

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)

INDEX

- abacus, 9, 17, 28, 30–5, 44, 46, 262
 - technical terms, *see* technical terms
- abnormalities, human and animal, 242
- abrasives, 318, 321
- abstraction, 64
- Academia Sinica, 174
- accordion, 384
- Account of the Travels of the Emperor Mu, *see* Mu Thien Tzu Chuan
- 'accountants' forms (Chinese numerals), 1, 2
- accuracy
 - and the construction of astronomical instruments, 134
 - in measurement, 380–1
- acephali (headless beings), 240, 241
- acoustics, 334, 364ff
 - Chinese and Greek approach contrasted, 364–5
 - technical terms, *see* technical terms
- see also* sound
- 'action at a distance', 323, 342
- adding machine, 30
- Aden, 270, 271
- addition, 18, 23, 24
 - algebraic, 15
 - of fractions, 24
- Admonitory Sayings, *see* *Fa Yen*
- advisory vessels, 335–6
- aerodynamics, 364
- Afghanistan, 250
- Africa, 256
 - place-names, 270
 - shape of, 267, 270, 272
- agrarian bureaucracy, *see* bureaucracy
- Agricola, Georgius, 313, 314, 324
- agriculture, 75–6
- Ainu, *see* tribal peoples
- air
 - in a state of agitation, 382–3
 - resistance, 341
- Albertus Magnus, 312
- alchemy, 67, 307, 308, 309, 310, 333
 - Arabic, 22, 315
- Alexander the Great, 197
- Alexandria and Alexandrians, 36, 133, 200, 253, 315, 357, 375, 384
 - clepsydra, 149, 152
- Alfonso X (king of Castile), 312
- algebra, 5, 9, 11, 15–16, 17, 26, 39, 40, 41, 46ff, 62, 63, 184, 189, 212, 221
 - Arabic, 47
- Babylonian, 47

Index

395

- derivation of the word, 47–8
 geometry and, 44
 Indian, 47
 algebraic symbolism, slow to develop in Europe, 48
Algebrista, 47
 Algeria, 51
Alhazen, *see* Ibn al-Haitham
 'Ali ibn al-Shāṭir, 133
Allegorical Essays, *see* *Yü Chien*
 alloys, 17, 308
 assaying of, 322
Almagest (Ptolemy), 117, 200
 alphabetic languages, and atomic theories, 329
 alphabets, 185–6
 Altair, 108, 109
 Altar of Heaven, Peking, 112
 altitude
 measurement of, 218
 of a star, 72, 117
 alum, 295, 307, 309, 314, 315, 343
 aluminium oxide, 321
 aluminium sulphate, 315
 alunite, 315
 Amazon (river), 233
 America, 282
 Central, 186, 317
 American Museum of Natural History, 105
 Amerindians, 28, 186
 ammonium alum, 315
 ammonium chloride, *see* sal ammoniac
 Amne Machin range, 251
 amulets, 317
 An (Chin emperor, A.D. 397–419), 28
An Thien Lun (Discussion on the Conformation of the Heavens), 81
 Analysis of the Motions of the five Planets, *see* *Wu Hsing Hsing*
Tu Chieh
 analytic geometry, *see* geometry
 anaphoric clock, 178
 Anaximander of Miletus (sixth century B.C.), 226, 240
 ancestors, sacrifice to, 365–6
 anemometer, 230–1
 animal cycle, 105, 191
 animals, 241
 fossil, *see* fossil animals
 invertebrate, 297
 marine, 353
 in the sun and moon, 212
 symbolic, 105, 110, 122
 vertebrate, 299
 Annam, 267
 Annual Customs and Festivals of Peking, *see* *Yen-ching Sui Shih Chi*
 annual motion, 166
 Antares, 108, 198, 205, 206
 Anthoniszoon, Adrian, 43
 Antigonus of Carytos (c. 200 B.C.), 236
 Antipodes, 86, 256
 Antiquary-Royal, 260
 antiseptics, 317
 Anu, Stars of, 111, 112
 Anyang, 101, 194, 224, 227
 jade objects found at, 318
 Apennine mountains, 291
 Apianus, Peter (16th century A.D.), 54, 175, 208
 Apocryphal Treatise on the Book of Changes ... *see* *I Wei Chhien Tso Tu*
 Apocryphal Treatise on the Historical Classic ... *see* *Shang Shu Wei Khao Ling Yao*
 Apollonius of Pergamon (c. 220 B.C.), 43

Index

396

- aqua regia, 322
 Aquarids, 210
 Arabia, 271, 315, 316
Arabian Nights, 271
 Arabic alchemy, 22, 315
 Arabic algebra, 47
 Arabic astronomy, 67, 71, 82, 109, 117, 134, 135, 147, 164, 170, 175, 176, 207, 221
 Arabic cartography, 271ff, 283
 Arabic geography, 245, 250
 Arabic geometry, 221
 Arabic manuscripts, 121
 Arabic maps, 267, 270
 Arabic mathematics, 17, 18, 26, 36, 49, 56, 62
 'Arabic' numerals, 5, 20
 Arabic optics, 356
 Arabs, 17, 39, 69, 137, 244, 252, 259, 270, 278, 285, 329, 384
 arbalest, *see* crossbow
 Archimedes (*c.* 255 B.C.), 58, 333, 336
 architects and architecture, 11, 334, 45
 arcs, 45
 circular, *see* circular arcs
 Arcturus, 109, 198
 areas
 measurement of, 9, 13, 17, 59,
 plane, *see* plane areas
 of segment of a parabolic curve, 58
 Aries, First Point of, 70, 72
 Aristotelian theory of 'exhalations', 306–7, 308
 Aristotle, 87, 90, 222, 226, 301, 306, 308, 329, 331, 334, 341, 343
 arithmetic, 18, 23, 42
 Babylonian, 36
 binary, 58
 Italian, 25
 Sumerian, 36
Arithmetica, 18
 Arithmetical Classic of the Gnomon and the Circular Paths of Heaven, *see* *Chou Pei Suan Ching*
 arithmetical progressions, *see* progressions
 armillary rings, 86, 164, 171, 180, 276
 armillary spheres (*hun i*) 86, 135, 151, 159, 164ff, 219, 230
 bronze, 170
 computational, 172–3, 174, 181
 demonstrational, 165, 174, 180, 181
 difference between Chinese and those of the Europeans and Arabs, 164, 167
 ecliptic, 167, 218, 219
 equatorial, 165, 166, 167, 218
 mechanised, 171–2, 174
 most primitive, 165
 observational, 165, 172–3, 174, 180, 181
 oldest text on, 170
 Su Sung's, 168, 169
 water-wheel and, 171, 173
 with clock-drive, 168
 arrow-bundles method, 57
 arsenic, 314
 arsenious acid, 306
 arsenolite, 306, 308
 arthropods, 299
 Artificer's Record, section of the *Chou Li*, *q.v.*
 artisans, 63, 65, 171, 358, 365
 artists, 286ff, 346
 asbestos, 316–17, 318, 321
 Ashurbanipal (Assyrian king, 668 to 612 B.C.), 111
 Asia, 4, 222, 253, 256, 258, 264, 315
 Central, 251, 264, 267, 295, 315
 East, 273, 274ff, 279, 285

Index

397

- map of, 264
 Mongolian unification of, 267
 South-east, 4
 Western, 357
 asphalt, 292
 assassination attempt, on the Prince of Chinn, 260
 assaying, 322
Assembly of Computing Methods
 connected with the Calendar,
see Shen Tao Ta Pien Li Tsung Suan Hui
 Assyria, 204
 astringents, 315
 astrolabe, 117, 174, 176, 178, 212,
 engraved charts for, 221
 astrological names, 186–7
 astrological omens, 111
 astrology, 9, 68, 77, 81, 125, 128, 173,
 197, 207, 224, 227, 229, 236, 264
 Babylonian, 119
Astronomical Bureau, 76–7, 78, 201
 astronomical coordinate system in
 cartography, 264
 astronomical definitions, 69ff
Astronomical Department of the Hamlin Academy, 77
 astronomical instruments, 76, 77,
 79, 80, 82, 86, 91, 117, 118,
 128ff, 159ff, 175, 218, 221
 of extremely large size, 134ff
 astronomical literature, 72ff
 Chinese, 73–9
 European, 72–3
 astronomical manuscripts, 121
 astronomical observations, 67–8,
 69, 76, 77, 84, 89, 91, 95, 103,
 116, 123, 130, 133–4, 159ff
 astronomical observatories
 Imperial, 77, 78, 174
 Indian, 134
 al-Ma'mün's, 133
 Marāghah, 17, 135, 175, 305
 Ming Thang, 75
 Peking, 165, 204, 218, 219
 Purple Mountain, 174
 Samarkand, 17, 135
 astronomical records, 67, 69, 76,
 194ff, 221
 reliability of, 200, 202, 205, 210
European, *see European astronomical records*
Korean, *see Korean astronomical records*
 astronomical tables, 216
 astronomy, 17, 11, 44, 67ff, 251,
 331, 337
Arabic, *see Arabic astronomy*
Babylonian, *see Babylonia*
 equatorial and polar character of,
 213, 221
European, *see Europe*
 foretelling of State affairs and, 68
 geography and, 273
Greek, *see Greece*
Indian, *see India*
 integration into modern science,
 218ff
 interest taken by Westerners in
 Chinese astronomy, 69
 modern, 214
 'official' character of, 67, 73, 75
Persian, *see Persia*
 positional, 118, 123
 quantitative positional, 121
 semi-secrecy of, 78–9
 technical terms, *see technical terms*
Athens, Tower of the Winds, 230
Atlas Sinensis (Martini), 283
atmosphere
 absence of, in outer space, 88
 of the earth, *see earth's atmosphere*

Index

398

- atmospheric agitation, 383
 atomic instants of time, 326, 343
 'atomic' points, 59
 atoms and atomism, 325, 326,
 328–9, 334, 335, 343
 Atwood, George (A.D. 1780), 332
 aurora borealis, 80, 233
 technical term, *see* technical terms
 autumn, 95, 100, 102
 Avicenna, *see* Ibn Sīnā
 axes, 211
 azimuth, 72, 117, 218, 262, 276, 279
 Aztecs, 75, 186
 azurite, 308
- Babylon, capture of, 197
 Babylonia, and the Babylonians, 35,
 154, 186, 242, 275, 282, 285,
 292, 307, 37
 algebraia, 47
 arithmetic, 36
 astrology, 119
 astronomy, 67, 81, 84, 90, 103,
 104, 111, 112, 159, 180, 184,
 189, 193, 194, 196, 207
 clepsydra, 148, 149
 mathematics, 41, 42, 50, 61, 62,
 81
 multiplication table, 25
 numeral system, 5
 rock-crystal from, 357
- Bach, J.S. (1685 to 1750), 385
 bacteria, 347
 balance, 330, 331, 332–3
 'ball-and-link' convention of rep-
 resenting star groups, 121,
 122
 'ball-arithmetic', 32, 58
 'Ballad of Sir Patrick Spens', 204
 balls, gathered into triangles,
 pyramids, etc., 57
 balls, recording by means of drop-
- ping, 301ff, 304
 bamboo, 343, 349, 384
 analogy, 19
 fossil, 296
 bamboo sticks, as counting-rods, 28
 bamboo tablets from Chu-yen,
 Mongolia, 25–6
 bamboo tubes
 used for canalising *chhi*, 366–7,
 374, 375, 384
 barbarians, 267
 Barca, siege of, 384
 barium, 357
 barium sulphate, 348
 baryta deposits, 348
 basanite, 322
 al-Baṣnī, Ibn Wahb, 274
 'bat-stones', 299
 Bate, John (1634), 364
 al-Battāni, 133
 beads
 of opaque glass, 357
 'bear alum', 343
 Bearers of the Tables of Population,
 see Fu Pan Chē
 beast dances, 368
 Beatus Libaniensis (d. A.D. 798),
 254, 256
 Beazley, C.R., 257, 272
 Bede, the Venerable, 236
 beeswax candles, 350
 Beetle and the sea, *see* *Li Hai Chi*
 bell-founding, 376–80
 bellows, 88, 384
 piston-, 384
 bells, 368, 369, 371, 372, 382
 classification of, 373
 hand-, 376
 sympathetic resonance in, 374
 technical terms, *see* technical
 terms
 tuning of, 376–80

- with clappers, 376
Yin and Yang-, 372
 see also *chung, ling, to*
Beroossus (third century B.C.), 194
bestiaries, 306
Bhojadeva inscriptions, 4
bile, 315
binary arithmetic, *see* arithmetic
binomial theorem, 54ff
biology, 242
bioluminescence, 347–8
Biot, Jean-Baptiste (astronomer, 1774–1862), 73
biquadratic equations, *see* equations
Bird Star, *see* *Niao hsing*
birds
 fossil, 299
Bivalve molluscs, 297
'black ashes' (*hei hui*), 292
black-clothed people, 244
Black Tortoise (northern 'Palace'), 101
Bleeding, 315
blood
and ignis fatuus, 347, 348
circulation of, 328
low calcium content in, 297
Blue Dragon (eastern 'Palace'), 101
boiling, successive phases of, 344, 346
boils, 315
Bombay, 271
'Bononian stone', 348
Book of Changes, *see* *I Ching*
Book of Connections, *see* *Chui Shu*
Book of the Devil Valley Master, *see* *Kuei Ku Tzu*
Book of Master Chi Ni, *see* *Chi Ni Tzu*
Book of Master Kuan, *see* *Kuan Tzu*
Book of Master Kuan Yin, *see* *Kuan Yin Tzu*
Book of Master Lieh, *see* *Lieh Tzu*
Book of Master Mêng, *see* *Mêng Tzu*
Book of Master Mo, *see* *Mo Tzu*
Book of Master Shen, *see* *Shen Tzu*
Book of Odes, *see* *Shih Ching*
Book of the Preservation-of-Solidarity Master, *see* *Pao Phu Tzu*
Book of (the Prince of) Huai-Nan, *see* *Huai Nan Tzu*
Book of Transformations, *see* *Hua Shu*
'Book of War', 367
book-keeping, *see* double-entry book-keeping
book titles, 217
Boötes (constellation), 108, 109
borax, 317
bottles of rock-crystal, 318
bows, 241
brachiopods, 297, 298
Brahe, Tycho (astronomer, sixteenth century), 117, 134, 166, 167, 190, 205, 207, 213, 218
brazing, 317
breath, 366
bridges, 249
Brief Records set down after the (Western) Chin (Dynasty), *see* *Chin Hou Lüeh Chi*
brine, 307, 309, 310, 317
brine-testing methods, 337
British Museum, 123
Broken Bamboo, problem of the, 10
bronze, 353, 359
Bronze Age, 353
bronze bird, moved by the wind, 230
bronze bowl planisphere, 126
bronze-founders, 65

Index

400

- bronze instruments, 129, 169, 170
 bronze mirrors, 105, 140, 353
 bronze phoenix, 230
 bronze vessels
 as clepsydras, 152
 inscriptions on, 1, 2, 6, 36
 Brown, A. Lloyd, 254, 257
 Bruno, Giordano (1548 to 1600),
 340
 Buddhism and Buddhists, 63, 87,
 128, 166, 245, 264, 274, 275,
 281, 291, 326
 date of entry into China, 292
 interest in expressing large
 numbers, 38
 monks, 292
 Buddhist emblem, 155
 Budge, E.A. Wallis (ed.), 111
 buoyancy, 336–7
 Bureau of Astronomy and Calendar,
 302
 bureaucracy, 78, 79, 246
 agrarian, 66, 91, 119
 Confucian, 78, 200
 imperial, 260
 bureaucratic government
 astronomy and, 119
 mathematics and, 63
 Burma, 318
 burning, 347
 burning-lenses, *see* lenses
 burning-mirrors, *see* mirrors
 Bushell, S.W., 122
 al-Būzjanī, Abū'l-Wafā (A.D.
 940–998), 134
 Byzantines, 22, 271, 279, 283
 Byzantium, 253
 calcium, 297
 calcium magnesium silicate, 316,
 318
 calcium silicate, 321
 calcium sulphide, 348
 Calculation of Integration and
 Equation, *see Hisāb al-Jabr*
 w'al-Muqābalah
 calculus, 58ff
 calendar experts, assembly of,
 104 B.C., 138, 152
 calendar reform, 216
 calendar tablets, 202
 Calendar of the Works and Days,
 see Shou Shih Li
 calendars, 74, 75, 79, 80, 133, 134,
 203
 farmer's, 79
 lunar, 183
 solar, 183
 and State power, 78, 182
 calendrical science, 7, 11, 16, 44, 50,
 66, 69, 78, 79, 82, 133, 164,
 173, 182ff, 191, 194, 199, 328,
 370
 establishment of a calendar by the
 imperial ruler, 67
 Jesuits and, 68
 mathematics and, 62
 Caley, Sir George, 364
 Calicut, 270
 Calisthenes (Aristotle's nephew,
 331 B.C.), 197
 Callipus of Cyzicos (c. 370–330
 B.C.), 192, 193
 Cambodia, 4
 Cambridge University Library, 27,
 153, 244
 Camelopardus (constellation), 113
 camera obscura, 138, 351, 356
 Camillus Leonardus (A.D. 1502),
 312
 campaign against the Huns, 260
 canals, 76, 246, 334
 Cancer, Tropic of, *see* Tropic of
 Cancer

Index

401

- candles, 350
 Canis Major, 124
 Canis Minor, 124
 cannon, 342
 Canon of the Virtue of the Tao, see
Tao Tê Ching
 Canopus, 119
 Canton, 274, 285
 Canton, John (1768), 348
 Canton's phosphorus, 348
 'cap-dance', 370
 capitalism, 65
 Capricornus, 123
 carbon-black ink, 311
 cardinal points, 76, 84, 100, 101,
 187
 Cardan, Jerome, 364
 carpenter's square, 7, 40, 330
 carrying-over process, 24
 Cartesian coordinates, 35
 cartography, 39, 44, 237ff, 245, 246,
 249, 252ff, 283, 285, 299
 application of survey methods to,
 279
 carvings, 121, 122, 123
 Cassini, 133
 Cavalieri, Bonaventura (1653), 59
 caves (*tung*), 293
 celestial bodies, 69, 198
 auspicious and inauspicious con-
 junctions of, 108
 floating in infinite space, 87
 movements of, 69, 164, 169
 perfect and changeless, according
 to Europeans, 67–8
 positions of, 71, 79, 164, 184
 risings and settings of, 83
 Celestial Emperor (star), 113
 Celestial equator, see equator
 (celestial)
 Celestial globe (*hun hsiang*), 77, 125,
 151, 172–3, 180ff, 218, 219
 solid, 180, 181
 technical terms, *see* technical
 terms
 in Su Sung's astronomical clock-
 tower, 181, 182
 celestial latitude, *see* latitude
 (celestial)
 celestial longitude, *see* longitude
 (celestial)
 celestial motions, formulae for, 50
 celestial objects, finding positions
 of, 352
 'Celestial Officials,' chapter of the
Shih Chi, *q.v.*
 celestial perfection, 207, 211, 214
 celestial phenomena, 207, 211
 celestial poles, *see* poles (celestial)
 celestial sphere, 7, 69, 70, 82, 92,
 109, 125, 129, 164, 171
 annual revolution of, 128
 apparent rotation of, 70, 72, 85,
 103
 Greek and medieval European
 idea that the heavenly bodies
 were fixed to a series of spheres
 nesting one within another, 68,
 88, 190
 theory of, 68, 84, 85, 180
 Celestial Unique (star), 113
 Central America, *see* America
 Central Asia, *see* Asia
 centre of curvature, 351, 352
 centrifugal pump, *see* pumps
 cephalopods, 299
 Cepheus (constellation), 160
 ceramics, 65
 Cesi Academy, 216
 Ceylon, 258, 270
 Champa, 4, 270
 Chan Ho, 334
 Chang (*hsiu*), 119
chang (resonance period), 192, 193

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

402

- C**hang Chhang (d. 48 B.C.), 281
Chang Chhao (mathematician, A.D. 1670), 22
Chang Chhien (traveller and explorer, second century B.C.), 244, 250, 251, 260
Chang Chhiu-Chien (mathematician, fifth century A.D.), 11, 50, 57
Chang Chhiu-Chien Suan Ching (Chang Chhiu-Chien's Mathematical Manual), 11
Chang Chhiu-Chien's Mathematical Manual, see *Chang Chhiu-Chien Suan Ching*
Chang Fu-Hsi, 361
Chang Hêng (mathematician and astronomer, c. A.D. 130), 42–3, 85, 86, 87, 152, 165, 170, 171, 172, 181, 230, 259, 261, 262, 263, 267, 280, 283, 301ff, 352
Chang Hua (A.D. 232–300), 296
Chang Huang (cartographer, A.D. 1562), 274
Chang Meng-Pin (astronomer, c. A.D. 570), 184
Chang Shih-Nan (Sung official), 343
Chang Shou-Chieh (Thang commentator), 367
Chang Shui (river), 293
Chang Tsai (Neo-Confucian philosopher), 88, 382
Chang Tzu-Hsin (astronomer, c. A.D. 570), 184
Chao (King of Yen), 316
Chao-chhing, 282
Chao Tho (minister of State, c. 215 B.C.), 28
Chao yao (star), 108
Chao Yu-Chhin (mathematician, c. A.D. 1300), 43
characters, carving and incising of, 282
charcoal, hygroscopic properties of, 226
charts, *see* mariner's charts
chemical changes in the earth, 307
chemical combination, 231
chemical condensers, 350
chemical substances, 311
chemiluminescence, 347, 348
Chêñ-Kuan reign-period, 338
Chen Luan (mathematician, fl. A.D. 570), 9, 32, 147
Chêñ Chin-Tê, 31
Chêñ Heng, 275
Chêñ Ho (admiral, fifteenth century A.D.), 244–5, 250, 270, 271
Chêñ Hsüan (commentator, A.D. 127–200), 38, 368, 370, 372, 381
Chêñ Jo-Tsêng (geographer, A.D. 1562), 246
Chêñ Lei Pen Tshao (Reorganised Pharmacopoeia), 312
Chêñ Meng (Right Teaching for Youth), 382
Chêñ Ssu-Hriao (d. A.D. 1322), 314
chess, 57, 262
chessboard, 44
‘**chessboard method**’ (of multiplication), 25
chessboard problems, 57
chha-na (atoms of time), 326
Chhang-Chhun Chen-Jen Hsi Yu Chi (Western Journey of the Taoist Chhang-Chhun), 250
Chhang-chou, 210
Chhangchow, 246
Chhangsha
maps of, 260
Chhen (astronomical technical

