, 404–5
sequential adjustment 134–6
Shafer, W. 205
Shannon measure of information content 24
Shen, A. 71
Shubik, M. 219, 227
Silver, J. 243–4
Silverberg, G. 27
Simon, H.A. 36, 70, 87, 398
simplex algorithm 52–3
simplicity and complexity in macroeconomics 201–4
Singh, N. 132
Sipser, M. 47
size and growth of firms 246–9
Slade, M.E. 153
Slanina, F. 228
slaving principle 28
sliding windows 276–82
Slovic, P. 293
Slud, E. 244
Slutsky, S. 130
Smale, S. 58, 65, 77
small tent complexity 3–4
small-world network, economic interactions 330
Smith, A. 245
Smith, Adam 201, 420
Smith, E. 228
Smith, V. 93, 293, 394–5, 404
Smoryński, C. 46, 47
society and its economy as a complex system 326
Solomon, S. 219
Solomonoff, R.J. 31, 71, 403
Solow, R. 201–2, 205
Sonnenmans, J. 94, 119
Sorenson, T.S. 27
Sorger, G. 88, 99, 100, 103, 373
Sornette, D. 224, 237–8, 251–2
Soudack, A.E. 374
Spear, S.E. 94
specialization 173
spontaneous order 396–7
spruce budworm dynamics 370
spurious Hurst exponent 261
stability of equilibria 153–4, 181
stability-resilience trade-offs 370
forestry management 379
Stackelberg, H. von 124
Stackelberg model of oligopoly theory 129–30, 148–9
type 1-complexity 152
Stackelberg price competition 133
Stanley, H.E. 216, 227
Stanley, M.H.R. 224
static expectations see naive expectations
stationary increments 264–7
stationary processes 263–4
Stauffer, D. 224, 251
Stefanini, L. 157
Steiglitz, K. 54
Steindl, J. 246
Stigler, G. 219
stochastic models, foreign exchange markets 314–20
stock market crashes, forecasting 237–9
Stolk, A. 152
story-telling and modelling causal interaction 199
subgame perfection in evolutionary dynamics 353–68
Suchanek, G.L. 93
Sunder, S. 94
Sutton, J. 247
Swallow, S.K. 377
synergetics 28
Szidarovsky, F. 146, 147, 150, 157
Takamoto, K. 244
Takayasu, H. 219, 246
Takayasu, M. 246
Tang, L.H. 228
Taqqu, M.S. 261
Tarr, D.G. 149
Tata, F. 232
technical analysis (chartists)
exchange rate models 296–314
foreign exchange markets 294–5
and herding model 315–19
selection of trading strategy 304–10
switching between markets 310–13
tent map 196–7
Theocharis, R.D. 145
Thomas, A.W. 224
Thompson, S.B. 236
three-move centipede game 359–63
Tian, G.-S. 228
time-bounded complexity component 72
time series with nonstationary increments 259–82
topological complexity 48
BCSS model 57–67
trader behaviour, foreign exchange markets 293–5
trading strategies
endogenous selection 304–10
foreign exchange markets 294–5
see also fundamental analysis; technical analysis
trading strategy selection
by evolutionary fitness measures 308–10
by misalignment 305–8
traditional equilibrium development
text 327–9
transportation study, West Bengal
332–44
travelling salesperson’s problem (TSP)
41–2
Treatise on Probability 71
Tsuda, I. 384
Tuinstra, J. 119
Turing, A.M. 23, 27, 31, 36, 56–7
Tversky, A. 293
two-move centipede games 355–9
type 1-complexity oligopoly models
126, 151–3, 155
type 2-complexity oligopoly models
126–7, 155–6

ultimatum game 365–7
ultrametric structures 248–9
uncertainty dimension 161–2
Uspensky, V.A. 71

Valori, V. 94
value, dynamic definition 274–5
van Ness, J.W. 261, 272
Vandewalle, N. 217, 232
Vassilicos, J.C. 232
Veendorp, E.C.H. 149
Velden, van de, H. 94
Velupillai, K.V. 23, 24, 29, 402
verifi ability, fast and easy 45–6
verstehende psychology 399–400, 404–5
Vessal, A. 149
Vincovic, D. 182
Vitanyi, P. 71, 77–8
Vives, X. 132–3, 145
volatility clustering 217
voluntary heterogeneity 172–4
von Mises, L. 394, 404
von Neumann, J. 423–4
von Stackelberg, H. 124
see also entries under Stackelberg
Vriend, N.J. 178
Wagener, F.O.O. 119
Walras, L. 422
Walters, C.J. 374–5
wealth and income distribution 239–45
Wear, D.N. 377
Weihrauch, K. 77
Weintraub, E.R. 5
Weisbuch, G. 188
Weitzman, M.L. 383
West Bengal, non-equilibrium spatial
model 332–44
Westerhoff, F. 298, 304, 306, 310–11,
320, 321
White, D.L. 156
Whitman, D.G. 405
Wieland, C. 310–11, 320
Williams, A.W. 93
Wilson, J. 384
Wirl, F. 152
Wolpert, D.H. 403
Wright, I. 247

Yakovenko, V.M. 242, 244
Yamasaki, K. 227
Yen, J. 146, 147
Yoshikawa, H. 218, 248
Zemann, E.C. 149–50
zero intelligence traders 228
Zhang, A. 147
Zhang, Y. 147
Zhou, W.-X. 237–8, 251–2
Zovko, I.I. 226