Index

*Note:* Page numbers in *italics* denote figures. Page numbers in *bold* denote tables.

algae, Bonamargy Friary 98
Alps, Friuli-Venezia Giulia 198, 200, 202, 203
alum, alveolar weathering 21
Andelsbuch tufa 144, 145, 146
   petrophysical properties 147–150
anisotropy, calcarenous Tufa 136
Apulia, calcarenite 129–139
   properties 133–138
Aquileia 201
arkose, Charles Bridge restoration 2, 3, 4
Ashino tuff, sodium sulphate weathering 45–48, 49, 54
ashlar, Oxford 106
Austria, calcareous tufa 143–151
Bath stone 103, 105, 106
bauxite, Vitulano marbles 221–222, 225, 226
biological colonization 90, 91–92, 98
black crusts 25–26
  gypsum 90, 91
Paris Basin limestone 26–33
Bohdíkov marble 176, 177, 179, 180, 181
Bohemian Cretaceous Basin
   sandstone 13, 15
Bohemian Massif, graphitic marbles 175–182
Bonamargy Friary, sandstone decay 88–98
   background stress 89–92, 96
   complex pathways 93–94, 96
   exceptional stress 90, 92–93, 94, 95, 96, 97
box-work
   Bonamargy Friary 90, 93
   Oxford 109
Božanov arkosic sandstone 4
Brann marble 176, 177, 178, 179, 180, 181
Bratislava, Leitha limestone 166–173
breccia
   Friuli-Venezia Giulia 201, 202, 203
   Vitulano marbles 221–222
   see also Hötting Breccia; Piasentina stone
Buckland, Reverend William (1784–1856),
   Corsi Collection 190–191
Budapest, travertine 5–6, 6
building stone
   Apulia 129–139
   Austria 143–151
   availability of 1–7
   choice of 101–102
   Oxford 106–109
Czech Republic, database 211–216
Friuli-Venezia Giulia 197–207
Portugal 153–161
Cabo Ortegal, serpentinite 81–85
Caen stone, Lepine limestone as substitute for 2
calcarenite, Apulia 129–139
   classification 130–133, 134
   properties 133–138
Calcarenite de Gravina Formation 129, 130
Calcareniti di Andrano Formation 129
Calcareniti di Porto Badisco Formation 129
Calcareaous Massif, Estremadura 155
calcin 30, 32
calcite veins 81
calcium
   Bonamargy Friary 90, 92, 94
Saxony sandstone 15–16
chlorides, Saxony sandstone 14–16, 19
Clausetto stone 202
climate change, Bonamargy Friary 93–98
Clipsham stone 103, 105, 106, 109
compatibility evaluation
   limestone 2, 5–6, 111–117
   tuff 122–126
Compton, Spencer Joshua Alwyne, Lord (1790–1851),
   Corsi Collection 189
conductivity
   hydraulic, Apulian calcarenite 135, 136, 137
conglomerate
   carbonate, Hundsheim 168–169, 169, 170, 171, 172
   Friuli-Venezia Giulia 202
conservation intervention
   Bonamargy Friary 90, 93
   limestone compatibility evaluation 111–117
   Oxford 107–109
Coral Rag 105, 106
Corallian Group 102–103, 105
Corsi, Faustino (1771–1845) 186–188
   collection of decorative stone 185–193
   enduring reputation 191–193
   nomenclature 187
Cotswold stone 103, 104, 105, 106
Courville limestone, black crusts 27, 29–31, 32
cracks, Teplá trachyte 76, 78
Cretaceous, sandstone
   alveolar weathering 11–22
   Charles Bridge 2, 3, 4
Czech Republic
   graphitic marbles 175–182
   historical building stones, database 211–216
   Teplá Monastery fire damage 73–78
INDEX