Index

403

- term), 108
- C**hhen Cho (astronomer, fourth century A.D.), 115, 180, 181
- C**hhen Thing (Ming period), 231
- C**hheng-Hua reign period, 208
- C**hhêng Ta-Wei (Ming mathematician), 17, 20, 22, 32
- C**hhêng-tu, 247
- C**hhi (pneuma, subtle matter, matter-energy), 85, 87, 88, 224, 226, 232, 300, 301, 306ff, 314, 327, 328, 344, 381
and acoustics, 365ff, 374, 382–3
canalising of, 366–7, 374, 375, 384
- c**hhi (fortnightly periods), *see* fortnightly periods
- C**hhi Fa (The Seven Beguiling Tales), 235
- C**hhi Meng (astronomer, Later Han), 86
- C**hhi-tan Tartars, *see* tribal peoples
- C**hhiéh Hu Shih (official in charge of the clepsydras), 76
- C**hhien Han Shu (History of the Former Han Dynasty), 28, 44, 80, 151, 188, 202, 260, 361
- C**hhien Lo-Chih (astronomer, fifth century A.D.), 115, 180, 181
- C**hhien-Lung Atlas of China, 283
- C**hhien niu (star), 108
- C**hhien-Thang River, 233, 234
- C**hhih Shui I Chen (Pearls recovered from the Red River), 17
- C**hchin (dynasty), 9, 104, 180, 259, 260, 262, 328, 334, 357
- C**hchin Chiu-Shao (mathematician, thirteenth century A.D.), 4, 13, 15, 18, 50, 227
- C**hchin Ku-Li (fourth century B.C.), 383
- C**hchin Shih Huang Ti (first em-
- peror), 20, 28, 37, 149, 260
- tomb of, 282
- C**hching (clear, i.e. high notes), 381–2
- C**hching (period), 50, 68, 74, 131, 144, 185, 215, 218, 246, 252, 300, 311
penal code, 77
- C**hching-Chün (monk and cartographer, 1328–1392), 270
- C**hching I Lu (Records of the Unworldly and the Strange), 346
- C**hching-išhêng (azurite or malachite, i.e. copper carbonate), 308
- C**hchinghai province, 317
- C**hchinling mountains, 247
- C**hhiu Chhang-Chhun (Taoist alchemist, fl. 1219–1224), 250–1
- C**hhiung Thien Lun (Discourse on the Vastness of Heaven), 83
- C**hou Hai Thu Pien (Illustrated Seaboard Strategy), 246
- C**hu (river), 235
- C**hu Hsiüeh Chi (Entry into Learning), 155, 295
- C**hü Yuan (poet, fourth century B.C.), 80
- C**hui hui ('the blowing of the ashes'), 375
- C**hui Hung Chhiao, *see* Drooping Rainbow Bridge
- chhun** (bronze bell and tuning instrument), 376, 377
- C**hun Chhiu (Spring and Autumn Annals), 108, 198, 202, 225
- C**hun Chhiu Fan Lu (String of Pearls on the Spring and Autumn Annals), 381
- C**hung-Chêng Li Shu (Chung-Chêng Reign-Period Treatise on

Index

404

- Astronomy and Calendrical Science), 216
- Chhüthan Hsi-Ta (astronomer, fl. A.D. 718), 116
- Chi* (technical term for Jupiter cycle), 191, 193
- Chi-chou Fēng Thu Chi* (Customs of the Province of Chi), 242
- Chi Ni Tzu* (Book of Master Chi Ni), 190, 224, 293, 310, 312
- Chia Hsien (mathematician, c. A.D. 1100), 56
- Chia-hsing city, 231
- Chia I (Han poet), 37, 292
- Chia Khuei (astronomer, c. A.D. 85), 80, 130, 133, 165
- Chia Tan (Thang cartographer), 262, 264
- Chiang* plant (ginger), 323
- Chiang Chi (astronomer, c. A.D. 400), 203, 231
- Chiang Khuei (Sung scholar), 362
- Chiang Sēng-Pao (c. A.D. 550), 242
- Chiangsu, 248
- Chieh-thung Ssu temple, 363
- Chiao Shih chou* (eclipse cycle), 203
- Chiaochow (modern Hanoi), 130
- chickweed, 324
- Chieh-Tzu Yuan Hua Chuan* (Mustard-Seed Garden Guide to Painting), 291
- Chien (astronomical technical term), 108
- Chien Hsing calendar, 203
- chien i* ('simplified instrument'), 174, 176
- chih* (series of twelve characters in the sexagesimal cyclical system), 184, 186
- Chih-Chêng reign-period, 231
- Chih-Chih (Han leader, c. 50 B.C.), 260
- Chih-Chun reign-period (1330–1333), 158
- Chih-Ho reign-period, 207
- Chih Kung Thu (Illustrations of the Tribute-Bearing Peoples), 242
- Chih nu (Weaving Girl constellation), 108, 122
- Chih-Phing reign-period, 210
- Chih-Yuan reign-period (1264–1294), 158, 201
- Chime-stones, 335, 369
- Chin (period), 3, 87, 154, 246, 249, 261, 292
- chin* (radical for all metals and alloys), 308
- Chin Hou Lüeh Chi* (Brief Records set down after the (Western) Chin (Dynasty)), 374
- Chin Sha Chiang (river), 252
- Chin Shu* (History of the Chin Dynasty), 78–9, 171, 228, 261
- Chin Tartars, 167, 169
- Chin Thang Shu* (Old History of the Thang Dynasty), 119
- China, medieval European knowledge of, 252
- Chinese–Arabic contacts, *see* transmissions and cultural contacts
- Chinese language, 237, 329
- Chinese Pottery* (Laufer), 281
- ching* (essence), 335
- Ching (*hsiu*), 124
- ching* and *wei* (technical terms for warp and weft), 262
- Ching Chhu calendar (A.D. 237), 183
- Ching Ching Ling Chhiah* (Chêng Fu-Kuang), 361
- Ching Fang (astronomer, first century B.C.), 90, 210, 226, 233
- Ching Hsing phenomenon, 201, 204
- Ching Kho (227 B.C.), 260

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

405

- ching thien* (well-field system), 262
Chinghiz Khan (Mongol emperor), 250
Chinn, Prince of (227 B.C.), 260
Chio (hsiu), 92, 94, 109
Chiu Chang Suan Shu (Nine Chapters on the Mathematical Art), 7, 9, 11, 12, 18, 26, 37, 42, 48, 49, 50, 51, 56, 62
cho (turbid, i.e. low notes), 381–2
choirs, 385
Chou (period), 2, 3, 6, 36, 37, 38, 65, 80, 116, 118, 129, 130, 159, 186, 191, 198, 210, 212, 223, 259, 261, 275, 300, 316, 318, 336, 349, 357, 368, 374, 378, 379, 389
Chou Hsing-Ssu (d. A.D. 521), 185
Chou Kung (Duke of Chou, c. 1000 B.C.) 7, 69
Chou Kung Tshê Ching Thai Thais Chha Pao Kao (Report of an Investigation for the Measurement of the Sun's (Substitional) Shadow), 135
Chou Kung's Tower, 135, 136, 137
Chou Li (Record of the Rites of Chou), 76, 92, 129, 130, 132, 151, 152, 156, 259, 275, 336, 343, 353, 373, 376, 377
Chou Mi (thirteenth century A.D.), 343
Chou Pei theory, *see* Kai Thien theory
Chou Pei Suan Ching (The Arithmetical Classic of the Gnomon and the Circular Paths of Heaven), 7, 8–9, 35, 41, 56, 84, 90, 112, 115, 133, 162, 193
Chou Shu-Hsüeh (mathematician, sixteenth century A.D.), 59
Christian Topography (Cosmas Indicopleustes), 256, 257
Christianity, 68, 217, 256, 258, 329
chromium, 318
chronological tables, 44
chronology, 186
chrysolite, 316
chu (torch or candle), 350
Chu Chhuan, *see* Ning Hsien Wang
Chu Hsi (Neo-Confucian Philosopher, twelfth century A.D.), 87, 290, 292
Chu Kao Chih, *see* Jen Tsung
Chu Shih-Chieh (mathematician, thirteenth century), 13, 15, 16, 51, 53, 55, 56, 57
Chu Ssu-Pen (cartographer, 1273–1337), 267, 268, 270, 272
Chu Tsai-Yü (Manchu prince and scholar, 1584), 385, 387
Chu Tzu Chhuan Shu (Collected Works of Chu Hsi), 189, 290
Chu Wen Kung, 229
Chuan (music-master, sixth century B.C.), 372
Chuan Hsü (legendary emperor), 84
Chüeh (an unidentified mineral, perhaps realgar), 307
Chui Shu (Book of Connections), 11
Chuko Liang (third century A.D.), 242
chün (tuning instrument), 374, 380, 386
Chun Wang coordinates, 262
chung (standard measure of volume), 380
chung (hanging clapperless bell), 376, 379
Chungking, 122
cinema, 362
cinnabar, 306, 308, 309, 313, 323
'i'cinnabar bed', 313

Index

406

- circle, 7, 41, 65
 - arcs and segments of, 17
 - division into 360 degrees, 36
 - inscribed in triangles, 15, 16
 - measurements, 17, 59, 61
 - as the most perfect figure, 221
 - circles of the celestial sphere, 164
 - circular arcs, lengths of, 12
 - circumference, 41
 - determination of, 15
 - circumpolar constellation template, 159ff, 163–4
 - cirro-nebula, 226
 - cithara, 373
 - clam-shells, 353
 - Classic of the Mountains and Rivers, see *Shan Hai Ching*
 - classification in fours, 370
 - clays, 309
 - Cleomedes the Stoic (c. A.D. 175), 187
 - Clepsydra Technique, see *Lou Kho Fa*
 - clams, 291
 - clepsydras, 76, 77, 135, 136, 145, 147, 148ff, 157, 158, 171, 178
 - floating bowl type, 149, 337
 - inflow type, 149, 152, 153, 154, 156
 - legendary invention of, 153
 - lotus-, 155
 - oldest printed picture of, 156
 - outflow type, 149, 151, 154
 - public and palace-, 151, 155
 - regulators for, 142
 - steelyard, 155
 - stopwatch, 151, 155
 - temperature and, 224
 - wheel-clocks, 151
 - climata* (term for areas between parallels), 253, 256; *see also* ‘climates’
 - climate, 222ff
 - supposed influence on human beings, 224
 - ‘climates’, 271, 272, 273
 - climatic cycle, 366, 368
 - climatic pulsations, 224
 - clock-drive, 171ff, 174, 221
 - clock faces, 178
 - clock-time, 157
 - clocks, 81
 - astronomical, 172
 - incense-, 157
 - mechanical, 148, 149, 151, 157, 158, 172
 - water-, *see clepsydras*
 - water-driven mechanical, 135, 182
 - clockwork, 151, 174
 - cloth
 - fibres, 317
 - fire-proof, 316
 - Cloud Forest Lapidary, see *Yün Lin Shih Phu*
 - clouds, 80, 225, 226, 306, 307, 308
 - classification, 226
 - colours of, 76
 - technical terms, *see technical terms*
 - and weather-prediction, 223–4, 226
 - coal, 292, 315
 - coastal protection, 246
 - Cochin, 270
 - coefficients, 39, 48, 49
 - table of, 54, 55, 56
 - coins
 - casting of, 282
 - decimalisation of, 337
 - inscriptions, 1, 2, 3, 6
 - rod-numerals on, 28
 - Coleridge, S.T., 136
 - Collectanea Rerum Memorabilium*

Index

407

- (Solinus), 240, 241
- Collected Notes on the Rustic Guest, see *Yeh Kho Tshung Shu*
- Collected Works of Chu Hsi, see *Chu Tzu Chhiüan Shu*
- Collection of the most important Military Techniques, see *Wu Ching Tsung Yao*
- Colour
 - in the classification of minerals, 308, 309
 - sound and, 365–6
- colour block-printing, *see* printing
- combinatorial analysis, 18
- combing of the hair, producing sparks, 349
- combustion, 344
 - spontaneous, 344
- comets, 80, 82, 207ff, 221, 222
 - members of the solar system, 208
 - path of, 208
 - spiked, 209
 - tails of, 208, 210
 - technical terms, *see* technical terms
 - theories about, 210
- Commentary on the Armillary Sphere, see *Hun I Chu*
- Commentary on the Book of Changes, see *I Chang Chu*
- commerce, 65
- common denominators, 7
- compass-bearings, 259, 270, 271, 280
- compass needle, 146
- compass points, 186, 308, 368, 370, 371
- compass roses, 280
- compasses, 8, 275, 330
 - magnetic, *see* magnetic compass
- compensating tanks, in clepsydra, 149, 151, 153
- concentric circles, 238
- concentric crystalline spheres, 87, 213, 214, 215, 221
- concentric squares, 238, 240, 262
- concertina, 384
- conchs, 290, 297
- concrete fact, Chinese attitude to, 62, 63
- condensation, 225–6
- Confucian bureaucracy, *see* bureaucracy
- Confucian temples, *see* temples
- Confucius and Confucianism, 63, 88, 90, 199, 213, 225, 232, 282, 285, 316, 335–6
 - lack of interest in scientific problems, 89
- conic sections, 43
- conjuring tricks, 359
- conservancy, 8
- The Consolidator; or Memoirs of Sundry Transactions from the World in the Moon* (Defoe), 214
- constant-level overflow tank, *see* overflow tank
- Continuation of Ancient Mathematical Method for Elucidating the Strange (Properties of Numbers), *see* *Hsü Ku Chai Chi Suan Fa*
- continuity and discontinuity, 329, 334, 335, 343
- continuum concept, 328, 329
- contour maps, *see* maps
- Conversations on recent Events in the Mountain Retreat, *see* *Shan Chü Hsin Hua*
- Conversations while Avoiding the Heat of Summer, *see* *Pi Shu Lu Hua*
- coordinate geometry, *see* geometry
- coordinate reference points, 273

Index

408

- coordinates, 35, 43–4, 69, 71, 92, 95, 103, 115ff, 164, 175, 178, 253, 256, 261, 262
 celestial and terrestrial, 261
 ecliptic, 175, 213
 equatorial, 170, 175, 176, 213, 221
 geographical and celestial, 264
 terrestrial and celestial, 261
Copernicus and Copernicanism, 65, 190, 213, 215–16, 218
copper, 308, 313, 323
copper carbonate, 308, 314
copper-smelting, 314
copper sulphate, 313–4
cord, asbestos, 317
corona, 204
correlative thinking, 382
corundum, 321
cosine, 17, 44
Cosmas Indicopleustes (*c.* A.D. 540), 256, 257, 258
 mountain of, 258
cosmic breath, 314
cosmic mirrors, 262
cosmography
 ‘religious’, 238, 255, 256ff, 267, 271, 274–5, 283, 285
cosmological symbolism, 144
cosmology, 62, 64, 79, 80, 82ff, 87–8, 100, 112, 194, 205, 214
cosmos (*yü chou*), 87
Cottoniana map, 259
‘counter-earth’, 90
‘counter-Jupiter’, 90, 191
counting-board, 1, 3, 4, 5, 15, 24, 25, 28, 29, 30, 47, 48, 56
counting by tens, 20
counting-rod numerals, *see rod-numerals*
counting-rods, 1, 3, 16, 28, 35, 39, 48, 49, 58, 275
 hexagonal bundles of, 57
influence on orthography, 30
marked with numbers, 28, 30
sliding, 30
 for square and cube roots, 30
court ladies of the Northern Chhi, 346
Crab Nebula, 205, 206
crabs, 299
crack-volumes, 59
craftsmen, *see artisans*
cranks, 302, 303
creation, date of, 194
crocodiles, 223
cross-staff, *see Jacob's Staff*
cross-wire grid rights, 278, 279
crossbow, 279
crossbow trigger, 302
crow (symbolic animal), 122
crow in the sun, 212
cruses, 349
crystalline deposits, 294
crystalline spheres, *see concentric crystalline spheres*
crystallographers, 60
crystallography, 306, 313
crystals, 347
Ctesibius (third century B.C.), 149
cube, 26
cube roots, 26, 56, 61
cubic equations, *see equations*
cuckoo, 223
Cull Collection of Chinese Bronzes, 140
cultural contacts, *see transmissions and cultural contacts*
cuneiform tablets, 148
Cuneiform Texts from Babylonian Tablets etc. in the British Museum (ed. E.A. Wallis Budge), 111
customs and products, records of, 246

Index

409

- Customs of the Province of Chi, see
Chi-chou Fēng Thu Chi
 cut-off device (clepsydra), 156
 cyclical characters, 184–5, 190
 cyclical recurrences, 327–8, 335
 cyclical world catastrophes, 290,
 291–2
 cyclones, 222
Cyranides, 312

 dances, 368, 370
 and winds, 375
 Dati, Leonardo (c. A.D. 1420), 256
 ‘dawdling’ (of armillary sphere),
 172
 dawn mists, 231
Dawn of Modern Geography
 (Beazley), 257
 day and night, 151
 division of, 152, 154
 day-count, 133–4, 184, 186
De Lapidibus (Theophrastus), 312
De Materia Medica (Dioscorides),
 312
De Mineralibus (Albertus Magnus),
 312
De Re et Praxi Geometrica, 278
De Rerum Natura (Lucretius), 232,
 329
 dead reckoning, 253, 264, 280
 decimal fractions, *see* fractions
 decimal measurement, 129, 337
 decimal notation, 37, 38, 39
 decimal place-value, 5, 36
 decimal point, 15, 39
 decimal system, 374
 declination (celestial coordinate), 71
 declination ring, 166, 176
 declination of a star, *see* stars
 declination of the sun, *see* sun
 deductive geometry, *see* geometry
 definitions, *see* astronomical
 definitions, geometrical
 definitions
 Defoe, Daniel, 214
 deforestation, 295
 degrees, *see* university degrees
 Democritus (fifth century B.C.), 328
 denominator, 37
 lowest common, 36
 density, 336–7
 dental troubles, 297
 denudation, 292
 Descartes, René, 44
 Description of the Buddhist
 Temples of Loyang, *see* *Lo-*
 Yang Chhieh Lan Chi
 Description of the Palace at
 Chhang-an, *see* *San Fu Huang*
 Thu
 Detailed Analysis of the
 Mathematical Rules in the
 ‘Nine Chapters’ and their
 Reclassification, *see* *Hsiang*
 Chieh Chiu Chang Suan Fa
 determinants, 16, 49
 dew, 226, 353, 366
 ‘Diagram of the Old Method for
 finding Eighth and Lower
 Powers’, 16
 Diagrams presented to Yü the Great
 by miraculous animals, 20
 Diameter, 17
 determination of, 15
 Diamond, 321
 dice, 58
 diet, 297
 Digges, 361
Dioptra, 276
 Diorite, 318
 Dioscorides (A.D. 60), 312, 317, 321
 diplomatic envoys, 252, 260
 Dipper, 92, 93, 94, 101, 125
 Directions, 375

Index

410

- Director-General of the Masses 259
- Directorate of Astronomy and Calendar, 77
- 'Directors of Fire Ceremonies', 353
- Directors of Regions, 259–60
- 'Directors of Sun Fire', 353
- disc knife, *see* rotary disc knife
- disc-shaped earth, 238, 256
- discontinuity, *see* continuity and discontinuity
- Discourse on [calendrical] Time, *see* *Shih Wu Lun*
- Discourse on the Diurnal Revolution, *see* *Hsin Thien Lun*
- Discourse on the Hung Fan chapter of the *Shu Ching* . . . *see* *Hung Fan Wu Hsing Chuan*
- Discourse on the Vastness of Heaven, *see* *Chhiung Thien Lun*
- Discourses on the (ancient feudal) states, *see* *Kuo Yü*
- Discourses weighed in the Balance, *see* *Lun Heng*
- Discovery of a World in the Moon* (Wilkins), 214
- Discussion on the Conformation of the Heavens, *see* *An Thien Lun*
- Discussions and Conclusions regarding the Geography of the *Tribute of Yü*, *see* *Yü Kung Shao Tuan*
- diseases, 314
kidney, 317
- distance, measurement of, 304
- distillation apparatus, 350
- diurnal motion, 166
- divination, 9, 21, 58, 224, 367
association with games, 139, 144
- divination boards, 139, 141, 262, 263
- Divination by Weird Wonders, *see* *Yao Chan*
- division, 24, 25, 26
of fractions, 7, 35
- tables, 26
- Djaring Nor, 251
- dog-faced men, 241, 242
- double-entry book-keeping, 65
- 'Double False', *see* Rule of False Position
- double-hours, 108, 154, 186, 191
- double-vault theory of the world, 84
- Dox, Paul (1510), 280
- Draco (constellation), 113, 160
- 'dragon blubber', 316
- dragon fire (perhaps lightning), 344
- dragon-horse, 20
- dragons, 86, 194
- dragons and the pearl (art motif), 109, 110
- 'dragon's bones', 299
- 'dragon's teeth', 299
- Dream Pool Essays, *see* *Mêng Chhi Pi Than*
- driving-wheels (mechanical clocks), 158
- 'Drooping Rainbow Bridge', 248
- droughts, 76, 227, 228, 366, 370
- drugs, 241, 293
of immortality, 309
mineral, 309, 310
plant, 309, 310
- Drugs of the Southern Countries beyond the Seas, *see* *Hai Yao Pén Tshao*
- Drums, 368, 369, 371, 372, 382, 383
- Dulcerto, Angelino (A.D. 1339), 258
- duplication (doubling), 24
- duration, 340
- dust, 306
dispersal of, 343
- dust-storms, 212

