

Index

Page locators in **bold** indicate tables. Page locators in *italics* indicate figures. This index uses letter-by-letter alphabetization.

a

abusive children 873–876
 abusive parents 877
 achondroplasia 129, 129–132
 adenoid facies 240–247, 241–249
 adenoid hyperplasia 607
 adenoid hypertrophy
 cephalogram and cephalometrics 192
 Class III malocclusions 608, 676
 Class II malocclusions 468
 craniofacial growth and development 26, 30, 31
 AHP *see* progressive hemifacial atrophy
 airway problems
 Class III malocclusions 582–583, 583
 Class II malocclusions 432–433, 432–433
 craniofacial growth and development 26, 30
 diagnostic tools 236, 237, 243–247, 249
 temporomandibular joint disorders 746, 746–747
 alveolar bone
 maxillary complex 133, 135
 occlusion and oral function 153, 154–160
 alveolar process 133, 134
 ANB angles 202, 203
 Class III malocclusions 578, 596, 645, 646–647, 662, 670, 690–691, 702, 705, 717
 Class II malocclusions 420, 482, 538, 566–567
 Class I malocclusions 324, 354, 358, 376
 ankyloglossia
 Class II malocclusions 485–488, 485–488
 Class I malocclusions 263–264, 263–265
 ankylosis
 craniofacial growth and development 72
 temporomandibular joint disorders 800, 805, 807–813, 807–813, 815–820, 845, 845–854

anodontia 158, 158
 ANS *see* anterior nasal spine
 anterior and lateral disk displacement with recapture 782, 782–783
 anterior nasal spine (ANS) 196
 anterior relationships 252–255, 252–255
 autologous bone grafts 841–844
 averageness 228

b

Basion-X2-Sella angle 172–173, 174
 Baume Type I arch 166, 166
 beauty
 beauty and proportion 219, 219
 beauty in humans 224–228, 224–229, 234
 proportions in nature 219, 220–223
 bilateral lingual arch space regainer 386
 bilateral posterior crossbite 315–324, 318–324
 Binder's syndrome 126, 126–128
 Biological Model 10–11, 10–11
 bionators
 advantages and disadvantages 441–443
 Class II malocclusions 437–444
 case examples 439–574, 439–575, 459, 519–520, 531, 532–537, 538–549, 541–548
 communication 870–871, 871, 873, 874–876
 craniofacial growth and development 18
 cranium 106–108
 fitting and adjusting the appliance 443
 instructions to parents and children 443–444
 mode of operation of bionator 437–438, 438
 opening *versus* closing the bite 438–439, 438–442, 439–574, 439–575
 temporomandibular joint disorders 737–738, 739–740, 752, 757–759, 770, 770–772, 804, 820, 825–826, 827–829, 831, 834–839, 858

treatment outcomes 444
 wax construction bite 444, 444
 biprotrusive facial profile
 craniofacial growth and development 2, 3
 occlusion and oral function 176–177, 177–182
 bitewing radiography 75
 blankets 866
 Bolton-Broadbent-Golden series 172–173, 174
 bonded appliances
 Class III malocclusions 625, 665, 686–695, 695, 718
 Class II malocclusions 451, 457, 538
 Class I malocclusions 271, 275, 386
 bonded splints 800–801
 bone
 cells of the bone 58
 cranium 89, 90–92
 endochondral bone formation 57, 67–73, 70–75
 intramembranous bone formation 57, 61–65, 62–66, 70
 mandible 141, 144–148
 maxillary complex 133
 methods of bone formation 56, 57
 osteoblasts 59, 59–60
 osteoclasts 61, 61
 osteocytes 60, 60–61
 periosteum and endosteum 57–58, 58–59
 as a tissue 56–61, 58–61
 tooth movement 58, 58–59
 bone-anchored devices 623, 625
 bottle-feeding 185
 botulinum toxin type A 525
 brachycephaly 95, 117–118
 breastfeeding 184, 184–185
 brush border effect 61
 bruxism 775, 779, 779