Gilbert Collection 189
Grand Tour, dispersal of decorative stone 189, 190
granite see Makabe granite
Greater Oolite Group 102–103
Gröden Sandstone, properties 147, 149, 150
Grotto Marullo 133, 137
gypsum
black crusts 25–33
Bonamargy Friary 89, 96
Saxony sandstone 14–15, 19, 20–21
Hasenstoppler tuff 120
Headington freestone 103, 105, 106, 107, 109
hexahydrite 50–51
Saxony sandstone 15, 16, 19
Hohenleie tuff 119, 120
honeycomb weathering see weathering, alveolar
Horice standstone 3, 4
Horni Hanchoy marble 176, 177, 179, 180, 181
Horni Lipová marble 176, 177, 178, 179, 180, 181
Hötting Breccia 144, 145, 146
properties 148–151
Hungary, travertine 6
Industrial Revolution, impact on building stone choice, Oxford 106–107
Inferior Oolite Group 102–103
Ireland, Bonamargy Friary, sandstone decay 88–98
iron precipitation, Bonamargy Friary 90, 91, 96
Istria stone 201, 204–205
Jarrett, Stephen, Corsi Collection 191
Jitrava marble 176, 177, 179, 180, 181
joints
Bath stone 106
Vitulano marbles 224
Julian Alps 198
karst 197, 198, 199, 200, 201, 203, 204
Gorizia 204
Trieste 204
Vitulano marbles 221–222, 225, 226
Koga rhyolite, sodium sulphate weathering 45–48, 49
Konig, Charles (1774–1851), Corsi Collection 190
Křižany marble 176, 177, 179, 180, 181
Kufstein Fortress, tufa 144, 145
Kuzuu dolomite, sodium sulphate weathering 45–48
Lece Formation 129
Lecce, Santa Croce Basilica 130
Leipzig, alveolar weathering 13–14, 16, 18–20
Leitha limestone
Bratislava 166–173
composition 168–169
hygric properties 167, 170, 171, 172, 173
Lepine limestone, as substitute for Caen stone 2
Leuba, alveolar weathering 13–20, 13
lichen 91–92
lime mortar 90, 92, 94, 95, 96