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

411

- Dutch ambassadors to Peking, 215
 dyeing, 314, 315
 dyes, 309
 dykes
 construction, 15, 227
 repair, 261
 dynamics, 339ff
 dynastic histories, 78, 80
- Ea, Stars of, 111, 112
 'Early History of Tibet' (S.W. Bushell), 122
 ears, 383
 earth the, 181
 chi of, 224, 226
 circumference of, 253, 337, 339
 curvature of the surface of, 133, 238, 253, 273
 daily rotation of, 70, 72
 disc-shaped, 238, 256
 man's kingdom in the centre of, 83
 motion of, 88, 187
 orbit round the sun, 147
 rotation of, on its axis, 173
 shape of, 83, 84, 86, 237–8, 256, 274, 337
 size of, 89, 253, 270, 337
 sphericity of, *see* sphericity of the earth
 as the stationary centre of the celestial sphere, 68, 69, 85, 88, 190, 213, 216
 tilt of axis, 147
 two emanations from, 226
 Yin nature of, 88
- earth models in demonstrational armillary spheres, 165, 180, 181
- earth-shine, 204
- earthly regions associated with sections of the sky, 264
- 'earthquake weathercock', 301
- earthquakes, 80, 233, 292, 300ff
 records of, 300
- earth's atmosphere, 222, 231, 352
 moisture in, 226
- earth's crust, 286, 300
 show chemical change in, 307
- Easter, movable date of, 183
- Eastern Sea, 281, 282
- echoes, 382, 383
- eclipse cycles, 195, 203
- eclipses, 76, 90, 151, 193, 194ff, 202, 212, 218, 221, 251, 327
 annular, 199
 cause of, 203
 duration of, 202
 earliest recorded, 196–7
 lunar, 90, 125, 192, 193, 194, 195, 197, 198, 200, 203, 253
 partial, 202, 203
 prediction of, 66, 68, 80, 197, 203, 212
 prevention of, 75
 'radiating influence' theory of, 198–200
 as 'reprimands from heaven', 203
- solar, 125, 194, 195, 196, 197, 198, 199, 201, 202, 203, 204, 356
- technical terms, *see* technical terms
- total, 202, 203, 204
- ecliptic, 16, 70, 71, 72, 80, 84, 91, 112, 118, 125, 126, 164, 169–70, 181, 184, 189, 197, 203
- graduation of, 170
- obliquity of, 80–1, 130, 132
- ecliptic coordinates, *see* coordinates
- ecliptic ring, 164, 165, 166, 167, 170
- economic geography, *see* geography
- Eden, 254
- Edict (ninth century A.D.) ordering that observers in the imperial

Index

412

- observatory should keep their business secret, 78
- eggs, use in brine-testing, 337
- Egypt and the Egyptians, 51, 154, 239, 275, 276, 282, 318, 353
- astronomy, 90, 91
- clepsydra, 148, 149, 152
- mathematics, 5, 37, 42, 56, 61, 62
- Egyptian tombs, 148
- electricity, 231, 347
- static, 348
- electroluminescence, 347, 348
- Elements* (Euclid), 18, 41, 43
- elimination, methods of, 49
- elephants, 223
- weighing of, 336
- ellipse, 43
- elliptical orbits, 189
- embassies
- from the West, 152
- to Indo-China, 295
- embryology, 242
- Emery, 321
- emperor and imperial court analogies, 91, 92, 101, 111, 113
- empiricism, 42, 43, 62, 66, 221, 290, 323, 332, 384
- 'emptiness'
- of the heavens, 87, 88
- of Taoist mysticism, 5, 87
- enemy morale, 367
- engineering, 9, 11, 30, 325, 332, 334
- hydraulic, 8, 238, 280, 371
- mechanical, 81, 151
- water-mill, 30
- England and the English, 211, 280, 370
- Enlarged Terrestrial Atlas, see *Kuang Yü Thu*
- Enlil, Stars of, 111, 112
- Entry into Learning, see *Chhu Hsiieh Chi*
- ephemerides, 77, 79, 182, 184
- Epicureans, 329, 352
- epidemics, 202
- Equal Temperament, 385
- equals sign (=), 48
- Equation of Time, 157, 158
- equations, 9, 15, 17, 44, 46, 47, 48, 49, 61, 62, 184
- biquadratic, 17
- cubic, 51, 61
- indeterminate, 9, 11, 49–50
- numerical, 26, 51–2, 54
- quadratic, 11, 15, 50–1
- simultaneous, 9, 16, 48, 49
- simultaneous linear, 48
- of the third degree, 11
- equator (celestial), 16, 70, 71, 72, 81, 92, 94, 95, 100, 101, 103, 104, 108, 109, 117, 118, 125, 163, 164, 180
- equator (terrestrial), 70
- equatorial coordinates, *see* coordinates
- equatorial mountings, 164, 174ff, 176, 179, 221
- equatorial ring, 165, 166, 167, 170
- equatorial torquetum, *see* torquetum
- equilibrium, 333, 336
- equinoxes, 75, 76, 104, 109, 119, 126, 128, 181, 184
- autumnal, 70, 145, 170
- vernal or spring, 70, 103, 145, 170, 182
- precession of the, 72, 81, 83, 103, 104, 108, 112, 118, 170, 213
- Eratosthenes (276–196 B.C.), 18, 132, 253, 339
- Erh Ya* (Literary Expositor), 371
- eroded forms, 286
- erosion, 289, 292
- escarpments, 151, 171, 173
- Essays on (Astronomical and

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

413

- Meteorological) Presages, see *Thien Yuan Yu Li Hsiang I Fu*
 'establishment of the port', 236
 ethnology, 242
Etymologiae (Isidore of Seville), 257
 Euclid (third century B.C.), 7, 18,
 26, 40, 41, 43, 47, 62, 352
 Eudoxus of Cnidus (c. 409–356
 B.C.), 85, 188
 Europe, 39, 51, 54, 57, 59, 60, 61,
 63, 65, 134, 215, 217, 219, 250,
 255, 259, 270, 275, 279, 280,
 296, 299, 300, 305, 310, 311,
 316, 317, 322, 324, 325, 326,
 328, 329, 333, 337, 339, 341,
 342–3, 344, 346, 353, 357, 361,
 364, 372, 384, 385
 abacus, 35
 algebra, 17, 47, 49
 astrology, 68
 astronomy, 67, 68, 87, 88, 90,
 115, 117, 118, 119, 127, 145,
 147, 159, 161, 164, 167, 170,
 178, 181, 183, 187, 189, 190,
 191, 193, 197, 207, 211, 212,
 213, 214, 216, 221
 cartography, 252ff, 256, 273
 geography, 240, 245, 246, 249,
 267, 283, 285
 geology, 291, 292, 297
 geometry, 9, 44
 magic square, 22
 mathematics, 1, 5, 15, 16, 18, 25,
 26, 36, 39, 43, 44
 mechanical clock, 172
 meteorology, 222, 223, 227, 228,
 230, 233, 236
 mineralogy, 306, 307, 309
 Napier's bones, 28, 30
 puzzles, 45–6
 social and economic changes in,
 65
 telescope, 174
 time-measurement, 148, 157
 travellers from, 250
 European 'embassies' to China, 152
 evaporation, 225–6, 309, 310, 314,
 349
 evaporation rate, 152
 Evelyn, John, 280
 examinations, 77
 exhalations, see Aristotelian theory
 of 'exhalations'
 exhaustion, method of, see method
 of exhaustion
 expectorants, 315
 expeditions and voyages, 51, 241,
 250ff, 270, 316
 against the Huns, 260
 interplanetary, 214
 of Chêng Ho, 244–5, 271
 of Henry the Navigator, 259
 of Hsü Hsia-Kho, 251–2
 of Kuan Sui, 133
 of Nanking Yueh and I-Hsing,
 130
 of Sulaimān the Merchant and of
 al-Baṣrī, 274
 to Afghanistan, 250–1
 to Chinghiz Khan, 250
 to Persia, 250
 to the source of the Yellow River,
 251
 to the south seas, 119, 121, 295
 trading, 245
 experimentation, 63, 64, 66, 130,
 230, 232, 253, 297, 323, 332,
 349, 350, 351, 354, 356, 361,
 365, 375, 385, 387
 Exploitation of the Works of
 Nature, see *Thien Kung Khai
 Wu*
 exploration, see expeditions and
 voyages

Index

414

- exports and imports, 318, 321
 eye, theory of emission of visual rays from, 352
 'eye-beads', 357
 eye-glasses, *see* spectacles
- Fa Yen* (Admonitory Sayings), 169
Fabricius, 211
 fabulous beings, 240, 241, 242
 factors, highest common, 36
 falling bodies, 325
 'false jade', 318
 famines, 62, 76
fan (term used for alum), 309, 310
Fan Chhêng-Ta (Sung scholar), 362
Fan Shun-Chhen (astronomer, fourteenth century), 158–9
Fang (*hsiu*), 101, 104, 122
Fang Chung-Thung (mathematician, seventeenth century), 22
 farmers, 173, 223
 fate-calculation, 58, 76
 faulting, 286
 feather dances, 370
 feathers, 336
 hydroscopic properties of, 226
Fêng Hsiang Shih (imperial astronomer), 76
Fêng Kuei-Fen (1851), 218
Fêng Thu Chi (works on folk customs and their geographical distribution), 242
 fiefs, 261
 de Fermat, Pierre, 44
 de Fibonacci, Leonardo (mathematician, thirteenth century), 51
 fifth (central or circumpolar) palace, 100
 figurate numbers, 57
 filial piety, 232
 filter, 154
 financial affairs, 15
Finé, Oronce, 278
 finger reckoning, 28
 fire, 343
 varieties of, 344, 345, 347
 fire-drill, 353
 fire-making, 346
 'fire-pearl', 359, 360
 fire-proof cloth, 316
 fire-proofing of wood, 316
Fire Star, *see* *Huo hsing*
 fireflies, 348
 fireworks, 314
 First Point of Aries, *see* Aries
 First Point of Libra, *see* Libra
 First World War, 285
 fish-glue, 241
 fish
 fossilised, 299
 imprints of, 299
 technique for detection of, 384
 five colours, the, 366
 five elements, the, 100–1, 105, 186, 187, 329, 370
 five flavours, the, 366
 flags
 Taoist, 121, 122
 to indicate political adherence, 259
 flame, 344
 'cool'-, 344
 flavour, and sound, 365–6
 flint and steel, 346
 float (clepsydra), 149, 151, 152, 155, 178
 floating bodies, 336
 Flood, *see* Noah's Flood
 floods, 76, 227, 228, 366
 fluorescence, 347
 fluorspar, 348
 flutes, 368, 369, 371
 tubes of, 374

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

415

- fluxions, method of, *see* method of fluxions
- Fly-Whisk Conversations of the Scholarly Guest, *see Mo Kho Hui Hsi*
- Fo Tsu Thung Chi* (Records of the Lineage of Buddha and the Patriarchs), 274
- focal point, 351, 352, 353, 354, 356
- focusing, 138
- folded strata, 286
- folklore, 89, 127–8, 242, 321, 334, 358
- folksongs, 101
- foot-rules, 129
- Foothill Hall Essays, *see Lu Thang Shih Hua*
- forces, 331ff
- combination of, 332
 - and motion, 340–1
- Former Han (period), 9, 42, 69, 76, 82, 142, 143, 152, 200, 241, 259, 281, 292
- formulae for dealing with the arcs and segments of a circle, 17
- fortifications, 383
- fortnightly periods, 147, 181, 191–2
- Fortunate Islands, 254
- fortune-telling, 108
- fossil animals, 297ff
- fossil man, 299
- fossil plants, 296
- fossil shells, 297
- fossils, 291, 292, 296ff
- foundry-men, 376, 377
- 'four-element process', 16
- fractions, 7, 9, 35–6, 61
- decimal, 15, 36, 37, 39
 - sexagesimal, 36
 - technical terms, *see* technical terms
- fracture, 333–4
- France and the French, 249, 280
- Fraunhofer, Joseph (1824), 174
- free fall, 332, 341
- free reed, 384
- French Revolution, 39
- fresco paintings, 123, 296
- friction, 341, 343, 344
- and emissions of light, 347
 - as cause of sound, 382
- Frontier Agents, 260
- Fu (place in Shensi), 295
- Fu An (astronomer, A.D. 84), 165
- Fu-Hsi (legendary culture-hero), 7, 8
- Fu Pan Chê (Bearers of the Tables of Population), 282
- Fu Tsê-Hung (geographer, A.D. 725), 248
- Fu Yin (geographer, twelfth century, A.D.), 246, 247
- Fukien, 202, 384
- fulcrum, 332, 333, 356
- fuller's earth, 315
- fumaroles, 226
- Fundamental Ideas of the Five Classics, *see Wu Ching Thung I*
- funeral rites, *see* rites and ceremonies
- fungi, 347
- fungicides, 314
- Galen, 310
- Galilean method, 64
- Galileo, G. (1564–1642), 63, 64–5, 211, 213, 215–16, 217, 236, 330, 341, 342, 361
- St Gall, codex of, 161
- galley method (technique of long division), 26
- games, associated with divination, 139, 141
- gamut of twelve notes, 372, 373

Index

416

- garnets, 320, 321
 gases
 rarified, 367
 sulphur-depositing, 226
 see also natural gas
 Gaubil, Antoine (Jesuit missionary,
 b. 1689), 72
 gazetteers, 246
 gear-wheels, 149
 gems, 306, 309, 321
 General Description of the World
 in the Thai-Phing reign-
 period, *see* *Thai-Phing Huan*
 Yü Chi
 geocentric world-view, 216
 Geographer-Royal, 260
 geographical symbols, 237, 269, 273
 geography, 237ff
 Arabic, *see* Arabic geography
 economic, 238, 310
 ethnological, 242
 human, 242
 physical, 238, 261
Geography (Ptolemy), 253
 geological prospecting, *see* Pros-
 pecting
 geological time, 291
 geology, 286ff
 in Chinese art, 286ff
 technical terms, *see* Technical
 terms
 geomancy, 252, 314
 geometric square, 26
 geometrical definitions, 40–1, 59
 geometrical figures, 65
 on a spherical surface, 16
 geometrical point, 40, 326, 334, 343
 geometrical progressions, *see* pro-
 gressions
 geometrical propositions, expressed
 in algebraic form, 44
 Geometry, 9, 13, 39ff, 61, 63–4,
 184, 189, 212, 221, 276, 277
 arises from measurement, 8–9,
 11–2
 analytic, 43
 coordinate, 43–4
 deductive, 39, 42, 43, 87, 88, 330
 Greek, *see* Greece
 solid, 9, 42, 43
 spherical, 88
 theoretical, 40
 geophones, 383
 geophysics, 322
 Germany, 211
 ben Gerson, Levi (Provençal Jewish
 scholar 1288–1344), 278, 279
 Gibraltar, 280
 Straits of, 258
 gimbal suspension, 364
 Ginger, 323
 Giraldus Cambrensis (A.D. 1188),
 236, 249
 girl cartographer, 262
 glass, 357
 burning, 360
 composition of, 357–8, 359
 earliest Chinese, 357, 358
 imported into China, 358
 lenses of, 360, 361
 oldest piece of, 357
 technical terms, *see* technical
 terms
 technology, 357
 glass-making, 315, 356, 358
 globe, *see* celestial globe
 glow-worms, 348
 gnomon, 7, 89, 91, 119, 128ff, 133,
 135, 136, 137, 138, 251, 275
 inclined, 147
 pole-pointing, 145, 146, 147
 of the sundial, 138, 142–3, 144,
 145, 146
 gnomon shadow lengths, *see* sun-

Index

417

- shadow lengths
- Gnomon Shadow Template, 115, 129ff
- gnomonic numbers, 18
- Gobi desert, 212, 268, 270
- gods and goddesses, with attributes
held by many limbs, 362
- Godwin, Francis, (1638), 214
- gold, 306, 307, 321, 322, 323, 336
adulteration of, 336
- Golden Mirror of the Flowering
Waters, *see Hsing Shui Chin
Chien*
- gorges, 265, 293
- gradient system, 238
- graduated pole, 275, 276, 280
- graduated scale, 212, 261
- Grand Canal, 248, 267
- granite, 286
- grass-sandals, 321
- gravity, 64, 236, 322, 342
centre of, 335
specific, 336–7
- grease, 295, 321
- Great Appendix to the *I Ching*, *see
I Ching*
- Great Bear, 83, 85, 87, 91, 93, 102,
123, 160, 161, 162
legend of its disappearance,
127–8
- Great Extension Calendar, *see Ta
Yen Li*
- Great Pharmacopoeia, *see Pén
Tshao Kang Mu*
- 'Great Star' (Ta hsing), 101
- Great Unique (star), 113
- 'Great Waste-Land of the
Generations', 290
- Greece and the Greeks, 63, 299,
307, 317, 322, 328, 329, 341,
342, 357, 365
- acoustics, 364–5, 373, 375, 385
- alphabet, 185
- astronomy, 67, 68, 71, 80, 84, 85,
87, 88, 89, 90, 91, 116, 117–18,
133, 166, 167, 180, 184, 187,
189, 190, 193, 194, 197, 203,
213, 221, 263–4
- atomic theory, 328–9
- cartography, 44, 253, 259, 264
- clepsydra, 149
- earthquakes, 301
- geography, 249, 256, 283
- geometry, 39, 47, 87, 189, 349
- mathematics, 1, 18, 36, 37, 39, 40,
43, 51, 56, 58, 62, 329
- meteorology, 222, 223, 225, 226,
236
- mythology, 241
- numerals, 4
- optics, 349, 352
- science, 62
- grid, in Egyptian hieroglyphs, 44
- grid system, 39, 44, 238, 240, 259,
261, 262, 270, 273, 279, 283,
285
astronomical aspects of, 263
- grindstone, 308, 322
- groma, 275
- guest-stars, *see novae*
- gunfire, 285
- gunpowder weapons, 342
- Gwalior
- Bhojadera inscriptions, 4
- haematite, 323
- Hai Chiao Thu Hsi* (Preface to
Diagrams of the Tides), 236
- Hai Tao Suan Ching* (Sea Island
Mathematical Manual), 13
- Hai Yao Pén Tshao* (Drugs of the
Southern Countries beyond the
Seas), 315
- Hai yen* (eye of the sea, wells), 293

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

418

- von Hallerstein, Augustin, 219
 Halley, Edmond, 118
 Halley's Comet, 208, 210
 haloes, 223, 227–8, 229
 lunar, 226
 technical terms, *see* technical terms
 Hamlin Academy, 77
 'hammoniac', 315
 Han (dynasty), 1, 3, 9, 26, 28, 212, 261, 262, 263, 264, 278, 293, 302, 309, 323, 326, 327, 328, 333, 334, 336, 337, 346, 353, 355, 357, 358, 375, 380, 381
 armillary sphere, 169, 170
 astronomy, 80, 89, 90, 104, 109, 113, 116, 118, 121, 127, 134, 137, 138, 139, 144, 145, 172, 180, 184, 185, 186, 193, 194, 197, 198, 200, 203, 205
 cartography, 259–60, 275, 281, 282
 carvings and reliefs, 121, 122, 139
 clepsydra, 149, 151, 155
 geography, 256
 mathematics, 36, 37, 42, 48, 51, 56
 medicine, 328
 meteorology, 224, 225, 230, 232
 tombs, *see* tombs
 Han apocrypha, 173
 Han I (*fl.* A.D. 223), 134
 Han watch-tower, 202
 Han Wu Ti (emperor), 260, 292
Han Wu Ti Nei Chuan (Inside Story of the Emperor Han Wu Ti), 274
 Han Yen (mathematician, *fl.* 780–804), 38
 Handbook of Archaeology, *see* *Ko Ku Yao Lun*
 Hangchow, 83, 233, 248, 346
 Hanoi, *see* Chiaochow
 'hard wind', 88
 harmonica, 384
 harmonium, 384
 'harmony' (of the armillary sphere), 172
 Harriot, T., 211
 harvest signs, 80, 190
 Harvey, William, 328
 de la Hautefeuille (1703), 305
 Haüy, René-Just, 306
 headless beings, *see* acephali
 hearing, 383
 heat, 328, 343, 344, 347
 heavenly bodies, *see* celestial bodies
 'heavenly reprimands', 203, 224, 232
 Heavens, the
 apparent colour of, 86
 circumference of, 85
 emptiness of, 86, 87, 88
 geometrical division of, 95
 rotation of, 83, 84–5, 86, 92, 103, 172
 shape of, 83, 84, 85, 238
 Yang nature of, 88
 Hebrew numerals, 4
 Hebrews, *see* Jews
 heliacal risings and settings, 91, 95, 109, 111
 helicopter, 65
 helicopter top, 364
 heliocentric theory, *see* Copernicus and Copernicanism
 Hellenistic cartography, 258, 283
 Hellenistic geographers, 271, 283
 Hellenistic times, 178, 194, 221, 249, 279, 317
Hēng numerals, 3
 Henry the Navigator, Prince (1394–1460), 259