C

- calvarium 94–96, 94–96, 109, 109
- canaliculi 60, 60
- canine relationships 254–255, 255
- canting inclination 732–733, 736–737, 767, 824
- carpal radiography 78–79, 80–81
- cartilage
 - bone formation 57, 67–73, 70–75
 - cells of the cartilage 66–74
 - chondroblasts 66
 - chondrocytes 66, 68–69
 - collagen 73–74, 74
 - cranial base 123
 - cranium 93
 - mandible 141–144, 144–145
 - maxillary complex 136
 - nasomaxillary complex 126–128
 - osteogenesis imperfecta 74–75, 75
 - as a tissue 66, 66
- cephalogram and cephalometrics 189–215
 - cephalometric points 195–197
 - Class III malocclusions 211, 213, 581–582, 584–588, 586, 590, 593–595, 607–609, 640–642, 645–646, 649–654, 658, 661, 662, 665–671, 676–678, 681, 681–683, 688, 690–691, 694–698, 702, 705–709, 712, 715–717, 721–723
 - Class II malocclusions 420, 433, 442, 455, 458, 463, 466, 468, 472–477, 480, 484, 494, 497–499, 505–508, 518, 523–525, 528, 531–532, 536–537, 543, 551, 555, 556, 557, 561, 565–569
 - Class I malocclusions 275, 277–278, 278–279, 297–298, 310, 311, 315–318, 323, 324, 326, 332, 335, 342, 345, 351, 354, 358, 361–362, 368, 371, 376, 380, 383, 387, 392–393, 398–399, 404
 - common angles used 198, 198–203
 - communication 874–876
 - concepts and definitions 189
 - cranial base 111, 119–120, 122, 125
 - craniofacial growth and
 - development 11, 24, 26–28, 34, 43, 62, 73
 - cranium 85, 88–89, 91–92, 96, 103, 108
 - dental measurements 206–208
 - diagnostic tools 218, 231–232, 236, 241, 243, 245–247, 253, 256
 - diagnostic value and problems 189–192, 190–194, 207–210, 207–213
 - mandible 149, 151
 - maxillary complex 135, 136
 - nasomaxillary complex 132
 - occlusion and oral function 155–156, 159, 172–173, 174, 178, 180
 - temporomandibular joint disorders
 - facial asymmetry 731, 740–741, 746, 757, 759, 761–763
 - mandibular growth and development 798, 802, 809, 817, 824, 826, 833, 837, 839, 849, 851, 856
 - Wits appraisal 203–207
- cervical vertebral maturation (CVM) 80, 81
- chin cup 578, 581, 597–598, 598
- chondroblasts 66
- chondrocytes 66–67, 68–69
- chronological age 78
- circummaxillary suture
 - closure 124–125, 124–126
- cleidocranial dysplasia 120–123, 120–123
- clicks and pops 776, 779–780
- closed lock 786, 786–789
- cluster analysis 579, 579–580
- CMT *see* congenital muscular torticollis
- cognitive impairment 873, 874–876
- collagen 73–74, 74
- communication 862–877
 - abusive, demanding children 877
 - abusive parents 877
 - appliance does not fall from child's mouth 869–870
 - Class III malocclusions and facemasks 870–871, 871
 - Class II malocclusions 443–444, 538–549, 540–548
 - Class II mandibular retrognathism 870–871, 871
 - Class I malocclusions 289, 291 294
 - Class I removable appliances 868
 - cognitive impairment 873, 874–876
 - concepts and definitions 862–863
 - culture and diversity 862–864, 863
 - fashionable appliances 867–868
 - habits 865–867, 867
 - how to achieve a change 864
 - improper wearing of appliance 869
 - insecure children 872–873
 - non-compliant patient 873
 - non-cooperative patients 869
 - non-responsible or abusive children 873–876
 - questions 865
 - reinforcing or replacing appliances 868–869
 - repeatedly lost appliances 869
 - talking to our children 865
 - types of children and
 - parents 872–877, 874–876
- compensatory Class III malocclusions 711–716, 711–724
- computed tomography (CT)
 - cephalogram and cephalometrics 191–192, 192–194
 - Class I malocclusions 269
 - cranial base 115
 - craniofacial growth and development 34
 - cranium 92
 - diagnostic tools 237
 - mandible 145–147
 - occlusion and oral function 173
 - temporomandibular joint disorders 804, 804–806, 810–811, 818, 827–829, 839–840, 846, 857
- condylar aplasia 822, 822, 840, 840–844
- condylar fractures 790–821
 - anatomical differences 790, 791
 - anatomic fracture distribution 790, 791
 - bilateral condylar
 - fractures 802–806, 803–807
 - physiological differences 790–791
 - psychological differences 791
 - temporomandibular joint
 - ankylosis 807–813, 807–813
 - unilateral condylar and corpus
 - fracture 796–797, 814–801, 814–815, 814–821
 - unilateral condylar fractures
 - 792, 792–795
- condyle
 - craniofacial growth 141–144, 144–145
 - temporomandibular joint
 - disorders 776–777, 779–781, 783–785
- congenital muscular torticollis (CMT) 97, 97, 728
- coronal suture system 94, 105–108
- coronoid process 149–150, 150–152
- corpus fractures 796–797, 814–801, 814–815, 814–821
- cranial base 111–126
 - anatomy and growth 111–112, 111–112
 - anterior cranial base 112–113
 - cephalogram and
 - cephalometrics 199–201
 - circummaxillary suture
 - closure 124–125, 124–126
 - cleidocranial dysplasia 120–123, 120–123
 - midface 123, 123
 - posterior cranial base 115–118, 115–119
 - vomero-premaxillary
 - synostosis 126, 126–128
- cranial expansion 109, 109
- cranial nerve 137
- cranial vault deformation 40, 40
- craniofacial growth and development
 - biological maturation 78–79, 78–79
 - Biological Model 10–11, 10–11
 - bone as a tissue 56–61, 58–61
 - cartilage as a tissue 66
 - Class I malocclusions 260
 - concepts of normality 52–54, 53–54
 - cranial dimension in child and
 - adult 35–38, 36–37