databases, historical natural stones
Czech Republic 211–216
Friuli-Venezia Giulia 197–199, 205–207
decorative stone
Corsi collection 185–193
medieval 188–189
Roman Empire 188
Vitulano marbles 219–230
Deka database 211–216
density
Apulian calcarenite 133, 136
Oya tuff 61, 64
Teplá trachyte 78
Vitulano marbles 223, 227, 228
Deventer, Römer tuff 120, 121
Devonshire, William Spencer Compton Cavendish, Sixth Duke of (1790–1858), Corsi Collection 189–190
dissolution, silica 90, 91
dolomite
Carnian 201, 202
Vitulano marbles 225, 226
see also Kuzuu dolomite
drying, Leitha limestone 170, 173
durability 4, 111
Apulian calcarenite 138
Leitha limestone 169
travertine 5–6
elasticity, Vitulano marbles 223, 227, 229
Elbe Zone, Cretaceous sandstone 12–13
epsomite 50–51
Saxony 19
Ettringer Tuff, Netherlands 119, 120
Euville limestone, black crusts 27, 28, 31
feldspar, fire damage, Teplá monastery 75–78
ferric oxide, Saxony sandstone 16–17
fire damage
Bonamargy Friary 90, 92–93, 97
trachyte, Teplá monastery 73–78
fly ash 25, 26
foralites, alveolar weathering 13–14, 18–19, 20
freeze-thaw action 4–5
Apulian calcarenite 138
microfracturing, Bonamargy Friary 90, 91
Oya tuff 61, 62–63, 65, 66, 67, 68–69, 71
Römör and Italian tuffs 125, 126
Friuli-Venezia Giulia 198, 199
Carnian 198, 202, 203
Eastern Hills 198, 202, 203, 204
historical stone resources
database 197–199, 205–207
inventories 205–206
Julian Alps 198
Karst 198, 199, 200, 201, 203, 204
moraines and alluvial plain 198, 199, 200, 204
Roman Empire 199, 201
stratigraphy 200
Western Hills 198, 202, 203
Galicia, serpentinite 81–85
giallo antico 187, 190
limestone
  bioclastic, Courville 27, 29–31, 32
calciclastic, Portugal 153–161
  compatibility evaluation 111–117
crinoidal, Euville 27, 31
detritic, sodium sulphate weathering 35–42
dolomitic, Carnian Alps 201, 202, 203
  Friuli-Venezia Giulia 202, 203, 204–205
Jurassic, Oxford 102–105
  Leitha, Bratislava 166–173
lumachelle, Wolfsthal 168, 169, 170, 171, 172
oolitic
  Oxford 102–105
  Savonnieres 27–29, 31–32
  travertine as substitute 5–6
Wolfsthal 168, 169, 170, 171, 172
  Oxford 101–110
  Paris Basin, black crusts 26–33
sandy
  St Margarethen 169, 170, 171, 172
  Wolfsthal 168, 169, 170, 171, 172
Vitulano marbles 224, 226
  see also Caen stone; Istria stone; karst; Lepine limestone
Little Ice Age, Bonamargy Friary 90, 93, 94, 96, 97
Lysice marble 176, 177, 178, 179, 180, 181
magnesium sulphate
  salt-hydration systems 50
  Saxony sandstone 14–16, 19, 20–21
  weathering 46, 47, 48, 49–55
  Makabe granite, sodium sulphate weathering 45–48
  marble
Friuli-Venezia Giulia 202, 203
  graphitic, Raman microspectrometry 175–182
  ‘green’ 81
  Vitulano 219–230
Marinoni, Camillo, Friuli Mineralogical Tour (1881) 205
microfracturing
  freeze-thaw action 90, 91
  thermally assisted 89–90
Miers (1858–1942), Corsi Collection 191
Milton stone 105
mirabilite 35, 36, 40, 43–44, 50–51, 54–55
Moca Creme limestone 153–161
  chemical composition 155–156
  petrophysical properties 156–161
montmorillonite, Oya tuff 60–71
moraines, Friuli-Venezia Giulia 198, 199, 204
mortar
  lime, Bonamargy Friary 90, 92, 94, 95, 96
  modern
Bonamargy Friary 90, 93, 95, 96
  Oxford 109
Neapolitan Yellow Tuff
  characteristics 122, 123, 124, 125
  as replacement for Römer tuff 122, 124, 125–126
Neoene, Leitha limestone 166
Netherlands, Römer tuff 120, 121
nitrates, Saxony sandstone 14–16, 19
nomenclature, work of Corsi 187
nucleation 54–55
Opificio delle Pietre Dure 189
ophicalcite 83, 84–85
Oxford, building stone diversity 101–110
  causes of change 106–109
  architectural style 106
  conservation 107–109
  industrial revolution 106–107
  university and colleges 107, 109
Oya tuff 59–61, 60
  properties 61–62, 64, 65, 66
  weathering 59–71
  sodium sulphate 44–48, 49, 63, 66
P-wave velocity, trachyte 76, 78
Palmanova building stone 201, 205
Paris Basin limestone
  black crusts 26–33
  sodium sulphate weathering 35–42
Parliament House, Budapest, travertine 5–6, 6
permeability, Apulian calcarenite 134
  Dura 138
  Gaggina marble 138
Pietra di Cursi 131, 132–133, 134–139
Dolce 132, 132, 138
Dura 138
pollution
  lignite power plants, Saxony 19
  lime burning, Saxony 19
  see also black crusts
porosity 45, 49
  Apulian calcarenite 134
  Austrian tufa and breccia 146, 147, 149
  Leitha limestone 169–170
  Oya tuff 61
  Portuguese calciclastic limestone 158, 159
  Saxony sandstone 16–17, 18
  Tuffeau and Sebastopol stones 112
porosity 45, 49
  Apulian calcarenite 133, 136–137, 136
  Austrian tufa and breccia 147–150
  fire damaged trachyte 76
  French limestones 27, 31, 32
  Leitha limestone 167, 169–170, 171
  Oya tuff 64, 65, 66, 70–71
  Portuguese calciclastic limestone 156–158
  Römer and Italian tufts 124–125
  Saxony sandstone 16–17, 19
  Teplá trachyte 78
  Tuffeau and Sebastopol stones 112
  Vitulano marbles 227, 228, 229
Portland concrete 4
Portland stone 102–103, 105, 109
Portugal, building stone 153–161
potassium, Saxony sandstone 16
by guest on 12 July 2019
Prague
Charles Bridge restoration 2, 2, 3, 4
pre-emplacement factors 92