Index

419

- hen's egg analogy, 85, 238
 Heo (star), 102
 herbals, 306
 hermits, 293
 Herodotus (fifth century B.C.), 241, 245
 Heron of Alexandria (*fl.* A.D. 65), 276, 304, 335, 352
 hexagrams, 58
 hides, treatment of, 315
 Hieron, King, 336
 'hill-censers', 281
 'Hilprecht' cuneiform tablet, 112
 Hindus, 5
 Hipparchus (Greek astronomer, c. 134 B.C.), 80, 118, 184, 253
Hisāb al-Jabr w'al-Muqābalah (The Calculation of Integration and Equation), 47
 Historical Classic, see *Shu Ching*
 Historical Geography of Szechuan, see *Hua Yang Kuo Chih*
 Historical Investigation of Public Affairs, see *Wēn Hsien Thung Khao*
 Historical Records, see *Shih Chi*
 History of the Administrative Statutes of the Sung Dynasty, see *Sung Hui Yao*
 History of the Chin Dynasty, see *Chin Shu*
 History of the Former Han Dynasty, see *Chhien Han Shu*
History of Israel Jobson, the Wandering Jew (Wilson), 214
 History of the Later Han Dynasty, see *Hou Han Shu*
 History of the Sui Dynasty, see *Sui Shu*
 History of the (Liu) Sung Dynasty, see *Sung Shu*
 History of the Yuan Dynasty, see *Yuan Shih*
 Ho (legendary astronomer), 73, 74, 75, 102
 Ho Chheng-Thien (astronomer, c. A.D. 450), 129, 130, 183
 Ho Thu (the 'River Diagram'), 20, 21, 22
Ho Yuan Chi (Records of the Source of the (Yellow) River), 251
 hodometer, 280, 304
 Holland, 211
 hollow objects, as resonators, 383–4
Holosteum umbellatum (umbellate chickweed), 324
 Homer, 91
 homophones, 1
 Honan, 300
 Hooke, Robert (1670), 174, 328
 horizon, 91, 92, 117, 121
 rings, 165, 167
 horizon circle for azimuth measurements, 218, 219
 'horse riding lamp', 362
 horsetails, 323
 Hou Chün-Chi (general, A.D. 635), 251
Hou Han Shu (History of the Later Han Dynasty), 130, 133, 188, 301
 Hou Khuei (legendary music-master), 369
 hour-circles, 92, 264
 hour-glass, 158
 house-swallow, 223
 Hsi (legendary astronomer), 73, 74–5, 102
 Hsi-Ho (mythological being, sometimes the mother and sometimes the chariot-driver of the sun), 75
 Hsi Chiang, see West River

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

420

- Hsi Shu** (legendary astronomer), 131
- Hsi Yang** (Western), in book titles, 217
- Hsi Yang Hsin Fa Li Shu** (Treatise on Astronomy and Calendrical Science according to the New Western Methods), 216
- Hsi Yu Lu** (Record of a Journey to the West), 250
- Hsia** (dynasty), 195, 241, 261
- Hsia Hsiao Cheng** (The Lesser Annuary of the Hsia Dynasty), 79, 102, 103
- Hsia Jih Chi** (Records of Leisure Hours), 361
- Hsiahou Yang** (mathematician, fifth century A.D.), 38
- hsiai** (a kind of shallot), 323
- Hsiang Chieh Chiu Chang Suan Fa Tsuan Lei** (Detailed Analysis of the Mathematical Rules in the 'Nine Chapters' and their Reclassification), 10, 26, 27, 56
- Hsiang Tho**, 89
- Hsiang Shan Yeh Lu** (Rustic Notes from Hsiang-shan), 348
- Hsiang Yen Lu** (The Smoke of Hunan Hearths), 383
- Rustic Notes from Hsiang-shan, see *Hsiang Yen Lu*
- Hsiao-An Hsin Fa** (Wang Hsi-Shan's New (Astronomical) Methods), 218
- Hsiao Ho** (general), 261
- Hsiao I** (c. A.D. 550), 242
- Hsiao Lung Chhiu**, 292
- Hsiao Shu** (Taoist), 316
- Hsiao Tai Li Chi** (Record of the Rites of Tai the Younger), 79
- Hsiao Tao-Tshun** (c. eleventh century A.D.), 60, 62–3
- Hsiao Thang Shan tomb-shrines**, 139, 141
- Hsiao Yang** (the fixed stars), 90
- Hsiao Yin** (the planets), 90
- Hsieh Chha-Wei** (mathematician, eleventh century A.D.), 35, 50
- Hsieh Chuang** (421–466), 282
- Hsien-Fêng Yuan Nien Chung Hsing Piao** (Table of Meridian Passages of 100 Stars in Right Ascension and Declination for 1851), 218
- Hsien-yang** (capital of the State of Chhin), 261
- Hsienyü Wang-jen** (astronomer), 169
- Hsin** (dynasty), 138, 140
- Hsin** (*hsiu*), 95, 101, 108, 122
- Hsin Fa** ('according to the new methods'), in book titles, 217
- Hsin I Hsiang Fa Yao** (New Description of an Armillary Clock), 81, 123, 125, 168, 169, 182
- Hsin Pien Tui Hsiang Ssu Yen** (New Reader with Four Characters to the Line and Pictures to Match), 32
- Hsin Shu** (New Book), 37
- Hsin Thien Lun** (Discourse on the Diurnal Revolution), 84
- Hsing** (*hsiu*), 119
- Hsing** (the red star), 101, 104
- Hsing Ching** (Star Manual), 80, 108, 180, 181
- Hsing Shui Chin Chien** (Golden Mirror of the Flowering Waters), 248
- Hsing Yün-Lu** (calendar expert, A.D. 1573–1620), 45, 183
- Hsintu Fang** (writer, sixth century A.D.), 305

Index

421

- hsiu** (28 lunar mansions), 76, 80, 85, 92, 94ff, 119, 171, 180, 213, 261, 264
 antiquity of, 101
 origin of, 109ff
 symbolic names of, 95
- Hsiu Chen Thai Chi Hun Yuan Thu** (Restored True Chart of the Great-Ultimate Chaos Origin), 60
- Hsu** (star), 102, 104
- Hsu Ang**, 133
- Hsü Chai (geographer)**, 249
- Hsü Chien** (Thang scholar), 295
- Hsü Hsia-Kho** (traveller, 1586–1641), 251–2
- Hsü Ku Chai Chhi Suan Fa** (Continuation of Ancient Mathematical Methods for Elucidating the Strange (Properties of Numbers)), 22
- Hsü Sung** (scholar and Commissioner of Education, 1810), 252
- Hsü Yo** (Later Han mathematician), 9, 32, 35, 38, 62, 262, 326
- Hsüan-chi** (sighting-tube instrument), 160, 161, 162, 163
- Hsüan-Ho** reign-period Treatise on Stones, see *Hsüan-Ho Shih Phu*
- Hsüan-Ho Shih Phu** (Hsüan-Ho reign-period Treatise on Stones), 312
- Hsüan Yeh** theory, 82, 86ff, 88, 213, 214
- Hsüeh Chi-Hsüan** (scholar, mid-twelfth century A.D.), 157
- Hsüeh Fēng-Tsu** (mathematician, seventeenth century A.D.), 218
- Hsün Tzu book**, 335
- Hsung Hsüeh Yin Yuan Thu Chi**, 234
- Hu Shan**, 296
- Hua Shu** (Book of Transformations), 360, 382
- Hua Yang Kuo Chih** (Historical Geography of Szechuan), 246
- Huai Nan Tzu** (Book of (the Prince of) Huai-Nan), 108, 129, 183, 188, 226, 230, 231, 307, 330, 333, 343, 353, 371, 372
- Huai Nan Wan Pi Shu** (The Ten Thousand Infallible Arts of the Prince of Huai-Nan), 346, 354
- Huai-Ping** (monk), 337
- Huan Than** (40 B.C. to A.D. 30), 152, 171, 232
- Huang Chhu calendar**, 134
- Huang Chi calendar**, 134
- Huang-chung** (pipe, bell on note), 380
- Huang Shang** (geographer and imperial tutor, A.D. 1193), 126
- Huang Ti** (legendary Yellow Emperor), 22, 153
- Huang Tzu-Fa** (writer, probably of the Han), 226
- Huang-Yu** reign-period, 77
- Huangfu Chung-Ho** (astronomer, A.D. 1437), 167, 176
- Huchow**, 246
- Hué**, 339
- Hui** (resonance period), 192
- Hui Shih** (logician, early fourth century B.C.), 59
- Hui-Yuan** (Thang monk), 337
- humming tube**, 367
- Hun hsiang** (technical term for celestial globe), 180
- Hun I** (On the Armillary Sphere), 170
- Hun i**, see armillary sphere
- Hun I Chu** (Commentary on the Armillary Sphere), 85

Index

422

- Hun Thien (Armillary Sphere)
Temple, 127
- Hun Thien theory, 82, 85–6, 87–8,
92, 238
- Hunan province
maps of, 260
- 'Hundred Fowls' problem, 50
- Hung Fan Wu Hsing Chuan*
(Discourse on the Hung Fan
chapter of the *Shu Ching* in
relation to the Five Elements),
184
- Hung Lu Department, 242, 243
- Hung Thien theory, 169
- Huns, 244, 260
- Huo hsing (Five Star or Constella-
tion), 101
- hurricanes, 223
- 'hurrying' (of armillary sphere), 172
- Hutton, James, (1802), 293
- Huygens, Christian (1698), 214, 328
- hydra, 119, 124
- hydraulic engineering, *see* engineer-
ing
- hydrochloric acid, 322
- hydrostatic 'trick' vessels, *see ad-*
visory vessels
- hydrostatic vessels, used in tuning,
375–6
- hygrometer, 226
- hyperbola, 43
- hypotenuse, 16, 41
- hypotheses, 64, 65, 217
- I Chang Chu* (Commentary on the
Book of Changes), 226
- I Ching* (Book of Changes), 20, 57,
223
- I Chou Shu* (Last Books of the
Chou), 183, 197
- I-Hsing (monk, mathematician and
astronomer, eighth century),
16, 50, 57, 81, 118, 127–8, 130,
- 134, 166, 172, 180, 194, 195,
338, 339
- I Ku Yen Tuan* (New Steps in
Computation), 15
- I Wei Chhien Tso Tu* (Apocryphal
Treatise on the *Book of
Changes* ...), 21
- I Wu Chih (descriptions of un-
familiar regions), 242
- I Yü Thu Chih* (Illustrated Record
of Strange Countries), 244, 245
- Ibn Aflah, Jābir (born c. 1130), 175
- Ibn Baṭṭūtah (1304–1377), 280
- Ibn al-Haitham (Alhazen, physicist,
A.D. 965–1039), 349, 352, 356
- Ibn Hauqal, Abu al-Qāsim
Muhammad (A.D. 950–970),
272
- Ibn Qurrah, Thabit (d. A.D. 901); 22
- Ibn Sīnā (eleventh century A.D.),
292, 312
- Ibn Yūnus, 133
- ice
as a burning-lens, 359–60
origin of rock-crystal from, 360
- ideographic language, 329
- al-Idrīsī, Abū 'Abdallāh al-Sharīf
(twelfth century A.D.), 245,
272–3
- ignis fatuus*, 347, 348
- ignis lambens*, 348
- illiteracy, 63
- Illustrated Pharmacopoeia, *see Pēn*
Tshao Thu Ching
- Illustrated Record of Strange
Countries, *see I Yü Thu Chih*
- Illustrated Seaboard Strategy, *see*
Chhou Hai Thu Pien
- Illustrated Treatise on Standard
Clepsydra Technique, *see*
Kuan Shu Kho Lou Thu
- images, 354

- inversion of, 351, 352, 356
- Imamura Akitsune, 304, 305
- impact, 344
- imperial bureaucracy, *see* bureaucracy
- imperial edict, 201
- Imperial Palace, Peking, 110
- Imperial University, 78
- impetus, 341
- implosion, 346
- imports, *see* exports and imports
- incense-burners, 281
- incense clocks, 157
- 'incense-stick' method of measuring time, 157–8
- indeterminate analysis, 13, 15, 49–50, 61, 194
- example of a worked-out problem in, 11
- indeterminate equations, *see* equations
- Index of Prohibited Books, 190
- India, 9, 17, 69, 166, 222, 241, 258, 270, 274, 285, 291, 306, 321, 326, 329
- abacus, 35
- algebra, 47
- astronomy, 81, 87, 90, 109, 116, 118, 134
- chess, 57
- mathematics, 4, 37, 38, 39, 51, 56, 61, 62
- Indian Ocean, 270, 271
- Indian philosophy, 5
- indicator rods (clepsydra), 149, 151, 152, 154, 155, 156
- Indien und China; Meisterwerke der Baukunst und Plastik (Nawrath)*, 110
- indivisibles, method of, *see* method of infinitesimals
- Indo-China, 4, 130, 274, 339
- embassy to, 295
- induction, 66
- industry, 65, 314, 315, 344
- infinite space, *see* space
- infinitesimals, 58, 59
- method of, *see* method of infinitesimals
- inflow type clepsydra, *see* Clepsydras
- ink, 295, 311
- ink-blocks, grinding of, 311
- Inkstone Record, *see* *Yen Phu*
- inorganic substances, 293, 306, 308, 309, 310
- luminescence of, 348
- inscriptions, 1, 5, 6, 36, 101, 103, 125, 133, 139, 143, 152, 197, 205, 206, 207, 266, 299
- Babylonian, 4
- Bhojadeva, 4
- Cambodia, 4
- Egyptian, 282
- Sumatra, 4
- insect pests, 314
- Inside Story of the Emperor Han Wu Ti, *see* *Han Wu Ti Nei Chuan*
- instants of time, *see* time
- instrument-making, 171, 212
- integration, 58, 59
- intercalated months, 102, 202
- interplanetary travel, 214
- interstice-volumes, 59
- Introduction to Mathematical Studies, *see* *Suan Hsüeh Chhi Mēng*
- Investigation of the Chinese Calendars New and Old, *see* *Ku Chin Lü Li Khao*
- Investigation of the Dimensions of the Universe, *see* *Kao Hou Mēng Chhiu*

Index

424

- Iran, 242
 iron, 308, 318, 322, 323
 oxides, 321
 silicate, 321
 iron lamps, 349
 irrigation, 8, 15, 76, 238, 366
 Isidore of Seville (A.D. 570–636),
 257
 Islam, 292, 296, 349
 al-İştakhrī, Abū Ishāq al-Fārist, 272
 Istanbul, 135
 Italian arithmetic, 25
Itinerary from Bordeaux to Jerusalem (A.D. 333), 245
- Jack-o'-lantern, 347
 Jacob of Edessa (Syrian bishop, A.D. 633–708), 245
 Jacob's Staff, 278, 279
 jade, 139, 155, 282, 306, 309, 317ff,
 323, 357, 359
 centres of production, 318
 colours of, 318
 semi-transparent, used for ob-
 servation of the sun, 212
 working of, 317, 321
 jade disco, 318
 jade images and symbols, 159
 jadeite, 318
 Jamāl al-Dīn (Persian astronomer, 1267), 278
 Japan, 121, 183
 mirrors, 354, 355
 Japanese earthquakes, 300
 Japanese mathematics, 22, 30, 32,
 49, 59, 60
 Japanese pirates, 246
 Japanese tea-ceremony, 346
 jasper, 322
 Java, 270
 Jen Tsung (Chu Kao-Chih, r. A.D.
 1425), 228, 229
- Jerusalem, 249, 256, 275
 Jesuit mathematicians, 17
 Jesuit opinions of Chinese as-
 tronomy, 68, 213
 Jesuit transmissions, 212, 215, 218
 Jesuits, 17, 26, 45, 57, 68–9, 72, 77,
 82, 87, 88, 90, 119, 147, 157,
 167, 172, 174, 181, 189, 190,
 203, 212ff, 218, 219, 226, 259,
 278, 361
 Jews, 147, 279
 'jig-saw' map, *see* maps
jīh erh (corona or solar halo), 204
Jo shui (weak water), 293, 294
Journal of the Royal Asiatic Society,
 122
Ju Chi Shih So (Piling up Powers
 and Unlocking Coefficients), 56
 judges, 361
 Julian cycles, 193
 Jupiter (planet), 76, 187, 188, 191,
 194
 cycle, 109, 190, 191
 Jupiter-stations
 technical terms, 191
 just intonation, 385
- Kai Thien theory, 82, 83, 84, 86, 87
Kaisan-ki-Kōmoku, 59
 kaleidoscope, 361
kan (series of ten characters in the
 sexagesimal cyclical system),
 184, 185, 186
 Kan Pao (c. A.D. 320), 376
 Kan Tē (astronomer, fourth century
 B.C.), 80, 104, 115, 130, 165,
 180, 181, 188, 198
 Kan Ying (Han official and travel-
 ler), 250
 Kansu, 227, 295, 302, 315
 maps of, 266
 Kao-chhêng, *see* Yang-chhêng

Index

425

- Kao Hou Mēng Chhiu**
(Investigation of the Dimensions of the Universe), 218
- Kao Tsu** (empress, 186 B.C.), 200
- Kao Yu** (Later Han commentator), 353
- Karakash** (river), 318, 319
- Kēng Hsin Yü Tshī** (Precious Secrets of the Realm of Kēng and Hsin), 324
- Kēng Hsün** (Sai technician), 155
- Kēng Shou-Chhang** (astronomer, 52 B.C.), 165, 169
- Kepler, Johannes**, 68, 189, 205, 208, 216, 236
- kettle**, 346
- Khai-Yuan reign period**, 119, 127
- Khai-Yuan Chan Chin** (The Khai-Yuan Reign Period Treatise on Astrology (and Astronomy)), 81, 116, 187, 188, 229, 233
- Khai-Yuan Reign Period Treatise on Astrology (and Astronomy)**, see *Khai-Yuan Chan Ching*
- Khaifēng**
Su Sung's clock tower in, 173
dykes at, 261
- Khan Yin** (geographer, fl. A.D. 300–350), 249
- Khang-Hsi reign-period**, 283
- Khang-Hsi emperor** (1666), 217
- Khang-Hsi Jesuit Atlas**, 283
- Khang Thai** (envoy to Indo-China, c. A.D. 260), 295
- kho lou** ('graduated leaker', the clepsydra), 149
- Khotan**, 251, 318, 319
- Khou Tsung-Shik** (twelfth-century pharmaceutical naturalist), 299
- Khubilai Khan**, 251
- Khuei** ('The Chiefs'), 92, 93
- al-Khujandi, Hāmid Ibn al-Khiḍr**
(fl. A.D. 995), 134
- Khun-Lun** (mountains), 225, 251, 274–5, 293
- Khun-ming Lake**, 292
- Khun-Wu sword or knife**, 316, 318, 321
- Khung Thing** (astronomer, A.D. 323), 166
- al-Khwārizmī, Muḥammad ibn Musa** (Persian algebraist, ninth century A.D.), 47
- Kidinnu** (Babylonian astronomer), 189
- kidney diseases**, *see* diseases
- kingfishers**, 370
- Kinship of the Three**, *see* *Tshan Thung Chhi*
- Kitāb al-Shifa'** (Ibn Sīnā), 312
- kites**, 230
- knives**, 318, 320
- knotted cords (as records)**, *see* *Quipu*
- Ko Hēng** (astronomer, third century A.D.), 181
- Ko Hung** (alchemist), 86, 291, 312, 317
- Ko Ku Yao Lun** (Handbook of Archaeology), 322
- Kögler, Ignatius** (A.D. 1744), 165
- Kögler, J. & von Hallerstein, A.**, 219
- Kokon Sampō-ki** (Old and New-Mathematical Methods), 59
- Korea**, 267, 270, 274
Han tombs in, 263
rain-gauges, 227
- Korean astronomical records**, 208, 209
- Korean planisphere**, 125
- Ku Chin Lü Li Khaō** (Investigation of the Chinese Calendars New

- and Old), 45, 183
Ku Wei Shu (Old Mysterious Books), 80, 188
Ku Ying-Hsiang (Governor of Yunan, sixteenth century), 17
Kuan Shu Kho Lou Thu (Illustrated Treatise on Standard Clepsydra Technique), 156
Kuan Sui (military commander, A.D. 349), 133
Kuan Tzu (Book of Master Kuan), 25, 323
Kuan-Yin, 362, 363
Kuan Yin Tzu (Book of Master Kuan)
Kuang Lun (Chang Fu-Hsi), 361
Kuang Wu Ti (emperor of the Han, A.D. 26), 261
Kuang Yü Thu (Enlarged Terrestrial Atlas), 267, 268, 269, 283
Kuangtung, 137, 252
Kuei Ku Tzu (Book of the Devil Valley Master), 327
Kuei piao (sundial), 138
Kufstein, relief map of, 280
kung note, 371, 372
Kung Kung (legendary rebel), 84
Kungyang Kao (commentator), 225
Kuo Pho (alchemist, c. A.D. 300), 231, 294
Kuo Shou-Ching (mathematician and astronomer, 1231–1316), 12, 16–17, 44, 45, 51, 82, 130, 133, 134, 135, 138, 167, 174, 176, 177, 178, 181, 215
 celestial globe of, 218
Kuo Yü (Discourses on the (ancient feudal) States), 372–3, 374, 380
Kuo Yuan-Sêng, 230
Kweichow, 252
lacquer, testing of, 343
lamp-clock time, 158–9
lamps, 349
 lit by 'dragon blubber', 316
 'horse riding', 362
Lanchow, 251
land-allotment, 262
*land once covered by the sea (*sang thien*)*, 291
land utilisation, idea of coordinates in, 44
lang-kan (possibly ruby, agate or coral), 359
language difficulty, 69
languages
 alphabetic, 329
 ideographic, 329
 Chinese, 237, 329
Lao Chün Miao, Kansu, 295
Lao Chün Tung temple, Chung-king, 122
Lao Hsüeh An Pi Chi (Notes from the Hall of Learned Old Age), 349
Lao Tzu, 28, 87
lapidaries, 306, 311, 312, 321
Lapidarium (Alfonso X), 312
Lapidarium (Marbodus), 312
lapis solaris, see 'Bononian stone'
Laplace, 132
Later Chou (period), 152
Later Han (period), 8, 9, 32, 82, 86, 101, 246, 261, 326, 353, 358
Later Sung (dynasty), 365
Later Wei (dynasty), 127
Latin alphabet, 185
Latin scholars, 26
Latin translations, 121
Latins, 328
latitude (celestial), 71, 116, 167
latitude (terrestrial), 71, 72, 146,