- craniofacial growth and development
(*cont'd*)
 diagnostic tools 217–218, 219
 empty cube metaphor 39, 39
 endochondral bone formation 57, 67–73, 70–75
 Epigenetic Landscape (Waddington) 7–9, 27, 28
 evolving concepts 1–54
 genetics and environmental factors 10, 13–31, 39
 goal definition with growth potential 81
 implementing craniofacial corrections 34–35
 intervention times 11–12, 12
 intramembranous bone formation 57, 61–65, 62–66, 70
 key understandings for clinician 2, 2
 Mayan cranial phenotype modification 40–42, 40–52
 Meccano model 9, 9
 mechanisms 56–82
 methods of bone formation 56, 57
 orthodontics 3, 7, 7
 orthopedics 7–9, 7–9
 phenotype *versus* genotype 38, 39
 temporomandibular joint disorders 790–861
 timing of developmental events 76–77, 77
 variability, genotypes and phenotypes 44–51, 53
 when parents do not want extractions 2–6, 2–7
see also individual anatomical divisions
 craniostenosis *see* synostotic plagiocephaly
 cranium 83–110
 anatomical divisions 93–109
 calvarium 94–96, 94–96, 109, 109
 localized linear scleroderma 85, 85–86
 neurocranium 93–94
 non-synostotic deformational plagiocephaly 95, 97–100, 97–102
 ossification 89, 90–92
 postnatal origin 92–93
 prenatal origins 83–84, 83–84
 progressive hemifacial atrophy 85, 87, 87–89
 synostotic plagiocephaly 95, 102–108
 crossbite
 Class III malocclusions 583–588, 585–595, 605, 629, 653, 664, 668, 688, 700, 701–710
 Class II malocclusions 487
 Class I malocclusions 263–265, 264, 269, 275–276, 279, 283–284, 293, 296–306, 296–306, 315–324, 318–324
 cranial base 125
 craniofacial growth and development 20, 23
 cranium 98
 nasomaxillary complex 130–131
 temporomandibular joint disorders 727–728, 731–746, 732–747, 762–763
 crowding
 Class III malocclusions 668–669, 675–684, 676–683, 701–702, 716, 716–724
 Class II malocclusions 466–470, 467–481
 Class I malocclusions 260–262, 262, 265–268, 279, 280, 285–286, 307–310, 309–312, 325–333, 325–333, 334–351, 334–401, 354–358, 361–398
 craniofacial growth and development 2–6, 2–7
 diagnostic tools 229–230
 maxillary complex 133, 133
 occlusion and oral function 169, 176–177, 177–182
 CT *see* computed tomography
 culture and diversity 862–864, 863
 curve of spee 556–561, 560
 cuspid relationships 252, 253–255
 CVM *see* cervical vertebral maturation
- d**
 Da Vinci, Leonardo 225, 257, 258
 deep bite
 Class III malocclusions 606
 Class II malocclusions 434–436, 482, 483–484, 499–502, 500, 509, 545–549, 556–561
 Class I malocclusions 353
 maxillary complex 133–135, 134–138
 deformational plagiocephaly (DP) 95, 97–100, 97–102
 Delaire facemasks 613, 614
 demanding children 877
 dens in dente 408, 408
 dental age 78, 81
 dentinogenesis imperfecta (DI) 74
 dentition
 maxillary complex 133, 133, 135–139, 136–139
 occlusion and oral function 153–188
see also mixed dentition; primary dentition
 dentoalveolar compensation
 craniofacial growth and development 16–17, 20, 40
 cranium 91, 108
 mandible 149
 maxillary complex 133–135, 134–135
 dentoalveolar protrusion
 cephalogram and cephalometrics 206–208
 Class II malocclusions 421, 457, 556
 Class I malocclusions 277, 297–298
 dentoalveolar retrusion 433–434
 dentures 158, 158–160
 developmental hip dysplasia 104
 deviated septum 193
 DI *see* dentinogenesis imperfecta
 diagnostic casts 160–161
 diagnostic tools 216–259
 adenoid facies 240–247, 241–249
 age at malocclusion manifestation 233
 anterior relationships 252–255, 252–255
 beauty and proportion 219, 219
 beauty in humans 224–228, 224–229
 canine relationships 254–255, 255
 cephalometrics in children 256
 cuspid relationships 252, 253–255
 esthetic goals 249–251
 molar relationships 252, 253, 255
 mouth breathing and orofacial growth 236–240, 236–240, 244
 occlusion and oral function 252–255, 253–255
 orthopedic *versus* orthodontic tools 217–218, 219
 physics and mathematics applied to biology 256, 256–258
 primary dentition 233, 252–255, 254–255
 proportions in nature 219, 220–223
 treatment of malocclusion of the teeth 216–217
 visual inspection of patient/face 233–236, 234–236, 244, 249
 distractors 814–815, 814–815
 dolichocephaly
 Class I malocclusions 391
 cranial base 117–118, 119
 Downs angle 206
 DP *see* deformational plagiocephaly
- e**
 ectodermal dysplasia 153, 154–160
 ectopic teeth 192, 194
 electromyography (EMG)
 occlusion and oral function 185
 temporomandibular joint disorders 818–820
 empty cube metaphor 39, 39
 encephalic expansion 92–93
 en coup de sabre 85, 85–86
 endochondral bone growth
 cranial base 123
 craniofacial growth and development 57, 67–73, 70–71
 cranium 93
 mandible 141–144, 144–145
 nasomaxillary complex 126–128
 endosteum 57–58, 58–59