properties
hygric
Austrian tufa and breccia 144–146
Leitha limestone 167, 169–173

physical
Andelsbuch tufa 147–148
Apulian calcarenite 133–138
evaluation 4–5
Hötting Breccia 148–149
Oya tuff 61–62, 64, 65, 66
Portuguese calciclastic limestone 156–161
Römer tuff 120

salt weathering experiments 45, 53
Sebastopol stone 112
Thiersee tufa 146–147, 149–150
trachyte, fire damage 76
Tuffeau stone 112
Vitulano marbles 223–224, 227, 228, 229
thermal, Apulian calcarenite 136, 137

provenance determination
Raman microspectrometry 175–182
work of Corsi 187–188

pseudomorphosis, gypsum-calcite 31
Purbeck Formation 102–103

quarries
abandonment 2, 5, 7, 198
Apulia 129–130, 131
Austrian tufa 145
Fair Head, sandstone 88
Friuli-Venezia Giulia 198, 202, 204
inventories 205–207

graphitic marbles, Czech Republic 175–176, 177
Hötting Breccia 144
Hungary, travertine 6
Leitha limestone 167, 168, 169
Oxford building stone 102–105, 104, 106, 107
Oya tuff 61, 62
Portugal, calciclastic limestone 158, 160, 161
pressures, Oya tuff 70–71
Rasˇovka marble 176, 177, 178, 179, 180, 181
recrystallization 44
Apulian calcarenite 133
Courville limestone 29, 32
Euvile limestone 27, 31
Savonnières limestone 27–29, 30, 31
restoration see conservation intervention

INDEX

Rheims, limestones, black crusts 27–33
Rhenish Tuff, Netherlands 119–120, 121
rhyolite see Koga rhyolite
Riedener Tuff 119
Roche fine, sodium sulphate weathering 35–42
Roman Empire
Corsi collection 186
decorative stone 188
Friuli-Venezia Giulia 199, 201
use of travertine 5
Römer Tuff
characteristics 120, 124, 125
Netherlands 119–120, 121
replacement by Italian tuffs 122–126
roughening 90, 91
St Agnese stone 204
St Martin’s Cathedral, Bratislava, Leitha limestone 166, 168, 169, 173
St Mathias Church, Budapest, travertine 6
St Thomas Church, Leipzig, alveolar weathering 13–14, 14, 15, 16, 18–20