Index

427

- 147, 148, 253, 254, 263, 271,
273
- Laufer, B., 161, 281
- law of signs, 39
- Laws of Nature, 63, 86
- lead, 308, 353
used in glass, 357–8
- Lecomte, Louis (1696), 215
- 'Left Pivot', 113
- Legalists, 37
- legends, *see* folklore
- Lei Kung Yao Tui* (Lei Kung's
Answers concerning Drugs),
313
- Lei Kung's Answers concerning
Drugs*, *see* *Lei Kung Yao Tui*
- Leibniz, Gottfried, 58, 60
- length
measurement of, 36, 37, 337–9,
380
- lines of equal —, 40
- units of, 130
- lenses, 159, 356, 358ff
burning-, 359
of glass and rock-crystal, 361
spectacle-, 361
technical terms, *see* technical
terms
- Leonardo da Vinci, 63, 65, 291, 292
- Leonids, 210
- Lepus, 124
- Lesser Annuary of the Hsia Dynasty,
see *Hsia Hsiao Chêng*
- Leucippus (fifth century B.C.), 328
- levers, 302, 303, 305, 329, 331
- Li Chhüan (Taoist and military
technologist, A.D. 759), 276
- Li Chi* (Record of Rites), 104
- Li Chi-Fu (geographer, A.D. 814),
249
- Li Chih-Chhang (secretary to
Chhiu Chhang-Chhun), 251
- Li Fan (astronomer, A.D. 85), 188
- Li Fu Jen (concubine of the em-
peror Wu of the Han), 361–2
- Li Hai Chi* (The Beetle and the
Sea), 230
- Li Kai (geographer, A.D. 800), 264
- Li Kao (Thang prince), 343
- Li Kung-Lin (painter, fl. A.D.
1000), 286, 288
- Li Lan (Taoist, c. A.D. 450), 155
- Li Ling (general, 99 B.C.), 260
- Li Nien, 20, 22
- Li Pai (poet), 291
- Li Shih-Chen (sixteenth-century
naturalist), 212, 294, 298, 310,
312, 344, 347
- Li Shih-Chhüan, 320
- Li Shun-Chu, 233
- Li Shun-Fêng (commentator on
mathematical books, late
seventh century), 11, 17, 50,
133, 166, 180, 184
- Li Tao-Yuan (geographer, sixth
century A.D.), 245, 299
- Li Tsan-Ning (monk), 348
- Li Tsê-Min (cartographer, c. 1330),
270
- Li Yeh (mathematician, 1178–1265),
13, 15, 48, 63
- Liang (period), 80, 81, 180, 242
- Liang Ling-Tsan (engineer, c. A.D.
725), 118, 172, 180
- Libra, First Point of, 70
- Lieh (Taoist), 334
- Lieh Tzu* (Book of Master Lieh), 87,
89, 316, 334, 358
- lifting and sinking of the pole,
theory of, 85
- light, *see* optics
- light-sources, 349, 350ff

Index

428

- lightning, 231–3, 307, 344, 383
 lignite, 292
 lime, 297
 limestone, 297
 limestone sundial, 139, 142
 limits, method of, *see* method of limits
 Lin Chhing (nineteenth century), 234
 Lin Hsiao-Kung (astronomer and mathematician, fl. A.D. 581–604), 305
 Lin-I, 130, 339
 Ling, Duke (sixth century B.C.), 372
ling (bell with clapper), 376
ling (zero), 5–6
ling chhih or *ling i*, 292
 Ling-chhiu, 339
Ling Hsien (Spiritual Constitution of the Universe), 85
 Lippershey, 361
 liquids, specific gravity of, 337
 Literary Expositor, *see* *Eh Ya*
 Liu (*hsiu*), 101, 119, 124
 Liu An (prince of Huai Nan), 253
 Liu Chhi (A.D. 1117), 361
 Liu Chhuo (calendar expert, fl. A.D. 604), 134, 184
 Liu Chih (astronomer, A.D. 274), 181, 200
Liu Ching Thien Wen Pien (Treatise on Astronomy in Six Classics), 82
Liu Ching Thu (Pictures of Objects mentioned in the Six Classics), 154, 156
 Liu Hsiang (c. 10 B.C.), 132, 184, 194, 200, 211
 Liu Hsiao-Jung, 133
 Liu Hsin (mathematician, first century A.D.), 42, 134, 187, 194, 203
 Liu Hui (mathematician, A.D. 264), 12, 13, 26, 37, 41, 42, 43, 59, 276
 Liu Hung (calendar expert and commentator, c. A.D. 178), 81, 130, 132, 133, 203
 Liu I (algebraist, A.D. 1075), 15
 Liu Ju-Hsieh (mathematician, c. A.D. 1100), 56
liu-po (game), 141, 144
liu sha (shifting sands), 293
 Liu Sung (dynasty), 282
 Liu Yuan-Ting (ambassador to the Tibetans, A.D. 822), 251
 Lo (river), 20
 Lo Hung-Hsien (cartographer, 1541), 267, 268
 Lo Shu (the ‘Lo River Writing’), 20, 21, 22
Lo Shu Wei Chen Yao Tu, 188
Lo-Yang Chhieh Lan Chi (Description of the Buddhist Temples of Loyang), 249
 logarithms, 218
 logic, 62
 logicians, 349
 Lohsia Hung (astronomer, c. 140–104 B.C.), 85, 133, 169, 171
 long-eared men, 240
 longitude (celestial), 71, 171, 264
 longitude (terrestrial), 71, 253, 254, 263–4, 271, 273
 Lop Nor, 251
 Lost Books of the Chou, *see* *I Chou Shu*
 lotus clepsydra, *see* clepsydras
 lotus-seed, use in brine-testing, 337
lou hu (‘drip vessel’, the clepsydra), 149
Lou Kho Fa (Clepsydra Technique), 154
 Lou Yuan-Shan (Sung rain-

Index

429

- forecaster), 226
- Loyang, 135, 136, 249
- loxodromes, 259
- lu* (radical for salt), 309
- lü* (pitch-measure), 380
- Lu, Master (Chhin magician), 20
- Lu Chih (c. A.D. 150), 242
- Lü Hsüeh Hsin Shuo* (New Account of the Science of the Pitch-pipes), 386
- Lu Kuei-Mêng (Taoist poet, tenth century A.D.), 296
- Lü Li Chih* (Memoir on the Calendar), 81
- Lu Nan Shan mountains, 252
- Lü Pu-Wei (merchant and naturalist c. 190 B.C.), 253
- Lü Shih Chhun Chhiu* (Master Lu's Spring and Autumn Annals), 104, 373
- Lü Tai-Lu (eleventh century A.D.), 321
- Lu Thang Shih Hua* (Foothill Hall Essays), 32
- Lu Thu, 21
- Lu To-Sun (geographer and traveler, A.D. 971), 246
- Lü Tshai (cartographer and sceptical naturalist, d. A.D. 665), 152
- Lü Wén (official, A.D. 800), 264
- Lu Yu (1190), 349
- lucky and unlucky numbers, 18
- Lucretius (first century B.C.), 199, 232, 329
- luminescence, 347–9
- Lun Héng* (Discourses weighed in the Balance), 212, 225, 232, 235, 358
- lunar eclipse cycle, 192, 193, 194
- lunar mansions, see *hsiu*
- lunations, 95, 182, 183, 186, 190, 191, 193, 194, 197, 198
- tides and, 234
- lung* (rising of the moon), 109
- Lung-Hsi, 302
- Lung Mén gorges, 247
- lute, 365, 371
- lyre, 373
- Ma Hsü (astronomer, c. A.D. 100), 80
- Ma Ku (legendary Taoist woman immortal), 291
- Ma-Ku Shan Hsien Than Chi* (Notes on the Altars to the Immortals on Ma-Ku Mountain), 291
- Ma Tuan-Lin (historian, thirteenth century A.D.), 82, 205, 207, 210
- Ma-wang-tin bomb, 187
- Macao, 321
- Macrobius, Ambrosius Theodosius (A.D. 395–423), 256
- macrocosm-microcosm analogies, 85, 91, 92, 235
- Magalhaens, Gabriel (Jesuit, seventeenth century), 157, 362
- magic, 238, 241, 323, 375
- bells and, 372
 - sympathetic, 367, 368
- magic lanterns, 361, 362
- 'magic mirrors', 354, 355
- magic square, 9, 17, 18–23, 24, 80
- magical operations, 139
- magician-technologists, 65, 141
- magicians, 75, 199
- magnesium silicate, 323
- magnetic compass, 145, 147, 262, 263, 283, 325, 342
- magnetic needle, 280
- magnetic polarity, 139, 259
- magnetism, 325
- magnetite, 323

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

430

- magnifying glasses, 361
 malachite, 308, 313
 mammals, fossilised, 299
 al-Ma'mūn (caliph, A.D. 813–833),
 271, 339
 al-Ma'mūn's observatory, 133
The Man in the Moone . . . (Godwin),
 214
 Manchu conquest (1644), 217
 manganese, 318
 manganese dioxide, crystallisation
 of, 296
 Manual of the White and Gloomy
 Planet of War, see *Thai Pai*
 Yin Ching
 manuscripts
 on planetary motions, 187
 Mao (Pleiades), 101, 102, 104
 Mao Hēng (commentator), 38
 Maoris, see tribal peoples
 Map of the Earth, see *Ti Chih Thu*
 Map of the Tracks of Yü the Great,
 see *Yü Chi Thu*
 Map of the True Topography of the
 Five Sacred Mountains, see
 Wu Yo Chen Hsing Thu
 map-making, see cartography
 mappaemundi, 256
 maps, 254, 259ff, 270ff
 carved in stone, 266, 267
 of Chu Ssu-Pêñ, 267
 of concentric squares, 238
 contour, 265
 'Cottoniana', 259
 disc-like, 285
 European, 258
 first historical reference to a map
 in China, 260
 grid, 273, 274
 of Isidore of Seville, 257
 'jig-saw', 282
 military, 260
 of Ortelius, 282
 population statistics and, 282
 printed, 267
 Ptolemy's world-maps, 254
 relief, 275, 280ff
 Ricci's world-map, 282
 on silk, 260, 261, 262
 strategic, 266, 282
 T-O maps, 254, 256, 271, 272
 wheel-, 256, 271, 272, 274, 283
 on wood, 280–1, 282
 Marāghah observatory, see astronomical observatories
 Marbodus (c. A.D. 1070), 312
 marine animals, 353
 mariner's charts, 270, 271
 mariner's compass, 257
 Marinus of Tyre, 253, 259, 283
 al-Marrākushī, 'Alī, 273
 Mars (planet), 127, 187, 188, 194
 marsh-lights, see *ignis fatuus*
 Martini, Martin (cartographer,
 1655), 282
 Maspero, H., 168
 Master Lu's Spring and Autumn
 Annals, see *Lü Shih Chhun*
 Chhiu
 Master Sun's Arithmetical Manual,
 see *Sun Tzu Suan Ching*
 Master Tsochhiu's Enlargement of
 the Spring and Summer
 Annals, see *Tso Chuan*
 Master Yen's Spring and Autumn
 Annals, see *Yen Tzu Chhun*
 Chhiu
 matches, see sulphur matches
 materials, strength of, 333
 Mathematical Manual of the Five
 Government Departments, see
 Wu Tshao Suan Ching
 mathematical symbolism, 49
 Mathematical Treatise in Nine

Index

431

- Sections, *see Shu Shu Chiu Chang*
- mathematical works, 6ff, 78, 79
 - Han, 3
 - Ming, 5
 - printing of, 3
- mathematics, 1ff, 62, 63, 78, 129, 184, 212, 325, 329, 330, 331, 339, 356, 373, 374, 385
- Arabic, *see Arabic mathematics*
- Babylonian, *see Babylonia*
- Egyptian, *see Egypt*
- European, *see Europe*
- Greek, *see Greece*
- Indian, *see India*
- Japanese, *see Japanese mathematics*
- Persian, *see Persia*
- technical terms, *see technical terms*
- matrices, 49, 52, 53, 57, 217
- Mayas, 186, 193
- mean time, 157
- measurement, 36, 37, 39, 64, 330, 331, 339
 - decimal, 129, 337
 - geometry and, 8, 39, 43
 - standard, 42
 - systems of, 129
 - units of, 331, 337
- mechanical clocks, *see clocks*
- mechanical engineering, *see engineering*
- mediation (halving), 24
- medicine, 297, 299, 309, 310, 311, 314, 315, 317, 321, 326, 328, 366
- 'meditation fire', 344
- Mediterranean, 233, 253, 254, 256, 257, 258–9, 299, 301
- Mei-Ku, 75
- Mei Ku-Chhêng (mathematician, 1681–1763), 17
- Mei Piao (mineralogist, ninth century A.D.), 310, 312
- Mei Shêng (poet, d. 140 B.C.), 235, 236
- Mekong (river), 252
- Memoir on the Calendar, *see Lü Li Chih*
- Memoir on Some Traditions of Mathematical Art, *see Shu Shu Chi I*
- Mencius, *see Mêng Kho Mêng Chhi Pi Than* (Dream Pool Essays), 11, 57, 59, 210, 236, 279, 280, 293, 356
- Mêng Tzu (Mêng Kho, Confucian philosopher), 80, 336
- Mêng Tzu (Book of Master Mêng), 194
- mercantile capitalism, *see capitalism*
- Mercator, Gerard (1512–1594), 259
- Mercator's projection, 123, 124, 125, 273
- merchants, 186, 252, 279, 322
- mercuric sulphide, 309
- mercury (metal), 151, 155, 282, 307, 308, 324
- Mercury (planet), 187, 188, 189, 211
- mercury seismograph, *see seismographs*
- meridian arc survey, 338
- meridian line of A.D. 725, 338, 339
- meridians, 91, 253, 264, 283
 - ring, 165
 - transits, 136, 181
- Meru (Mt), *see Khun-Lun*
- Mesopotamia, 36, 61, 353, 357, 358
- clepsydra, 149, 152
- metabolic rate, 344
- metal-barrel gun, 342
- metal oxides, 317

Index

432

- metal surfaces, cleaning of, 317
metallurgy, 88, 315, 322, 353, 384
metals
 accumulate in certain plants, 323–4
 formation of, in the earth, 226, 306ff
 ores of, 260
metamorphosis of minerals, theory of, 308
meteor showers, 210
meteorites, 199, 210–1, 222
 technical terms, *see* technical terms
Meteorologica (Aristotle), 222, 226
meteorological measurement, 222
meteorological observations, 76
meteorological records, 222, 224, 227
meteorology
 changes of meaning, 222
 divination and, 224
meteors, 80, 82, 210, 222
 technical terms, 210
methane, 347
method of exhaustion, 58, 59, 60
Method of Finite Differences, 11, 17, 50–1, 184
method of fluxions, 58
method of infinitesimals, 58
method of limits, 58
Meton of Athens (*c.* 432 B.C.), 191–2, 193
metric system, 337ff
Mexicans, 317
Mi Fu (high official of the Sung), 311
Miao Chhang-Yen (third century A.D.), 230
mica, 311, 313, 321
microcosm, *see* macrocosm
micrometer screws, 212
microscope, 318, 361
Middle Ages, 249, 264, 278, 339, 341, 342, 344
Middle East, 191
military maps, *see* maps
military technology, 270, 325
milk products, 297
Milky Way, 125, 126, 181, 222
millet grains and metrology, 380, 381
mimes, 368, 371
mineral acids, 322
mineralogy, 293, 306ff
 modern, 306
minerals, 241, 311
 catalogues of, 306
 classification of, 306, 308–9, 311
 copper-bearing, 313
 crystal forms of, 306, 313
 formation of, in the rocks, 226
 metamorphosis of, 308
 practical uses of, 314
Ming (dynasty), 5, 11, 17, 30, 48, 63, 68, 80, 82, 115, 127, 144, 147, 158, 170, 203, 215, 218, 219, 226, 230, 231, 244, 249, 250, 251, 295, 299, 311, 357
Ming Huang Tsa Lu (Miscellaneous Records of the Brightness of the Imperial Court (of Thang Hsüan Tsung)), 127
Ming Thang, *see* astronomical observatories
mining and miners, 260, 315, 317, 318, 322, 323, 324, 383
Ministry of Rites, 77
mirages, 231
mirror-making, 354, 355
mirrors, 349, 352, 360, 361
 bronze, 105, 140, 353, 372
 burning-, 353, 356, 359
 concave, 351, 353, 354, 360

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

433

- convex, 351, 354, 360
 cosmic, 262
 'light-penetration —', 355
 magic-, 354, 355
 moon-, 353
 plane, 351, 353, 354, 360
 TLV-, 138, 139, 140, 144
- Miscellaneous Records of the Brightness of the Imperial Court ... see *Ming Huang Tsa Lu*
- Miscellaneous Records of the Lone Watcher, see *Tu Hsing Tsa Chih*
- Miscellany of the Yu-Yang Mountain (Cave), see *Yu-Yang Tsa Tsu*
- missiles, trajectory of, 325
 missionaries, 68, 216
Mo Ching (Mohist Canon), 36, 40, 41, 326, 334, 339, 341, 350
Mo Kho Hui Hsi (Fly-Whisk Conversations of the Scholarly Guest), 296
Mo Tzu (Book of Master Mo), 383
 'mock suns', 227–8
 'mode-keys', 372
 Mogadiscio, 270
 Mohist Canon, see *Mo Ching*
 Mohists, 37, 41, 59, 325, 326, 331ff, 341–3, 349ff, 354
 molluscs, 297, 353
 monetary reform, 65
 Mongol conquests, 274
 Mongolia, and the Mongols, 26, 191, 251, 267, 361
 Mongolian unification of Asia, 267
 monkeys, 242
 monks, 292
 monomolecular films, 343
 monsoon season, 76
 monsoons, 222–3
- monstrosities, human and animal, 242
 monthly observances, 79
 Monthly Ordinances, see *Yüeh Ling*
 months
 intercalary, 102, 202
 of the tropical year, 191
 moon, 76, 90, 95, 181
 changes in apparent size of, 89–90
 falls back eastwards, 199
 full, 92, 95, 100, 182, 197, 198, 235
 new, 182, 193, 197, 198, 201
 path of, 16, 166, 197, 203
 position of, 172
 rabbit in the, 212
 reflected light of, 90, 197, 327
 rising of, 109
 shape of, 199
 tides and, 235, 236
 unusual appearances of, 80
 the 'white road' of, 125
 Yin nature of, 90, 198, 236
- moon-mirrors, see mirrors
 'moon-stations', 109, 111, 112
 moon's phases
 and the waxing and waning of certain marine animals, 353
 mordants, 315
 mortuary jar, 281
 Moschopoulos, Manuel (*fl.* 1295–1316), 23
 motion, 64, 325, 339ff
 circular, 341
 deflected, 341
 and duration, 340
 along slopes, 342
 in space, 340
 technical terms, see technical terms

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

434

- motion, theory of
 - lack of later Chinese contributions to, 342–3
- motion and rest, relative values of states of, 342–3
- Mount Wilson, California, 179
- mountains, 249, 256, 281, 299, 318
 - of Cosmas, 258
 - origin of, 290ff
 - and the precipitation process, 226
 - sacred, 281, 282
- mountain islands, 281, 282
- mouth-organ, 382, 384
- Mu (High King of the Chou), 316
- Mu Thien Tzu Chuan* (Account of the Travels of the Emperor Mu), 191
- Mul Apin lists of stars, 112
- mulberry-grove (*sang thien*), 291
- Müller, Johannes of Königsberg (Regiomontanus), 207
- multiplication, 24, 25, 30, 61
 - algebraic, 15
 - of fractions, 7
- multiplication tables, 4, 7, 25
 - on bamboo tablets, 25–6
 - Pythagorean, 26
- Muscat, 271
- muscular movement
 - and heat-production, 344
- music, 334, 365–6, 368, 382, 385
- musical instruments, 368, 370
 - stringed, 371, 372, 373, 374
- Muslims, 82, 272, 273, 384
- mussels, 279
- Mustard-Seed Garden Guide to Painting, see *Chieh-Tzu Yuan Hua Chuan*
- mysticism
 - and mathematics, 38
- mythology, 84, 212, 242
 - Greek, see Greece
- Nabonassar (747 B.C.), 197
- Naburiannu (Babylonian astronomer), 189
- nadir, 72
- al-Najjāri, Jamāl al-Din ibn Muhammad (A.D. 1267), 175
- Nan-Chiao, 75
- Nan Chou I Wu Chih* (Strange Things in the South), 242
- Nan II Wu Chih* (Strange Things from the Southern Borders), 242
- Nan Tou, *see* Dipper
- Nanhai (Mongol imperial summer capital), 137
- Nanking, 72, 73, 167, 174, 300
- Nankung Yüeh (astronomer, eighth century A.D.), 130, 137, 338, 339
- Napier's bones, 28, 30, 31
- natural gas, 344
- Naturalists, School of, 80, 89, 235
- Nature, continuity and oneness of, 342
- Nature, order in, 330–1
- nautiloids, 297
- navigation, 259, 325
- Nawrath, A., 110
- neap tides, *see* tides
- negative numbers, 15, 39, 61
- negative signs, 15, 52
- Neo-Confucians, 4, 60, 87, 88, 125, 290, 291
- Neolithic arces, 211
- Neolithic jade tools, 318
- nephrite, 318
- Neptunian theories, 286
- New Account of the Science of the Pitch-pipes, *see* *Lü Hsiēh Hsin Shue*
- New Book, *see* *Hsin Shu*
- New Description of an Armillary