ENT *see* otorhinolaryngologist

environmental factors

- Class III malocclusions 578, 580, 583–587, 584–587, 639, 675–710, 676–681, 683–710
- Class II malocclusions 420–421, 429–437, 430–433, 445–450, 446–449, 460–464, 460–465, 490–525, 490–525
- Class I malocclusions 265–268, 265–268, 296, 296–297
- craniofacial growth and development 10, 13–26, 30
- diagnostic tools 231–232, 233
- temporomandibular joint disorders 790–821, 791–821, 845, 845–853

Epigenetic Landscape (Waddington)

- Class I malocclusions 287
- craniofacial growth and development 7–9, 27, 28
- diagnostic tools 256–257

eruption

- Class III malocclusions 673
- Class II malocclusions 439–440, 495, 495
- Class I malocclusions 261, 292–293, 407–408, 408–418
- mandible 147, 148
- maxillary complex 135, 136–138
- occlusion and oral function 153, 166–173, 167–174, 175–176, 185–186

esthetic goals 249–251, 250

euryprosopic facial phenotype 397

extractions

- Class III malocclusions 720–721
- Class II malocclusions 424, 425, 427
- Class I malocclusions 261–262, 309–312, 344, 345, 400, 402–406, 403–406
- craniofacial growth and development 2–6, 2–7
- diagnostic tools 230, 257
- maxillary complex 136
- occlusion and oral function 161, 162, 165, 176–177
- temporomandibular joint disorders 837

f

facemasks

- activating the intraoral appliance 623, 623, 625
- bone-anchored devices 623, 625
- Class III malocclusions 581, 589–595, 596, 613–618
- common problems 619–623, 619–624
- communication 870–871, 871
- compensatory Class III malocclusions 711–716, 711–724
- cranial base 114, 121–122, 124, 128, 131
- first adjustments 613–616, 614–616