salt crystallization 4, 11, 35
acicular 51, 52
alveolar weathering, Saxony 13–22
black crusts 25–33
compatibility evaluation, limestone 111–117
disjoining pressure 55–56
Oya tuff 62, 66, 68–69, 70–71
Portuguese calciclastic limestone 158, 160, 161
pressure, Oya tuff 70–71
subvesicular 51
see also salt weathering
salt uptake 49
salt weathering
Bonamargy Friary 89
Portuguese calciclastic limestone 158, 160, 161
sodium sulphate 35–42, 43–56
Oya tuff 44–48, 49, 62–71
salt-hydration systems 50
sandstone
alveolar weathering, Saxony 11–22
Charles Bridge restoration 2, 2, 3, 4
Cotta type 13, 14, 16, 18, 19, 20
Fair Head
Bonamargy Friary, NE Ireland, decay 88–98
properties 88, 89, 96
response to stress 96, 97, 98
Friuli-Venezia Giulia 203, 204
see also Záměl glauconitic sandstone
Indian, sodium sulphate weathering 45–48, 49, 52–53, 53, 54
Posta type 13
see also Tago sandstone
sanidine, Teplá trachyte 75, 76
saturation
Apulian calcarenite 133, 136, 137
Austrian tufa and breccia 147–150
saturation coefficient 45
Savonnières limestone, black crusts 27–29, 30, 31–32
Saxony, alveolar weathering 11–22
Sebastopol stone, compatibility evaluation 111–117
Semi-rijo limestone 153–161
chemical composition 155–156
physical properties 156–161
serpentinitite, Cabo Ortegal 81–85
mineralogy 81–82
varieties 82–85
serpentinization 81
Silesian marble 175–176
silica dissolution 90
slaking
Oya tuff 61, 62–63, 66, 67, 68–69, 71
see also wetting/drying cycles
Smirke, Sydney (1798–1877), Corsi Collection 190
sodium, Saxony sandstone 16
sodium carbonate
salt-hydration systems 50
weathering 46–47, 48, 53
sodium chloride, crystallization, compatibility evaluation, limestone 112–117
sodium sulphate
crystallization, compatibility evaluation, limestone 112–117
salt weathering 35–42, 43–56
Oya tuff 44–48, 49, 62–71
salt-hydration systems 50
temperature sensitivity 36–42, 43
soiling see black crusts
spalling, Teplá trachyte 77
Staré Hradisko marble 176, 177, 178, 179, 180, 181
starkeyite 50–51
Saxony sandstones 15, 19
strength
Apulian calcarenite 133, 136, 137–138
Portuguese calciclastic limestone 156
surface, Fair Head sandstone 96, 97
tensile
Oya tuff 61, 64, 71
Teplá trachyte 77
Tuffeau and Sebastopol stone 112
Vitulano marbles 223, 227, 228, 229
stress, sandstone, Bonamargy Friary 89–98
sulphates
black crusts 25–33
Saxony sandstone 14–15, 19, 21
supersaturation 19, 36, 43, 50, 51, 52, 54
tufa 143
surface, roughening 90, 91
tafoni 19
Tago sandstone
magnesium sulphate weathering 51–52, 52
sodium sulphate weathering 45–49, 49, 51–56
talc, Piedra de Doelo 83, 85
Taynton stone 103, 105, 106, 109
temperature change, microfracturing 89–90
Teplá monastery, trachyte, fire damage 73–78
thenardite 35, 36, 40, 43–44, 50, 53
Oya tuff 61, 63
see also sodium sulphate
thermal expansion
Fair Head sandstone 89–90
Vitulano marbles 224, 227, 229
Thiersee tufa 144, 145, 146
physical properties 146–147, 149–150
Tišnov marble 176, 177, 178, 179, 180, 181
trachyte, fire damage, Teplá monastery 75–78
travertine 5–6
Italian, sodium sulphate weathering 45–48
tridymite, Teplá trachyte 76
tufa, calcareous
Apulia 129, 131–133, 134–139
spring, Austria 143–151
Andelsbuch 144, 145, 146
properties 147–150
Thiersee 144, 145, 146
properties 146–147, 149–150
tuff see Ashino tuff; Neapolitan Yellow tuff; Oya tuff; Rhenish tuff; Tufo Etrusco; Tufo Romano
Tuffeau stone, compatibility evaluation 111–117
Tufo Etrusco 122, 123, 124
Tufo Romano 122, 123, 124
as replacement for Weiberner tuff 125
Udine, building stone 201, 202, 204, 205
Utrecht, Römer tuff 120, 121
Vallemontana marble 204
Verde Pireneos serpentinite 83, 84, 85
Vernadia stone 204
Vienna Basin, Leitha limestone 167
Vitulano marbles 219–230
geology 221–222
petrography 224, 225, 226, 228
properties 223–224, 227, 228, 229
uses 228, 230
wackestone, Vitulano marble 225, 226
water absorption capacity 45
Leitha limestone 167, 170, 172
Vitulano marbles 223, 227, 228, 229
weathering 4–5, 165
alveolar 11–12, 19, 21
Bonamargy Friary 91, 92
Saxony 12–22, 12
black crust 25–26
Paris Basin limestone 26–33
sodium sulphate 35–42
see also salt weathering
Weathering Susceptibility Index, Oya tuff 71
Weiberner Tuff, Netherlands 119, 120
wetting/drying cycles 19, 20, 21, 50, 63, 66
see also slaking
Wheatley limestone 105
Žulová marble 176, 177, 178, 179, 180, 181