Index

435

- Clock, see *Hsin I Hsiang Fa*
Yao
‘New Music’, 372
New Reader with Four Characters to the Line and Pictures to Match, see *Hsin Pien Tui*
Hsiang Ssu Yen
‘New Star’, 205
New Steps in Computation, see *I Ku Yen Tuan*
New Zealand, 317
Newton, Isaac, 58, 60, 208, 236, 341, 342
Newton’s laws of motion, 341
Niao hsing (the Bird Star or Constellation), 101, 102, 103
Nicholas of Cusa (1401–1464), 227, 340
Nieuwhoff, Johan (1656), 215
‘night-shining jewel’, 348
night watches, 151
Nile, 91, 256
Nine Cauldrons of the Hsia, 241
Nine Chapters on the Mathematical Art, see *Chiu Chang Suan Shu*
Nine Dragon Screen wall, 110
Nine Halls, 21–2
‘Nine Roads of the Moon’, 184, 185
Nineveh, 111
Ning Hsien Wang (Chu Chhüan, prince, mineralogist and alchemist), 244, 245
Ning Tsung, (r. A.D. 1195–1224), 123
Ningyuan, 252
nitric acid, 322
Niu (*hsiu*), 95, 129
Noah’s Flood, 292
north and south, position of, in Chinese maps, 267, 270
north polar distances, 165, 170
north pole (celestial), see poles (celestial)
Northern Chhi (dynasty), 184, 346
Northern Lights, see aurora
Northern Sung (period), 77, 155, 167
notation (musical), 372
notations, 1, 4
algebraic, 15
for numerals higher than 10, 6
place-value, 61
positional, 47
Thien Yuan, 52, 53, 56, 62
notes (musical), 373
names of, 371, 372, 373
of fixed or absolute pitch, 372
Notes from the Hall of Learned Old Age, see *Lao Hsiieh An Pi Chi*
Notes on the Altars to the Immortals on Ma-Ku Mountain, see *Ma-Ku Shan Hsien Than Chi*
Notes on an Embassy to the North, see *Pei Shih Chi*
novae, 82, 204–6, 207, 208, 221
oldest record of, 205, 206
technical terms, see technical terms
Nu (star), 108
Nü-Kua (legendary character), 8, 358
number-mysticism, see numerology
number-theory, see theory of numbers
numbers
negative, 15, 39, 61
theory of, see theory of numbers
types of, 19
very large, 38–9
numerals, 1, 2, 3
Greek, 4
Hebrew, 4
Indian, 4

Index

436

- enumeration systems, 185
 numerical equations, *see* equations
 numerology, 18
- oar in motion (analogy), 356
 observations, *see* astronomical observations
 observatories, *see* astronomical observatories
 octave, 373–4, 385
 odd and even numbers
 associated with the two sexes, 18
 Office of the Grand Revealed Music, 374
Oikoumene (that part of the world inhabitable by man), 253, 256
 oil, 349
 ‘inextinguishable’, 344
 Old History of the Thang Dynasty, *see Chin Thang Shu*
 ‘Old Method Chart of the Seven Multiplying Squares’, 55
 Old Mysterious Books, *see* *Ku Wei Shu*
 Old and New Mathematical Methods, *see* *Kokon Sampō-ki*
 ‘Old Quarter-Remainder Calendar’, 133
 Omei, Mt, 247
 ‘Omen text’, 223
 Omens, 111, 201–2, 203, 207
 Omissions from Previous Pharmacopoeias, *see* *Pén Tshao Shih I*
 On the Armillary Sphere, *see* *Hun I*
 On Inkstones, *see* *Yen Shih*
 On Maps and Books, *see* *Thu Shu Pien*
 On the Use of the Calculating-rods, *see* *Tshê Suan*
 opposability, method of, in Chinese astronomy, 91, 95
 optical instruments, 360
- optics, 328, 344, 347, 349ff
 Arabic, 356
Optics (Ptolemy), 352
 oracle-bones, 1, 2, 3, 4, 6, 36, 101, 103, 104, 128, 133, 183, 184, 193, 194, 197, 204, 205, 206, 224, 227, 282, 299, 308
 ‘orbits’ of the sun, moon, planets and fixed stars, 190
 orchestras, 372
 order, concept of, 63, 330
 ordnance surveys, 280
 Ordos Desert, 247
 ore beds
 signs of, 313
 formation by the circulation of ground waters, 313, 314
 ores, 260, 306, 323
 generation of, 309
 organic conceptions, 67, 325
 organic naturalism, 200, 236
 organic world-view, 323, 326, 328, 329, 364, 366
 Orion, 93, 101, 108, 124
 orrery, 164
 Ortelius, Abraham (sixteenth century A.D.), 259, 282
 outflow clepsydra, *see* clepsydras
 overflow tank, 151, 154, 156
 oxides, 322
 oyster shells, 290–1, 348
 oysters, 359
- Pacific Ocean, 222, 223, 318
 ‘packing’ theory, 60
 paddle-wheel, 230
 Painted Basket tomb, *see* tombs
 painting, 286ff, 314
 technical terms, *see* technical terms
 ‘Palaces’ of the lunar mansions, 80

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

437

- palaeontology, 290, 296, 299
- Palembang, 270
- Palestine
- map of, 273
- Pan*, 282
- Pan Chao (sister of Pan Ku, c. A.D. 120), 44
- Pan Ku (historian, c. A.D. 120), 44
- pan-pipes, 369
- Pao Chang Shih (imperial astrologer), 76
- Pao Chhi-Shou (nineteenth-century scholar), 22, 24
- Pao Phu Tzu* (Book of the Preservation-of-Solidarity Master), 311, 312
- paper
- sizing of, 315
- paper-folding, 46
- Pappus (fourth century A.D.), 341
- parables, 334
- parabola, 43, 58
- Paradise, 254
- paradoxes, 59
- Taoist, 16
- parallelograms, 43
- parallels, 253, 283
- Parhelia, 227, 229
- Paris Observatory, 72
- Parmenides of Elea (fifth century B.C.), 90
- Pascal, Blaise, 54
- Pascal's triangle, 16, 54ff, 61
- peach-trees (*Prunus persica*), 223
- pearls, 359
- Pearls recovered from the Red River, see *Chhih Shui I Chen*
- peat, 292
- Pegasus, see Ting
- pei*, see gnomon
- Pei Lin Museum, Sian, see Sian
- Pei Shih Chi* (Notes on an Embassy to the North), 250
- Peking, 17, 136, 137, 167, 215, 219
- Altar of Heaven, 112
 - Astronomical Bureau, 208
 - embassy to (1656), 215
 - Imperial Palace, 110
 - Observatory, *see* astronomical observatories
 - Temple of Heaven, 112
- Pén Tshao Kang Mu* (The Great Pharmacopoeia), 294, 297, 298, 306, 310, 312, 344
- Pén Tshao Shih I* (Omissions from Previous Pharmacopocias), 357
- Pén Tshao Thu Ching* (Illustrated Pharmacopoeia), 311, 312
- pendulums, 302–5
- pentatonic scale, *see* scales
- penumbra, *see* umbra and penumbra
- percussion instruments, 370
- perfection of the heavens, *see* celestial perfection
- periodical cataclysms, *see* cyclical world catastrophes
- permutations and combinations, 57–8
- 'perpetual lights', 158
- Perseid meteors, 210
- Persia, and the Persians, 17, 204, 227, 270, 305, 315, 384
- astronomy, 45, 81, 82, 100
 - expedition to, 250
 - Marāghah Observatory, *see* astronomical observatories
 - mathematics, 17
- Persian Gulf, 236, 257, 270, 271
- Persian merchants, 186
- Peru, 28
- petrifaction, 296, 307
- petroleum, 295
- phallic symbolism, 160
- Phan Ang-Hsiao (geographer, A.D.

Index

438

- 1300), 251
- pharmaceutical natural histories, 297, 299, 309, 310, 313, 317
- pharmacists, 333
- pharmacology, 313, 317, 366
- pharmacopoeia of the Heavenly Husbandman, see *Shen Nung Pên Tshao Ching*
- Phei Hsiu (cartographer, A.D. 224–271), 261, 262, 263, 267, 270, 274, 276, 279, 280, 283
- Phêng Chheng (Astronomer-Royal, eleventh century A.D.), 77, 296
- phenomenalism, 224, 232
- Phin-Yang, Shansi, 167
- phoenix
 - bronze, 230
 - legend, 317
- phosphorescence, 347, 348
- phosphors, 348
- phosphorus, 347
- physical geography, see geography
- physics, 60, 325ff, 334
- physiology, 328
- pi* emblems, 159ff, 164, 357
- Pi (hsiu), 95, 124
- pi (π), value of, 11, 12, 42–3
- Pi Hung (painter, A.D. 767), 296
- Pi Nai Shan Fang Chi* (Pi Nai Mountain Hut Records), 22, 24
- Pi Shu Lu Hua* (Conversations while Avoiding the Heat of Summer), 223
- piao*, see gnomon
- Piao ('The Spoon'), 92, 93
- pictographs, 1, 194
 - of counting-rods, 3
- Pictures of Objects mentioned in the Six Classics, see *Liu Ching Thu*
- Piedra de ijada* (jade), 317
- Pien Kang, 133
- piezoluminescence, 347, 348
- piling-up method, 40–1, 59
- Piling up Powers and Unlocking Coefficients, see *Ju Chi Shih So*
- 'piling up the rectangles', 8
- pine-forest stone, see *sung lin shih*
- pine-trees
 - petrification of, 296
- pine-wood, 295
- pinhole, 137–8, 351, 354, 356, 362
- pipes (musical instruments), 368, 371
- pirates, 246
- piston-bellows, 384
- pitch, 37off
 - measures of (lü), 380
- pitch-pipes, 367, 375, 380
 - standard, 375, 380
- place-names, 270, 273, 274
- place-value, 3, 4, 24, 26, 36–7, 61
 - decimal, 5, 36
 - subtractive, 5
- plane areas, 41, 42, 59
- plane trigonometry, see trigonometry
- planetary cycles, 193, 194
- planetary 'general conjunction' theory, 193, 194
- planetary motions, 187ff, 212
 - geometrical schemes of, 221
- planetary occultations, 194
- planetary paths, geometrical model of, 184
- planets, 76, 88, 90, 125, 198, 211
 - associated with the Five Elements, 187
- conjunctions of, 194
- erroneous Indian theory of two invisible planets, 90
- general conjunction of, 193
- movement of, 68, 80, 81, 88

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

439

- periods of revolution, 183
- reflected light of, 90
- tables of future planetary positions, 81
- planispheres, 111, 112, 113, 115, 119, 123, 125, 126, 127
 - Korean, *see* Korean planisphere
- plants, 241, 309
 - drugs, *see* drugs
 - as indications of ore deposits, 323–4
- Plato, 85, 329
- Pleiades, 101, 102, 104, 109
- Pleistocene, 299
- Pliny (first century A.D.), 241, 315
- Plough, 93, 108, 109, 125
- plumb-line, 275, 276, 330
- plurality of worlds, 87, 214, 215
- Plutarch, 317, 364
- Plutonian theories, 286
- pneuma, 328
- pneumatic theories, 301, 306
- Po-Ssu, 315
 - Po Wu Chi* (Record of the Investigation of Things), 295, 348, 359
- Po Yü (optician, seventeenth century), 361
- poem, on bronze mirror, 105, 140
- poets, 322
- pointer-reading devices, 230
- polar axis, 84, 85, 88, 181
 - inclination of, 83, 85
- polar regions (celestial), 123
- Polaris, 112
- Pole Star, 7, 76, 87, 94, 101, 108, 112, 115, 126, 160, 170
- pole stars, 112ff, 117, 271
- poles (celestial) 72, 83–4, 85–6, 91, 92, 103, 112, 113, 119
 - inclination of, 84
- north, 69, 113, 159, 160, 181
- position of the true pole, 162
- south, 70, 121, 181
- shifting of, 108
- political dominance and technology, 217
- political trends, and star-maps, 127
- politics and astronomy, 194, 200, 205
- Polo, Marco, 250, 346
- polygon, 43, 58
- Pompeii, 357
- pontoons, 337
- population statistics, 282
- pores, 314
- della Porta, 361
- portolans, 258, 259, 270–1, 273–4, 280, 285
- Portuguese, 149, 321
- Poseidonius of Apameia (c. 90 B.C.), 236
- positive and negative, in Nature, 231
- positive numbers, 15
- powders, 309
- powers of ten, 331
- Poyang Fu, 300
- precession of the equinoxes, *see* equinoxes
- Precious Mirror of the Four Elements, *see* *Ssu Yuan Yü Chien*
- Precious Secrets of the Realm of Kêng and Hsin, *see* Kêng Hsin Yü Tshê
- precious stones, *see* gems
- precipitation (meteorological), 224ff, 314
- prediction, *see* prognostication
- Preface to Diagrams of the Tides, *see* *Hai Chhao Thu Hsü*
- prehistoric monsters, 299
- printing, 63, 78

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

440

- colour block-, 290
- of mathematical works, 3, 13
- of star-maps, 123
- Prodromus* (Stensen), 286
- prognostication, 68, 76, 173, 199, 305, 367
 - by thunder and lightning, 232
- progressions, 18, 56–7
 - arithmetical, 9, 15, 56, 57
 - geometrical, 9, 56
- progressive approximation to a true description of reality, 79
- projectiles, 341, 342
- 'projection' for describing a spherical surface on a flat sheet, 253
- proof, absence of the idea of, in Chinese mathematical thought, 62
- prospecting
 - bio-geochemical, 323–4
 - geo-botanical, 323–4
 - geological, 322–3
- proverbs, 223, 230
- Pseudo-Plutarch (*c.* A.D. 220), 312
- Ptolemy (second century A.D.), 87, 117–18, 132, 196, 200, 252, 253, 254, 256, 259, 262, 271, 273, 274, 283, 352
- pu* (resonance period), 192, 193
- Pu Thien Ko* (Song of the March of the Heavens), 81
- public finance, 65
- pulley, 331, 332
- pump-drill, 332
- pumps, 384
 - centrifugal, 65
- Purchas his Pilgrimes*, 268
- 'Purple Forbidden Enclosure', 113
- Purple Mountain Observatory, *see* astronomical observatories
- putrefying substances, and bioluminescence, 347
- 'Puzzle of the Chinese Rings', 46
- puzzles, 45–6
- pyramid, 42, 59
 - spherical, 44
- Pythagoras and Pythagoreans, 18, 252, 365, 373, 374, 385
- Pythagoras' Theorem, 7, 41, 61
- Pythagorean form of the multiplication table, 26
- Pytheas, 132
- al-Qazwīnī, al-Mustaufī (1281–1349), 273
- quadrant, 134, 160, 218, 219
- quadrant altazimuth, 219
- quadratic equations, *see* equations
- quartz, 322, 357
 - dark glasses of, 361
- quartz sand, 321
- quicksands, 293
- quipu*, 28
- quotient, 25
- rabbit in the moon, 212
- races, timing of, 151
- radiant energy, 367
- rain, 222, 223, 224, 306, 307, 366, 368
 - 'the *chi* of earth', 224
 - forecasting, 226–7
 - 'originates in the earth and rises from the mountains', 225
- rain-dragon, 227
- rain-gauges, 227, 305
- rain-making dances, 368
- rainbows, 227, 366
 - technical term, *see* technical terms
- Ras Shamra alphabet, 185
- al-Rashīd, Harūn (Caliph), 271
- realgar, 307
- rebellions, 62, 78
- Record of the Investigation of

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

441

- Things, see *Po Wu Chi*
- Record of a Journey to the West, see *Hsi Yu Lu*
- Record of Rites, see *Li Chi*
- Record of Rites compiled by Tai the Elder, see *Ta Tai Li Chi*
- Record of the Rites of Chou, see *Chou Li*
- Record of the Rites of Tai the Younger, see *Hsiao Tai Li Chi*
- Record of Ritual Music and Dance, see *Yo Chi*
- Record of the Thirteen Provinces, see *Shih San Chou Chi*
- records
- accuracy of, 200ff
 - astronomical, see astronomical records
 - of customs and products, 246
 - of earthquakes, 300
 - meteorological, see meteorological records
- Records of Leisure Hours, see *Hsia Jih Chi*
- Records of the Lineage of Buddha and the Patriarchs, see *Fo Tsu Thung Chi*
- Records of Military Expeditions, see *Shu Chêng Chi*
- Records of the Source of the (Yellow) River, see *Ho Yuan Chi*
- Records of the Unworldly and the Strange, see *Chhing I Lu*
- rectangles, 7, 8, 40
- inscribed within a circle, 60
 - rectangular, grid, see grid system
- 'Red Road' (the ecliptic), 125
- Red Sea, 257, 271
- reed-organ, 369, 371, 384
- reeds (in musical instruments), 384
- reflected light (of moon and planets), 90, 197, 327
- reflections
- multiple, 354
- Reformation, 65
- refraction, 352
- Regiomontanus, see Müller, Johannes
- relief maps, see maps
- reliefs
- Han dynasty, 121, 139
 - Hsiao Thang shrine, 139, 141
 - Wu Liang tomb-shrines, 8, 101, 102, 139, 141
- religious cosmography, see cosmography
- remainder, 24, 37
- Renaissance, 39, 44, 61, 63, 65, 68, 117, 127, 134, 203, 217, 221, 223, 231, 236, 245, 249, 259, 275, 282–3, 285, 309, 317, 325, 334, 341, 343
- Reorganised Pharmacopoeia, see *Chêng Lei Pên Tshao*
- de Reparaz-Ruiz, 258
- Report of an Investigation for the Measurement of the Sun's (Solstitial) Shadow, see *Chou Kung Tshê Ching Thai Thais Chha Pao Kao*
- 'reprimands from heaven', see 'heavenly reprimands'
- reptiles
- fossilised, 299
 - resonance, 367
 - acoustic, 364, 371, 372, 374, 383
- resonance periods, 191ff
- technical terms, 192–3
- rest and motion, see motion and rest
- Restored True Chart of the Great-Ultimate Chaos-Origin, see *Hsiu Chen Thai Chi Hun Yuan Thu*

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

442

- retrograde motion, 187, 189, 190
 Rhodes, 253
 rhumb-lines, 258, 259, 271, 283
 'rhyme-tables', 44
 Ricci, Matthew, 68, 79, 174, 213,
 215, 282, 285
 rice, 282
 right-angled triangles, *see* triangles
 right ascension, 71, 72, 95, 104, 108,
 118, 130, 161, 163, 171
 right ascension and declination
 system, 117, 164, 165, 213
 'Right Pivot', 113
 Right Teaching for Youth, *see*
 Chêng Mêng
 rim-ocean, 83
 'Ring of Linked Rings' (puzzle), 46
 ring-test, for lacquer, 343
 ringing-stones, 368, 371, 372
 rites and ceremonies, 75, 79
 funeral, 151
 imperial temple, 159
 for each lunation, 186
 ritual objects, 159, 164, 241
 rivers, 245, 246, 247, 256, 292, 318
Rivers and Mountains (pseudo-
 Plutarch), 312
 road guides, 251
 'roads' of the planisphere, *see*
 Three Roads
 rock-crystal, 356–7
 bottles of, 318
 lenses of, 360, 361
 used for observation of the sun,
 212
 rock-salt, 307
 rocks, 286, 290, 306, 311
 rod-numerals, 1, 2, 3, 4, 24, 25, 26,
 28, 30, 36, 56
 Roger II (Norman king of Sicily),
 273
 Roman 'indiction' cycle, 193
 Roman Empire, 381
 Roman legionaries, 260
 Roman Syria, 152, 283, 316
 Romans, 35, 357, 370
 place-value system, 5
 Rome, 190, 239, 275
 root extraction, 24, 26, 27, 37, 51,
 56, 61
 rotary bow-drill, 332
 rotary disc knife, 318
 rotting, *see* putrefying substances
 Royal Ontario Museum, 142
 Royal Society of London, 217–18
 Rule of False Position, 9, 49, 61
 'Rule of Mixtures', 15
 Rule of Three, 9, 61
 Ruscelli (A.D. 1561), 254
 Russia, 384
 Rustic Notes from Hsiang-shan, *see*
 Hsiang Shan Yeh Lu
 'sabbatical' cycle, 173
 sacrifices, 79, 160, 185
 human, 75
 sages, recurrence of the birth of, 194
 Sagittarius, 123
 Sahara, 270
 sailing-carriage, 387
 sailing-directions, 270
 sailors, 283, 336
 sal ammoniac, 314
 salamander legend, 317
 Salamis
 marble 'abacus' at, 35
 salt, 309
 monopoly, 337
 rock-, 307
 salt pans, 309
 saltpetre, 314
 salvage operations, 337
 Salween (river), 252
 Samarkand, 26

Index

443

- S**amarkand observatory, *see as-tronomical observatories*
San Fu Huang Thu (Description of the Palace of Chhang-an), 230
 San Kuo (period), 7, 11, 48, 56, 155, 230, 245, 261
San Thung (Three Sequences) calendar, 134, 203
 sand, 306
 abrasive, 318
 and mechanical clocks, 158
 sand dunes, 294
 sand hour-glass, *see hour-glass*
 sandstone, 318
 Sang Chhien (river), 293
 Sang Chhin (first century B.C.), 245
sang thien (Taoist geological technical term), 291
 Sanskit texts, 307
 Sanuto, Marino (cartographer, 1306–1321), 272, 273, 274
 sapping, 383
saros cycle, 203
 Saturn (planet), 187, 188, 194
 Sawaguchi Kazuyuk (c. A.D. 1670), 59
 scales (musical), 370–1, 372, 373, 374, 384, 385
 heptatonic, 372
 pentatonic, 368, 371, 372, 385
 tempered, 385
 Scaliger, Joseph (sixteenth century), 193
 sceptical rationalism, 232
 Scheiner, C., 211, 214
 scholars, 354, 358, 365, 376
 banishment of, 252
 Schreck, Johann, *see Terrentius, Johannes*
 science
 ancient and medieval, 217
 decay of, in the West, 47
 deductive, 62
 experimental method of, 328
 flourishing during the Sung, 81
 standstill during the Ming, 82
 Jesuits and science, 217
 religion and, 217
 science, modern
 development of in Europe, 61, 63, 65, 88, 213, 299, 323, 329
 this development did not occur in China, 63, 65, 325
 universality of modern science, 217
 science and mathematics, 61ff
 science fiction, 214
 scientific method, 217
 scientific theory, lack of, 65
 Scorpio (constellation), 108
 screens, paintings on, 274
 sea-charts, *see mariner's charts, portolans*
 Sea Island Mathematical Manual, *see Hai Tao Suan Ching*
 sea-level, changes in, 292
 Sea Mirror of Circle Measurement, *see Tshê Yuan Hai Ching*
 sea routes, 267
 sea-water, phosphorescence of, 347
 searchlights, 361
 seasonal heat and cold, 88
 seasons, 102, 103, 182, 327, 368, 370, 371
 inequality of, 130, 184
 seaweed, 299
 secrecy, of technicians, 318
 security regulations and astronomical officials, 78, 171
 sedimentation, 289, 293
 seismographs, 301ff
 mercury, 305
 seismology, 261, 300ff
 Seleuceia, 236