fitting molar/cuspid bands 626–628, 626–629

genetic-environmental Class III

- malocclusions 675–710, 676–681, 683–710

horizontal growth and maxillary

- deficiency 617–662, 647–661

intraoral appliance confection 624

occlusion and oral function 155

open bite 716, 716–724

second adjustments 616–618, 617–618

skin sensitivity 619–622, 621

unstable facemasks 622–623

when to remove the

- appliance 629–638, 630–638

facial asymmetry

allowing facial asymmetry to

- develop 729–731, 729–731

bionator to open/close the bite 737–738,

- 739–740, 752, 757–759, 770–772

Class III malocclusions 701, 704

cranial base 124–125, 124–126

craniofacial growth and development

- 2, 20, 21, 64–65

cranium 89, 90, 93, 97, 97–108

crossbite caused by other

- factors 733–742, 733–743

early diagnosis 728, 728

late onset diagnosis/

- treatment 744–745, 744–745

mandible 150–151

mandibular lateral shift 727–728, 728,

- 733–734, 746–747

maxillary complex 134

midline shift 753–765, 754–765

mixed dentition 747–753, 749–752

mouth breather in early dentition 747

permanent dentition 765–773, 767–773

posterior crossbite 727–728, 731, 732,

- 744–747, 745–747, 763

primary dentition 746, 746–747

temporomandibular joint disorders

- 727–774, 794–801, 814–839,

- 853–860

facial depression

cranial base 114

nasomaxillary complex 129

fashionable appliances 867–868

Fibonacci series 219, 220–228,

- 224, 227–228

fibrous ankylosis 807

finite element modeling 223

FMA angles 206, 358

food retention 281, 281

forceful mandibular opening 847

forward displacement of the disk

- 777–779, 778–779

frontal bossing 129–130

functional matrix theory 128, 141–142

g

GAG *see* glycosaminoglycans

genetics

Class III malocclusions 578–588,

- 579–587, 639, 675–710,

- 676–681, 683–710

Class II malocclusions 420–421,

- 429–437, 451–459, 452–458,

- 490–525, 490–525

Class I malocclusions 263–264, 263–265

craniofacial growth and development

- 10, 13–14, 18, 28, 39

diagnostic tools 231–232, 231–233

occlusion and oral function 161, 161

temporomandibular joint

- disorders 822–844

geometric morphometrics 223

glass ionomer cement 799–800

glycosaminoglycans (GAG) 74

gnathion 196

Go-Gn-SN angle 206

Goldenhar syndrome 853–860, 854

gonial angle 196

growth potential 10

gummy smile 457, 517–525, 517–525

gum pads 184, 185

h

Haas expanders

Class III malocclusions 639, 642, 644,

- 651, 655–657, 677, 682, 687–689,

- 706–707, 713

Class II malocclusions 459, 466–470,

- 467–470, 517, 518

Class I malocclusions 270, 275, 276,

- 276–277, 276–281, 281, 307,

- 325–333, 325–333

cranium 106

nasomaxillary complex 131

temporomandibular joint disorders

- 734, 734

Haversian canals 60

headgear

Class II malocclusions 424, 425

diagnostic tools 217

hemifacial hyperplasia 84, 84

hemifacial hypertrophy 16–20, 18, 18

hemifacial microsomia 822–839

early orthopedics approach 823–830,

- 853–860, 854

late orthopedics

- approach 829–839, 831–834

hemi-mandibulectomy 63–66

hip dysplasia 105

histology 58