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

444

- Seleucus the Chaldean (*c.* 140 B.C.), 236
- Semitic alphabets, 185–6
- series, *see* progressions
- Seven Beguiling Tales, *see* *Chhi Fa*
- 'Seven Subtle Shapes' (puzzle), 46
- Severn (river), 234
- sexagenary cycles, 36, 184ff, 193, 194
- sextant, 134, 135, 218
- La Sfera* (poem, *c.* A.D. 1420), 256
- Shadow-Definer, 137–8
- shadow formation, 350–1
- shadow-lengths, *see* sun-shadow lengths
- shadow-play, 361ff
- shallot, 323
- Shamanism, 65, 366–7, 384
- Shan Chü Hsin Hua* (Conversations on recent Events in the Mountain Retreat), 147, 158, 201, 231
- Shan Hai Ching* (classic of the Mountains and Rivers), 240, 241, 245, 275
- Shan O (A.D. 1059), 246
- Shang (period), 41, 65, 101, 102, 104, 111, 128, 133, 148, 159, 161, 184, 191, 193, 195, 197, 198, 223, 227, 261, 275, 309, 318
- Shang Kao (semi-legendary mathematician), 7
- Shang numeral system, 5, 6
- Shang oracle-bones, *see* oracle-bones
- Shang Shu Wei Khao Ling Yao* (Apocryphal Treatise on the *Historical Classic*; the Investigation of the Mysterious Brightnesses), 172
- Shangtu (Xanadu), 136
- Shansi, 293, 300
- Shao Ong (magician, 121 B.C.), 361–2
- She-thi ('Assistant Conductors'), 109
- shells, 209–1, 299, 353
- like the out-stretched wings of a bird, 297
- Shen (*hsiu*), 93, 95, 101, 108
- Shen Kua (astronomer, engineer and high official, eleventh century A.D.), 11, 30, 45, 57, 59, 60, 77, 92, 115, 123, 127, 147, 210, 227, 233, 236, 278–9, 280, 281, 289, 292–3, 295, 296, 354, 355, 356
- Shen Nung Pén Tshao Ching* (Pharmacopoeia of the Heavenly Husbandman), 293, 309, 310, 312
- Shen Shih (late tenth century), 311
- Shen Tao Ta Pien Li Tsung Suan Hui* (Assembly of Computing Methods connected with the Calendar), 59
- Shen Tso-Chê (writer, *c.* twelfth century A.D.), 38
- Shen Tzu* (The Book of Master Shen), 336
- shēng*, *see* mouth organ
- Shēng-Tao (Taoist, A.D. 466), 347
- Shēng Tu (geographer, early Sung), 266
- Shensi, 293, 300
- shifting sands (*liu sha*), 293
- shih* (instrument), *see* divination board
- shih* (technical term for eclipse), 194
- shih* (radical for all stones or rocks), 308
- Shih Chi* (Historical Records), 28, 80, 92, 187, 188, 202, 300, 361, 374

Index

445

- Shih Chun (official), 76
Shih Ching (Book of Odes), 101, 102, 196, 197, 365
 Shih Hu (emperor of the Later Chou), 349
 Shih Khang (Sung judge, c. A.D. 1117), 361
Shih Lin Kuang Chi encyclopaedia, 153, 154
Shih San Chou Chi (Record of the Thirteen Provinces), 249
 Shih Shen (astronomer, fl. 370–340 B.C.), 80, 85, 104, 115, 130, 165, 180, 183, 188, 192, 197–8
Shih Wu Lun (Discourse on [calendarical] Time), 37
Shih Yao Erh Ya (Synonymic Dictionary of Minerals and Drugs), 310, 312
shih yen (stone-swallows), *see* stone-swallows
 ship
 watertight compartments in, 337
 al-Shirāzī, Qutb al-Dīn (A.D. 1236–1311), 227
 shooting stars, *see* meteorites
Shou Shih Li (Calendar of the Works and Days), 82
 Shou Shih Shih calendar, 134
Shu Chēng Chi (Records of Military Expeditions), 230
Shu Ching (Historical Classic), 73, 74, 75, 102, 104, 159, 195, 238, 240–1, 262, 302, 359
Shu Ching Thu Shuo, 131, 239, 243, 369
Shu Shu Chi I (Memoir on Some Traditions of Mathematical Art), 9, 32, 35, 38, 58, 291
Shu Shu Chiu Chang (Mathematical Treatise in Nine Sections), 4, 13, 227
Shui Ching (Waterways Classic), 245
Shui Ching Chu (The Waterways Classic Commented), 245, 299
 Sian
 Pei Lin Museum, 266
 siege of, 300
 Siberian coast, 241
 sidereal day, 186
 sidereal month, 95
 sidereal period, 190, 193
 sidereal time, and clock time, 152
 sidereal year, 128, 134
 sidereal year fraction, 134, 183
Sidereus Nuncius (Galileo), 215
 ‘sieve of Eratosthenes’, 18
 sight, 352
 sighting board, 276
 sighting-tube, 115, 159ff, 164, 166, 176, 181, 221, 276
 cross-wires in, 278
 mounted on ecliptic ring, 167
 on Su Sung’s clock tower at Khaifēng, 173–4
 signs, law of, *see* law of signs
 silica, 322
 silicon oxide, 357
 silk, 260, 261, 262
 silver, 308, 322, 336
 simultaneous equations, *see* equations
Sinanthropus pekinensis, 299
 sine, 17, 44
 ‘singing sands’, 294
 Sinkiang, 252, 315, 318, 319
 siphons, 151, 152, 154, 155
 Sirius, 91
 sixty-day count, *see* sexagenary cycle
 Sky Measuring Scale, 136
 slate, 318
 sleet, 224

Index

446

- slide-rule, 30, 212
 sliding rods, 30
 Smoke of Hunan Hearths, see
Hsiang Yen Lu
 snow, 224
 melting of, 76
 snow-gauges, 227, 305
 snow-glasses, 361
 So I-Chien (late tenth century), 311
 soapstone, 309
 social distinctions, 13, 342
 social trends, and star-maps, 127
 Socrates, 308
 sodium tetraborate, 317
 Sogdian merchants, 186
 soil
 chemical analysis of, 323
 solar prominences, 204
 solar time, 147, 157
 soldering, 317
 solid celestial spheres, see concentric
 crystalline spheres
 solid geometry, see geometry
 Solinus, Gaius Julius (third century
 A.D.), 240, 241, 245
 solstice-shadow measurements, 129,
 130, 138, 170, 251, 263
 solstices, 75, 76, 104, 109, 128, 129,
 161, 162, 181, 184, 253
 ‘standard’ measurements, 137
 summer, 70, 75, 85, 128, 129,
 130, 133, 137, 138, 144, 162,
 170, 253, 339
 winter, 70, 84, 103, 128, 129, 130,
 133, 138, 144, 162, 170
 Somali Republic, 270
 Song of the March of the Heavens,
 see *Pu Thien Ko*
 St Sophia, Istanbul, 135
 sound, 328, 364ff
 from a bell, 377–80
 due to friction, 382
 human response to, 383
 nature of, 381
 sources of, 368, 370, 371, 375, 383
 variations in, 367, 368
 as vibration, 381ff
 see also acoustics
 sound tables, of Chinese rhymes, 44
 sounds, classification of, 368, 370
 south-east Asia, 4
 south pole (celestial), *see* poles
 (celestial)
 South Seas, 270
 Southern Dipper, *see* Dipper
 Southern Sung (dynasty), 169, 174
 space, 40, 64, 65, 340
 infinite, 86, 87, 213, 214, 221
 movement in, 340
 Spain, 47, 258
 Spanish conquests, 317
 speaking trumpets, 367
 spectacles, 361
 dark, 357, 361
 invention in Europe, 361
Speculum Lapidum (Camillus
 Leonardus), 312
 ‘speculum metal’, 353
 speed and sound, 365
 spherical geometry, *see* geometry
 spherical trigonometry, *see*
 trigonometry
 spherical universe, 88
 sphericity of the earth, 86, 238, 253,
 264–5
 Spica, 95, 109
Spirifer, 297, 298
 Spiritual Constitution of the
 Universe, *see* *Ling Hsien*
 spontaneous combustion, *see*
 combustion
 spring, 95, 102
 Spring and Autumn Annals, *see*
 Chhun Chhiu

Index

447

- Spring Dragon**, 109
- spring tides**, *see* tides
- springs**, 293
- petrifying**, 293
 - hot**, 295
- square (surveyors' instrument)**, 7, 8, 275
- square of a number**, 26
- square roots**, 7, 26
- extraction of**, 26, 27, 37, 56, 61
- Ssu Yuan Yü Chien** (*Precious Mirror of the Four Elements*), 15, 53, 55, 56, 57
- Ssuma Chen** (*Thang scholar*), 367
- Ssuma Chhien** (historian and astronomer, late first century B.C.), 20, 28, 80, 92, 138, 152, 187, 188, 198, 204, 371, 374
- Ssuma Piao** (third century A.D.), 340
- stalactites**, 293, 294
- stalagmites**, 294
- standard measures**, 42, 380
- standard platinum measure**, 129, 331
- 'standard' solstice measurements**, 137
- star catalogues**, 80, 85, 112, 115ff, 221
- date of**, 117
- star charts**, 205
- star lists**, *see* star catalogues
- Star Manual**, *see* *Hsing Ching*
- star-maps**, 115–16, 118, 121ff, 125, 163, 180, 181
- printed**, 123
 - wood block**, 123
- Star Observation Platform**, 136
- star-position measurements**, 180, 181
- star recognition**, Chinese and European contrasted, 119ff
- stars**, 7, 78, 79, 88, 101
- circumpolar**, 68, 72, 73, 84, 86, 91–2, 92ff, 95, 101, 104, 108, 109, 111, 114, 119, 125
 - culmination of**, 92
 - declination of**, 72, 104
 - determinative**, 94, 95, 104, 109, 129
 - fixed**, 88, 90, 92, 264
 - invisible**, 86
 - legend and folklore**, 127–8
 - lucky and unlucky**, 108
 - 'magnitudes' of**, 125, 159, 205
 - motions of**, 118
 - naming of**, 119
 - near the equator**, 68
 - position of**, 71, 76, 172
 - shooting**, *see* meteorites
 - variable**, 204–5
- State organisation**, 197, 199–200
- State-religion, and astronomy**, 75
- steam**, 346, 365, 366
- steam engines**, 346
- steelyard**, 149, 155, 330, 333
- steelyard clepsydra**, *see* clepsydras
- stele**
- in Confucian temple, Suchow**, 125
 - in Confucian temple, Yang-chhêng**, 137
- stellar explosions**, *see* novae
- Steno, Nicolaus**, *see* Stensen, Niels
- Stensen, Niels** (A.D. 1668), 286
- Stevin, Simon** (Flemish physicist, c. 1620), 385, 386, 387
- stimulus diffusion**, 5, 305
- Stoics**, 328, 329
- stone crabs (*shih hsieh*)**, 298
- 'stone hemp'** (asbestos), 317
- stone oysters**, 297
- stone relief**, *see* reliefs
- 'stone serpents'** (*shih shê*), 297, 298

- stone-swallows, 297
 'stone veins' (asbestos), 317
 stones, 306, 307, 311, 312
 distinguished from minerals, 311
 stopwatch clepsydras, *see* clepsydras
 Stories of the Eastern Palace, *see*
 Tung Kung Ku Shih
 Strabo (first century B.C.), 241, 245,
 316, 317
 strain and load, 334
 Strange Things from the Southern
 Borders, *see* Nan I I Wu Chih
 Strange Things in the South, *see*
 Nan Chou I Wu.Chih
 Strangers, hatred and fear of, 242
 string, 317
 String of Pearls on the *Spring and*
 Autumn Annals, *see* *Chhun*
 Chhiu Fan Lu
 Stumpf, Bernard Kilian (Jesuit), 219
 Su Hsun (eleventh century A.D.),
 232
 Su Sung (astronomer, A.D. 1020–
 1101), 81, 123, 126, 127, 167,
 168, 169, 173, 174, 181, 182,
 311, 312, 313
 Su Tung-Pho (poet, eleventh cen-
 tury), 158
 suan (calculation), 3
Suan Fa Thung Tsung (Systematic
 Treatise on Arithmetic), 17, 20,
 22, 29, 32, 34
Suan Hsüeh Chi Mēng (Introduc-
 tion to Mathematical Studies),
 15, 39
 subtraction, 4, 23, 24
 Suchow, 246, 361
 Confucian temple, 125, 126
 Sui (dynasty), 78, 81, 155, 323, 346
Sui Shu (History of the Sai
 Dynasty), 138, 180, 246
 Sulaimān the Merchant, 274
 sulphur, 295, 348
 sulphur matches, 346
 Sumatra, 4
 Sumerian arithmetic, 36
 summation of a series, 12, 51
 summer, 75, 102
 sun
 angular motion of, 184
 annual movements of, 88
 apparent movement of, across the
 sky, 19, 50, 69, 70, 83, 84, 147,
 157
 changes in apparent size of, 89–
 90, 231
 crow in the, 212
 declination of, 130
 determination of position among
 the stars, 91, 92
 distance from the earth, 89
 eccentric motion of, 184
 illumination of the earth's surface
 by, 84
 path across the constellations of
 the zodiac, 68
 position of, 172
 rites to prevent the standstill or
 death of, 75
 shape of, 199
 unusual appearances of, 80
 'veilings' of, 198
 Yang nature of, 86, 90, 198
 sun-centred universe, *see* Coper-
 nicus and Copernicanism
 Sun Chhüan (first emperor of the
 Wu State), 262
 sun-shadow lengths, 7, 91, 92,
 128ff, 136, 145, 170, 253, 263,
 331, 339
 moment of minimum and
 maximum shadow length, 133
 south of the Tropic of Cancer,
 133

Index

449

- sun-spot cycle, 202, 224, 225
 sun-spots, 67, 198, 211–2, 221
 technical terms, *see* technical
 terms
Sun Tzu Suan Ching (Master Sun's
 Arithmetical Manual), 3, 4, 5,
 11, 36, 49, 56
Sun Yen-Hsien, 227
Sun Yün-Chhiu (optician, seven-
 teenth century), 361
 sundial, 138ff, 148, 157, 158, 159,
 212
 equatorial, 145, 147
 graduated on both sides, 145
 most primitive, 144
 portable, 145, 146, 148, 151
Sung (dynasty), 11, 13, 20, 26, 65,
 67, 81, 158, 159, 245, 278, 300,
 311, 327, 333, 348, 356, 361
 algebra, 17, 26, 39, 49, 52, 54, 56,
 62
 astronomy, 79, 80, 81, 112, 167,
 186, 202, 203
 clepsydras, 151, 152, 154, 156
 geography, 246, 249, 250, 265–6
 geology, 292, 295, 296, 297
 maps, 265ff, 281
 mathematicians, 4, 5–6, 15, 51,
 60, 63
 meteorology, 223, 226, 227, 236
Sung Chun (*fl.* tenth century A.D.),
 249
Sung Hui Yao (History of the
 Administrative Statutes of the
 Sung Dynasty), 206–7
sung lin shih (pine-forest stone), 296
Sung Shu (History of the (Liu)
 Sung Dynasty), 347
Sung Ying-Hsiang (A.D. 1637), 319
 sunglasses, 357
 sunset mists, 231
 Superintendents of Mining, 260
 supernovae, 204–6
 'supporting pillar' (opposing force,
 Mohist technical term), 340,
 341
 Supreme Ultimate Grand Origin,
 194
 surds, 39
 surface-films, 343
 surface tension, 343
 surfaces
 smooth, 343
 surveying and surveyors, 9, 11, 12,
 41, 43, 159, 212, 275ff
 suspension, 332
 swallows, 297
Syene, 253
 Sylvester, James (mathematician,
 nineteenth century), 16
 symbolic animals, *see* animals
 symbolic correlations, 105, 308,
 329
 sympathetic magic, 367, 368
 sympathetic resonance, *see* reson-
 ance, acoustic
 synodic month, *see* lunation
 synodic periods, 80, 187, 193
Synonymic Dictionary of Minerals
 and Drugs, *see* *Shih Yao Erh
 Ya*
Syria, 51, 152
 Syrian traders, 295
 Systematic Treatise on Arithmetic,
 see *Suan Fa Thung Tsung*
Szechuan, 246, 247, 295, 296, 315,
 322
 T-square, 7
 TLV-board, 139, 141
 TLV markings, 139, 144
 TLV mirrors, *see* mirrors
 T-O maps, *see* maps
Ta chio (star), 109

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

450

- Ta hsing, *see* Great Star
 Ta huo (star), 108
 Ta Lung Chhiu, 292
 Ta Ming calendar (A.D. 463), 134
Ta Tai Li Chi (Record of Rites compiled by Tai the Elder), 21
 Ta Yen calendar, 134
Ta Yen Li (Great Extension Calendar), 81
 Table of Meridian Passages for 100 Stars . . . *see* *Hsien-Fêng Yuan Nien Chung Hsing Piao*
 tables of latitude and longitude, 253
 tabulation systems, 44, 56
 Tai Chen (scholar and mathematician, eighteenth century), 12, 30
 Taihu, Lake, 248
tan (term in alchemy and mineralogy), 309
 Tan (prince of Yen, 240–226 B.C.), 280
 Tanaïs (Don) river, 256
 ‘tangrams’ (puzzle), 46
 tanning, 314
 Tao of Nature, 65
Tao Tê Ching (Canon of the Virtue of the Tao), 28, 223
 Taoism and Taoist, 5, 9, 58, 60, 62, 63, 67, 89, 223, 264, 274, 275, 281, 285, 290, 291, 292, 293, 307, 309, 334, 346, 349, 354, 358, 359, 365
 and astronomy, 87, 88, 199
 Taoist astronomical flags, 121, 122
 Taoist ‘emptiness’, *see* ‘emptiness’
 Taoist hermits, 293
 Taoist paradoxes, *see* paradoxes
 Taoist romance, 265
 Taoist temples, *see* temples
 Tarim basin, 251
 taxation, 9
 Te-hsing (earth-shine), 204
 tea-ceremony, 346
 technical education, 171
 technical terms
 abacus, 30
 acoustics, 381
 algebra, 15, 48
 astronomy, 108, 187, 189, 197
 aurora borealis, 233
 bells, 376–80
 celestial globe, 180
 clouds, 226
 comets, 208
 corona, 204
 cube, 26
 division, 26
 eclipses, 194, 202, 203
 fractions, 24
 geology, 291
 glass, 358
 haloes, 226, 228
 Jupiter-stations, 191
 lenses, 360–1
 mathematics, 24, 25, 52
 meteors and meteorites, 210–11
 motion (Mohist), 341
 novae, 205
 painting, 290
 rainbow, 227
 resonance periods, 192–3
 square of a number, 26
 square roots, 26
 sun-spots, 211
 telescope, 216
 warp and weft, 262
 weighing, 336
 technicians, 13, 65, 88, 318, 336, 354, 359
 technology, 134, 138, 217, 342, 344
 telescope, 164, 211, 212, 215, 216, 221, 361
 clock-driven, 174

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

451

- mountings, 164, 176, 179
 as gunnery sighting device, 361
 technical terms, *see* technical terms
Tempel's Comet, 210
temperature, 224
temples
 Chieh-thung Ssu, Chiangsu, 363
 Confucian, 125, 137
 Hun-Thien (Armillary Sphere), 127
 imperial, 159
 Lao Chun Tung, Chungking, 122
 'perpetual lights' in, 158
 Taoist, 121
 Temple of Heaven, Peking, 112
 Tunhuang cave-temples, 4
 Yüeh-Ya Chhuan, 294
Ten Thousand Infallible Arts of the Prince of Huai-Nan, *see* *Huai Nan Wan Pi Shu*
tēng ('rank'), 4
Tēng Ai (general of the Wei State), 276–7
tension, 334, 343
terra cotta template, 129
Terrentius, Johannes (Johann Schreck), 216
terrestrial globe, 175, 178
textile production, 56, 315
Thai, Lady of, 260
Thai Pai Yin Ching (Manual of the White and Gloomy Planet of War), 276
Thai-Phing Huan Yü Chi (General Description of the World in the Thai-Phing reign-period), 249
Thai-Phing reign-period Imperial Encyclopaedia, *see* *Thai Phing Yü Lan*
Thai Phing Yü Lan (Thai-Phing reign-period Imperial Encyclopaedia), 265
Thai Shan, 225, 265
Thai-Shih (reign-period), 347
Thai Shih Ling (Astronomer-Royal), 77
Thai Yang (the sun), 90
Thai Yin (the moon or 'counter-Jupiter'), 90, 190, 191
Thailand, 270
Thales of Miletus, 197
Than Chhiao (Taoist, tenth century A.D.), 354, 360–1, 382–3
Thang (dynasty), 11, 13, 16, 17, 30, 38, 51, 65, 78, 81, 105, 121, 127, 134, 151, 202, 236, 242, 245, 249, 250, 251, 264ff, 291, 295, 296, 310, 337, 339, 343, 349, 356, 357, 360, 362, 367, 376
Thang manuscript, 4
Thang Mêng (A.D. 190), 295
Thang Shen-Wei (pharmaceutical naturalist, c. A.D. 1115), 312
Thang Shun-Chih (military engineer and mathematician, 1507–1560), 17
Thao Ku (c. A.D. 950), 346
theodolite, 276
theology, 328
Theon of Smyrna (c. A.D. 130), 22
Theophrastus (372–287 B.C.), 311, 312
theoretical geometry, *see* *geometry*
theory of numbers, 9, 18, 329
thermal science, *see* *heat*
thermo-luminescence, 347
Thien chi (star), 94
Thien Hsüeh Hui Thung (Towards a Thorough Understanding of Astronomical Science), 218
Thien Kung Khai Wu (Exploitation of the Works of Nature), 319

Index

452

- Thien shu (Celestial pivot, star), 126
- Thien Thung-Hsiu (Taoist, c. A.D. 742), 383
- thien yuan* (unity symbol), 15
- Thien Yuan notation, *see* notation
- Thien yuan shu algebra, 54
- Thien Yuan Yu Li Hsiang I Fu* (Essays on (Astronomical and Meteorological) Presages), 228, 229
- Things Seen and Heard on My Official Travels, *see* *Yü Huan Chi Wén*
- Three Kingdoms (period), 155
- Three Roads, 111, 112, 119
- thu* (maps or pictures), 237
- thu shu* (maps embellished with drawings), 260–1
- Thu Shu Chi Chhêng* encyclopaedia, 189, 211, 216, 224, 250, 277, 286, 287, 289
- Thu Shu Pien* (On Maps and Books), 274
- Thuban, 112
- thunder, 231–3, 297, 307, 308, 366, 368, 382, 383
to make a sound like —, 346
- thunderbolts, 307
- thung* (resonance period), 192–3, 194
- Ti Chih Thu* (Map of the Earth), 264
- Tibet and Tibetans, 191, 251, 272, 274, 315, 317, 361
- Tibetan plateau, 251, 252
- tidal bores, 233, 234, 235
- tide-tables, 236
- tides, 88, 222, 233–6, 245, 293, 328, 342
combined action of sun and moon, 236
- dependence on the moon, 235, 236
- gravitational explanation of, 236
- ncap, 234, 236
- spring, 234, 236
- tiger-box (yü), 369, 371
- Timaeus* (Plato), 85
- timbre, 365, 368, 370, 380, 382
- time, 65, 87, 340
equation of, *see* Equation of Time
instants of, 326, 334
measurement of, 148–9, 151, 152, 157–9
- time-keeping, 81, 138, 142–3, 149, 153, 158, 172, 174
mechanical, 172
- tin, 323, 353
- tincal, 317
- tinder, 346, 353, 359
- Ting (Pegasus), 101
- Ting Chhü-Chung (mathematician, nineteenth century), 53
- Ting Huan (mechanician, c. A.D. 180), 364
- To* (upward-facing clapperless hand-bell), 378
- toad-grease, 321
- Tokyo University, 302
- tomb cupolas, 121
- tombs
of Chhin Shih Huang Ti, 282
Egyptian, 148
Han, 260, 263
Painted Basket tomb, 263
of the son of the Lady of Thai, 260
substitution of glass for jade and bronze objects in, 359
of Wang Hsü, 263
- tools
rotary, 318, 320
- Topographica Hibernica* (Giraldus

- Cambrensis), 236
 topography, 241, 242
 local, 246ff, 264
 special terms, 252
 topology, 46
 torches, 349, 350
 torquetum, 174–5, 176, 177
 equatorial, 176, 177, 178
 Tou Shu-Mêng (*c.* A.D. 770), 236
 Tou Yen (astronomer, *c.* A.D. 955),
 194
 touchstone, 322
 Towards a Thorough Understanding of Astronomical Science,
 see *Thien Hsiüeh Hui Thung*
 Tower of the Winds, Athens, 230
 trace-elements, 323
 trade and traders, 245, 283, 295,
 316, 318, 344, 358
 trade-routes, 246
Traité du Triangle Arithmetique
 (Pascal), 54
 trans-polar flying, 285
 transmissions and cultural contacts,
 60–1, 147, 175–6, 226, 242,
 250, 283, 285, 318, 353
 Arabic–European, 49
 Babylonia–China 119
 Babylonia–Greece–China, 84
 Babylonia–India–China, 47
 Babylonian–Hellenistic, 47
 Byzantines–Europe, 22
 China, India and the Arabs, 69,
 285
 China–Roman Syria, 152
 Chinese–Arabic, 43, 138, 147,
 170, 270, 271, 276
 Europe–China, 193, 279, 328
 Greece–China, 116, 166, 241
 India–China, 90, 111, 166
 Jesuit, 212, 215, 218–9
 Persia–Babylonia–China, 81, 270
 Russia–China, 384
 Samarkand–Europe, 26
 trans-Asian, 186
 Turkish–Chinese, 270
 travel and exploration, *see* expeditions and voyages
 treadle-driven rotary steel knife, 318
 Treatise on Architectural Methods,
 see *Ying Tsao Fa Shih*
 Treatise on Armament Technology,
 see *Wu Pei Chih*
 Treatise on Astronomy in Six
 Classics, *see* *Liu Ching Thien*
 Wen Pien
 triangles, 58, 65
 circles inscribed in, 15, 16
 right-angled, 7, 9, 16, 41, 44, 129,
 262, 277, 278, 279
 tribal peoples, 241, 242, 246
 Ainu, 241
 Chhi-tan Tartars, 227
 Chin Tartars, 167, 169
 Maoris, 317
 Turkic peoples, 191
 Yüeh-chih, 318
 tribolites, 229
 triboluminescence, 347, 348
 tribute and tribute-bearers, 242,
 243, 267, 297
 Tribute of Yü, chapter of the *Shu*
 Ching, *q.v.*
 trigonometry, 44ff, 61
 plane, 45
 spherical, 12, 17, 44, 45
 trigrams, 58, 105
 Tropic of Cancer, 133
 tropic year, 128, 133–4, 182, 186,
 190, 191, 193
 tropic year fraction, 134, 183
 Troy, siege of, 91
 truth, Chinese and Greek attitudes
 contrasted, 63

Index

454

- Tsang Min (second century A.D.), 244
tsê (late afternoon), 128
 Tsêng Kung-Liang (encyclopaedist, A.D. 1044), 276
 Tsêng Min-Hsing (son or grandson of Tsêng Nan-Chung), 145, 297
 Tsêng Nan-Chung (astronomer, twelfth century), 145
 Tshai Chün-Mo, 296
 Tshai Yuan-Ting (philosopher, A.D. 1135–1198), 375
 Tshai Yung (astronomer, A.D. 178), 81, 82, 130, 132, 133, 169, 253, 261
Tshan Thung Chhi (The Kinship of the Three), 315
Tshê Suan (On the Use of the Calculating-rods), 30
Tshê Yuan Hai Ching (Sea Mirror of Circle Measurement), 15
Tshung (ancient ritual object of jade), 159ff, 163
Tso Chuan (Master Tsochhiu's Enlargement of the Spring and Summer Annals), 3, 128, 200, 204, 241, 366
 Tsou Yen (naturalist philosopher, late fourth century B.C.), 212, 308, 367
 Tsu Chhung-Chih (mathematician, A.D. 430–501), 11, 43, 133, 134, 183, 184
 Tsu I-Chi, 15, 16
 Tsu Kêng-Chih (mathematician and astronomer fifth century A.D.), 43, 82, 129
 Tsu-Khao (*fl.* A.D. 1119–1125), 312
tsung hêng thu (vertical horizontal diagrams), 22
tsung numerals, 3
 Tu Fu (scholar and poet, eighth century), 46
Tu Hsing Tsa Chih (Miscellaneous Records of the Lone Watcher), 145
 Tu Shih (leading expedition to investigate the source of the Yellow River, A.D. 1280), 251
 Tu Wan (Sung scholar), 297, 311, 312, 313
Tuan (geometrical point), 326
 Tuan Chhêng-Shih (*c.* A.D. 800), 323
 Tun Li-Chhen (1900), 362, 364
 Tung Chung-Shu (second century B.C.), 364, 371, 372, 381
 Tung Fang constellation, 160
Tung Kung Ku Shih (Stories of the Eastern Palace), 281
 tung-oil, testing of, 343
 Tung Tso-Pin *et al.*, 135, 137
 Tungfang Shuo (advisor to Han Wu Ti), 292
 Tunhuang, 294
 manuscript star-map, 121, 123, 124
 Tunhuang cave-temples
 Thang manuscript, 4
 Tunhuang region, 321
 tuning, 364, 372, 373, 374ff, 385
 by ear, 373
 by means of hydrostatic vessels, 375–6
 tunnelling, 383
 Turin manuscript, 254
 Turkey, 270
 Turkic peoples, 191
 turtle, 20
 al-Tüsî, Naṣîr al-Dîn (A.D. 1331), 272, 273
 Tuttle's Comet, 210
 'two earths' theory, 85

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

455

- typhoons, 223
- tzolk'in* (260-day religious year of the Mayas), 186, 193
- Tzu-liu-ching brine-field, 310, 317
- Ulugh Beg, 133, 135
- umbra and penumbra, 350
- underground combustion of alum and sulphur, 295
- underground explosions, 323
- underground streams, 293
- university degrees, 78
- uranographic models, 180ff
- urine, 315
- Ursa Major, *see* Great Bear
- Ursa Minor, 113, 160, 163
- Ussher, Archbishop, 194
- vacuum, 341, 346
- valve 'clack', 384
- vases of diorite, 318
- Vega, 108, 109, 112, 122
- Venus (planet), 187, 188, 194, 202, 205, 211
- Verbiest, Ferdinand (Jesuit), 218, 219
- Vermilion Bird (southern 'Palace'), 101
- vertebrate animals, *see* animals
- Vesconte portolan, 259
- vibrating strings, 385
- vibration, 328, 376, 381ff
detection of, 383–4
- Vièlè, François (mathematician, A.D. 1580), 48
- Vietnam, 133, 339
- viscosity, 152
- viscous drag, 88
- vision, theory of, *see* optics
- vitriol, 306
- Vitruvius (*c.* 27 B.C.), 381, 384
- voice, 381
- volcanic intrusions, 286
- volcanoes, 295, 300, 315
- volumes, measurement of, 13, 59
- vomiting, 315
- voyages, *see* expeditions and voyages
- Waghenaer (sixteenth century A.D.), 259
- Wallis, John (1685), 46
- Wan Chhen (fourth century A.D.), 242
- Wang An-shih (reforming minister of State, eleventh century A.D.), 127
- Wang Chen-To, 303, 305
- Wang Chhung (first century A.D.), 86, 198–200, 212, 225, 226, 232, 235, 327, 358
- Wang Chia (late third century A.D.), 262, 316
- Wang Chih-Chien (Ming writer), 295
- Wang Chih-Yuan (cartographer, A.D. 1247), 126
- Wang Fan (mathematician, third century A.D.), 43, 89, 180, 181
- Wang Hsi-Ming (poet, sixth century A.D.), 81
- Wang Hsi-Shan (astronomer, 1628–1682), 190, 218
- Wang Hsi-Shan's New (Astronomical) Methods, *see* *Hsiao-An Hsin Fa*
- Wang Hsiao-Thung (mathematician, seventh century A.D.), 51
- Wang Hsü (*d.* A.D. 69)
tomb of, *see* tombs
- Wang Jung (minister of Chin, A.D. 235–306), 30
- Wang Kho-Ta (Ming astronomer), 82
- Wang Khuei (Ming biologist), 230

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

456

- Wang Lao (neighbour of I-Hsing), 127
 Wang Ling (202 B.C.), 28
 Wang Mang (emperors A.D. 9–23), 42, 261
 Wang Phu (c. A.D. 1135), 156
 Wang Wei (Ming astronomer), 82
 Wang Ying-Lin (Sung scholar), 82
 'Warnings from Heaven', 200, 201
 warp and weft, 262
 Warring States (period), 3, 7, 24, 28, 41, 82, 151, 187, 200, 223, 293, 331, 334, 350, 357
 watches (nautical), 270
 water
 preventions from freezing, 152
 in relation to the tuning of musical instruments, 375–6
 Yin nature of, 236
 water-clocks, *see* clepsydras
 water-conservancy, 238, 246, 280
 water-control, 8
 water currents at sea, instrument for recording, 304
 water-cycle, meteorological, 224, 226, 328
 water-jackets, 350
 water-level, 136, 275, 276, 293, 330
 water-mill engineers, 29
 water-power, 164, 165, 171
 water-tight compartments, 337
 water-wheel, 230
 with buckets, 151
 'waters under the earth', 86
 waterspouts, 231
 waterways, 245, 246
 Waterways Classic, *see* *Shui Ching*
 Waterways Classic Commented, *see* *Shui Ching Chu*
 wave theories, 325, 326–9, 334, 335, 381
 wave transmission, 334
 weak water (*jo shui*), 293
 weapons, 342
 weather, 79, 85, 200, 222–3
 magical control of, 370
 prediction, 223–4, 226
 weather-lore, 223
 weather-vane, 230
 weathercock, 230
 Weaving Girl constellation, *see* Chih nu
 week, 186
 weft, *see* warp and weft
 Wei (*hsiu*), 122
wei (word referring to the position of the rods on a counting-board), 3, 4
 Wei (State), 43
wei, *see* *ching* and *wei*
 Wei Chao (commentator, third century A.D.), 374
 Wei Pho (astronomer, eleventh century A.D.), 30
 Wei Po-Yang (second century A.D.), 315
 Weichow, 339
 weighing, 336
 terms for, *see* technical terms
 weight, 331ff, 380
 weights, minutest of, 326
 weights and measures
 decimalisation of, 337
 standardisation of, 37
 units of, 35
 wells, supposed connection with the sea, 293
wen (technical term in astronomy), 197
Wen Hsien Thung Kao (Historical Investigation of Public Affairs), 82, 205, 207, 210, 211
 Wén-Jung (monk, eleventh century A.D.), 348

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

457

- West, *see* Europe
- West River (Hsi Chiang), 252
- Western Journey of the Taoist
Chhang-Chhun, *see* Chhang-
Chhun Chen-Jen Hsi Yu Chi
- wheel-clock, *see* clocks
- wheel-maps, *see* maps
- whetstone, 360
- whirlwind, 231
- White Tiger (western 'Palace'), 101,
105
- wicks of lamps or candles, 316, 349,
350
- Wilkins, John (1638), 214
- will-o'-the wisp, 347, 348
- Williams, Wells (1848), 215
- 'wind-observing fan', 230
- Wilson, Miles (1757), 214
- winds, 76, 223, 224, 230, 366, 368,
370
 'the *chhi* of heaven', 224
 and dances, 368, 370, 375
 of the eight directions, 374–5
 signs of, 226
 velocity of, 230
- winged men, 241
- 'winged sun' symbol, 204
- winter, 75, 102
- witch-doctor, *see* Shamanism
- Wohltemperierte Clavier*, 385
- womb-symbol, 160
- wood, fire-proofing of, 315
- woodcuts, 274
- world catastrophes, *see* cyclical world
catastrophes
- world-cycles, 193, 194
- Wu (Chin emperor), 344
- Wu (emperor of the Han, 121 B.C.),
361–2
- Wu (State), 181
- Wu Ching Thung I (Fundamental
Ideas of the Five Classics), 200
- Wu Ching Tsung Yao (Collection of
the most important Military
Techniques), 276
- Wu Hsien (legendary minister of
the Shang), 80, 115, 181
- Wu Hsing Hsing Tu Chieh (Analysis
of the Motions of the five
Planets), 218
- Wu Liang tomb-shrines
 reliefs, 8, 101, 102, 139, 141
- Wu Mi (sixth century A.D.), 81
- Wu Pei Chih (Treatise on Arma-
ment Technology), 271
- Wu-Ting (king of the Shang, 1339–
1281 B.C.), 101
- Wu Ting (river), 293
- Wu Tshao Suan Ching (Mathe-
matical Manual of the Five
Government Departments), 1
- Wu Tzu-Hsü (minister of the State
of Wu), 235
- Wu Yo Chen Hsing Thu (Map of
the True Topography of the
Five Sacred Mountains), 265,
275
- Wuchiang, 248
- Wukusun Chung-Tuan (A.D. 1222),
250
- Xanadu, *see* Shangtu
- Xenophanes (sixth century B.C.),
299
- ya chhiu (siphon), 150
- yang (character), 164
- Yang-chhêng, 130, 132, 135, 136,
137, 339
- Yang Chia, 156
- Yang-Chia reign-period, 301
- Yang Fu (second century A.D.), 242
- Yang Hsiung (astronomer, 53 B.C.
to A.D. 18), 169, 171

Cambridge University Press

978-0-521-31536-4 - The Shorter Science and Civilisation in China: An Abridgement
of Joseph Needham's Original Text, Volume 2

Colin A. Ronan

Index

[More information](#)*Index*

458

- Yang Hui** (mathematician, thirteenth century), 10, 13, 15, 22, 26, 27, 43, 48, 56
- Yang-Ku**, 73
- Yang kuei** (the foreign sundial), 147
- Yang Wei** (astronomer, third century, A.D.), 183, 203
- Yang Wei-Te** (Chief Calendrical Computer), 207
- Yang Yü** (A.D. 1360), 158–9, 201, 204, 231
- Yangtze**, 233, 234, 235, 247, 252, 282, 295, 300
- Yao** (legendary emperor), 73, 74
- Yao Chan** (Divination by Weird Wonders), 233
- Yao Hsin** (astronomer, c. A.D. 260), 84
- Yarkand**, 318
- year**, 102, 109, 184
 sidereal, *see* sidereal year
 tropic, *see* tropic year
- yeh** (technical term), 262
- Yeh Kho Tshung Shu** (Collected Notes on the Rustic Guest), 292
- Yeh Mēng-Tê** (Taoist, A.D. 1156), 223
- Yehlü Chhu-Tshai** (statesman, A.D. 1190), 250
- Yellow River**, 20, 192, 223, 246, 247, 261, 267, 282, 293
 source of, 251
- Yellow Sea**, 307
- Yellow Springs**, 307
- Yen** (State), 260
- Yen Chen-Chhing** (eighth century A.D.), 291
- Yen-ching Sui Shih Chi** (Annual Customs and Festivals of Peking), 362
- Yen Phu** (Inkstone Record), 311
- Yen Shih** (On Inkstones), 311
- Yen Su** (clepsydra expert, A.D. 1030), 154, 155
- Yen-Tang Shan**, 289, 292
- Yen Tzu Chhun Chhiu** (Master Yen's Spring and Autumn Annals), 188
- Yenchow**, 296
- Yin** and the **Yang**, 21, 86, 88, 90, 105, 164, 186, 198, 210, 217, 231, 232, 233, 236, 300, 307, 308, 327, 328, 330, 344, 372–3, 381, 382
- Yin Khuei** (clepsydra expert, c. A.D. 540), 154
- Ying pu tsu** (Too Much and Not Enough), chapter of the *Chiu Chang Suan Shu*, *q.v.*
- Ying Tsao Fa Shih** (Treatise on Architectural Methods), 159, 160
- Yo Chi** (Record of Ritual Music and Dance), 368, 370, 382
- yogatara** (junction-stars), 109
- yogis**, 344
- yii** (radical for jade and precious stones), 309
- Yü the Great** (semi-legendary emperor), 8, 20, 238, 275
- Yü barbarians**, 73
- Yü Chi Thu** (Map of the Tracks of Yü the Great), 266
- Yü Chien** (Allegorical Essays), 38
- Yü Ching** (eleventh century), 236
- Yü Hsi** (astronomer, fl. A.D. 307–338), 81, 83, 118, 170, 238
- Yü Huan Chi Wén** (Things Seen and Heard on My Official Travels), 343
- Yü Kung** (Tribute of Yü) chapter of the *Shu Ching*, *q.v.*
- Yu Kung Shuo Tuan** (Discussions

Index

459

- and Conclusions regarding the Geography of the *Tribute of Yü*), 246, 247
- Yü Sung** (astronomer, c. A.D. 265), 83
- Yü Thu** (Earth-Vehicle (i.e. Terrestrial) Map), 267
- Yu-Ting Li Hsiang Khao Chheng** (Complete Studies on Astronomy and Calendar), 216
- Yu-Tu**, 75
- Yu-Yang Tsa Tsu** (Miscellany of the Yu-Yang Mountain (Cave)), 323, 356
- Yuan** (period), 11, 15, 16, 17, 81–2, 127, 134, 135, 137, 170, 174, 218, 267, 270
world-maps, 270
- Yuan-Chia calendar** (A.D. 443), 183
- Yuan-Ho Chün Hsien Thu Chih** (Yuan-Ho reign-period Illustrated Geography), 249
- Yuan Shih** (History of the Yuan Dynasty), 137, 174, 175
- Yuan Ti** (emperor of the Liang), 292
- Yüchang**, 145
- Yüeh-chih people**, *see* tribal peoples
- Yüeh Ling** (Monthly Ordinances), 79, 102, 103, 104, 372
- Yüeh Shih** (geographer, c. A.D. 980), 249
- Yüeh-Ya Chhuan** (temple and lake), 294
- Yün Lin Shih Phu** (Cloud Forest Lapidary), 299, 311, 312
- yün mu* (mica), 311
- Yung-Ning Kuan**, 296
- Yurungkash** (river), 318, 319
- Yüwén Khai** (Sui technician), 155
- zebra**, 244
- zenith**, 72, 117
- zero**, 4–6, 15, 24, 30, 52, 61
- zither**, 369, 371
- zodiac**, 69, 91, 112, 213
- zodiacal constellations**, 119
- zoetrope**, 361ff