horizontal growers

cephalogram and cephalometrics 205

Class III malocclusions 601–603,

- 617–662, 647–661

horizontal growers (*cont'd*)
 Class II malocclusions 438–439, 495–496, 556
 Class I malocclusions 367, 370
 musculature 138, 139
 Howship's lacunae 61, 61
 hyperdivergence 118, 119
 hypermental muscle 438, 438, 497–500
 hypodivergence 118, 119
 hypodontia 154–155
 hypohidrotic ectodermal dysplasia 153, 154–160
 Hyrax expanders
 Class III malocclusions 625, 663–668, 702–703, 717–720
 Class II malocclusions 446, 447, 471, 472–475
 Class I malocclusions 280, 281, 301–304
 craniofacial growth and development 28, 29

i

IMPA angles 662, 670
 impressions
 Class I malocclusions 282
 temporomandibular joint disorders 793, 799, 812
 incisal mandibular plane angle 207
 increment curves 78
 insecure children 872–873
 intervention times 11–12, 12
 intramembranous bone growth
 craniofacial growth and development 57, 61–65, 62–66, 70
 cranium 90
 mandible 141
 inverted overjet 578–579, 596, 597, 598, 640–642, 647, 663
 irritation 281, 281

k

Klamt appliance 842–844

l

labial arch 451, 457
 labial frenum 396
 lambdoidal suture system 94, 105–108
 lateral disk displacement with reduction 782, 784–785
 lateral plagiocephaly of the skull 90
 lateral pterygoid muscle 778, 778–779
 leptoprosopic face
 Class I malocclusions 391, 393, 397
 cranium 105
 ligaments 209
 linear scleroderma 84–87, 85–89
 lingual arch
 bilateral lingual arch space regainer 386
 Class II malocclusions 451
 occlusion and oral function 179, 181

lingual proclination 194
 lip bumper 451, 452–454
 localized linear scleroderma 85, 85–86
 lordosis 208
 lower face, mandible 141, 141
 lymphoid overgrowth 587

m

magnetic resonance imaging (MRI) 787
 malocclusions
 cephalogram and cephalometrics 210–211, 211–213
 Class III malocclusions
 airway problems 582–583, 583
 clinical diagnosis: facial/smile characteristics 596, 598, 599–604, 600, 608, 609–610
 communication 870–871, 871
 diagnosis 578–579
 environmental factors 578, 580, 583–587, 584–587, 639, 675–710, 676–681, 683–710
 genetics 578–588, 579–587, 639, 675–710, 676–681, 683–710
 management in primary, mixed and early permanent dentitions 578–724
 occlusion and oral function 582, 583, 601, 604–607, 605–607, 629, 631, 633
 phenotypic variations and cluster analysis 579, 579–580
 pseudo-Class III malocclusions 585–587, 586, 646–647
 traumatic injury 580, 608–609, 608–613, 611–612
see also maxillary advancement
 Class II malocclusions
 Class II Division 1 malocclusions 434, 434
 Class II Division 2 malocclusions 434–436, 435, 490–515, 490–515
 communication 870–871, 871
 dentoalveolar maxillary retrusion 433–434
 diagnosis 424–427, 424–427
 environmental factors 420–421, 429–437, 430–433, 445–450, 446–449, 460–464, 460–465, 490–525, 490–525
 genetics 420–421, 429–437, 451–459, 452–458, 490–525, 490–525
 management in primary, mixed and early permanent dentitions 420–575
 maxillary constriction from airway problems 432–433, 432–433
 maxillary constriction from habits 431–432, 431–432

principle components 421, 422–424
 why this happened 427–428, 428
see also mandibular advancement
 Class I malocclusions
 ankyloglossia 263–264, 263–265
 communication 868
 craniofacial growth and development 260
 environmental factors 265–268, 265–268
 genetic factors 263–264, 263–265
 historical development 260–262, 261–262
 management in primary and mixed dentitions 260–418
 maxillary advancement 695–700, 696–700
 temporomandibular joint disorders 794–795
see also maxillary expansion
 craniofacial growth and development 1–54, 56
 cranium 93, 106–108
 diagnostic tools 216–259
 mandible 152
 maxillary complex 133, 133
see also occlusion and oral function
 mandible 141–152
 ankylosis in adolescence 845, 845–853
 complexity of the mandible 141, 141–143
 condylar aplasia 822, 822, 840, 840–844
 condylar fractures 790–814, 791–821
 condylar involvement in craniofacial growth 141–144, 144–145
 genetic alterations 822–860
 hemifacial microsomia 822–839, 823–839, 853–860, 854
 integrating diagnosis and treatment planning 152
 lower face 141, 141
 new technologies 854
 patterns of apposition and resorption 148
 posterior mandibular growth 147, 147–148
 ramus and coronoid process 149–150, 150–152
 temporomandibular joint disorders 790–861
 vertical growth 148–150
 mandibular advancement
 advantages and disadvantages of orthopedic appliances 441–443
 bionators 437–444, 438–442, 439–574, 439–575, 444, 459, 519–520, 531, 532–537, 538–549, 541–548
 Class II Division 2 malocclusions 490–515, 490–515
 Class II malocclusions 437–575

- environmental Class II malocclusions 445–450, 446–449, 460–464, 460–465, 490–525, 490–525
- fitting and adjusting the appliance 443
- genetic Class II malocclusions 451–459, 452–458, 490–525, 490–525
- Haas expanders 459, 466–470, 467–470, 517, 518
- how to sell a case 540–503, 540–549
- Hyrax expanders 416, 446, 471, 472–475
- instructions to parents and children 443–444
- lateral expansion to free the mandible 466–470, 467–481
- mentalis muscle 438, 438, 496–497, 497–500
- mixed environmental and genetic Class II malocclusions 517–525, 517–525
- mode of operation of bionator 437–438, 438
- opening *versus* closing the bite 438–439, 438–442, 439–574, 439–575
- palatal inclined plane 451, 453–455, 459
- problems with mixed dentition 499–508, 500–501
- Sagittal expanders 460–464, 460–465, 477–488, 483–488, 495–515, 496–515
- temporomandibular joint disorders 781, 784–785, 787–789, 820, 834–837
- treatment outcomes 444
- twin block appliance 550, 550–555
- waiting to treat 526–539, 527–537
- wax construction bite 444, 444
- when things do not work 483–488, 483–488, 513–514, 514
- mandibular arch
- Class I malocclusions 286–287, 287
- cranial base 125
- craniofacial growth and development 14
- occlusion and oral function 158, 168–182, 168–182, **175–176**
- mandibular hyperplasia 23, 23–25, 34
- mandibular lateral shift
- Class III malocclusions 700, 701–710
- temporomandibular joint disorders 727–728, 728, 733–734, 746–747, 794–801, 853–860
- mandibular protrusion
- cephalogram and cephalometrics 201
- Class III malocclusions 578, 581–582, 653–661, 653–662, 675–684, 676–694, 716, 716–724
- craniofacial growth and development 30
- mandibular retrusion
- cephalogram and cephalometrics 211
- Class II malocclusions 421, 433, 440, 451–465, 452–458, 460–464, 472–480, 556
- diagnostic tools 230, 231, 236
- temporomandibular joint disorders 824, 829, 838
- mandibular rotation
- Class II malocclusions 421, 421–422
- craniofacial growth and development 27
- masseter muscle 777–778, 778
- maxillary advancement
- Class III malocclusions 583–724
- Class I malocclusions 695–700, 696–700
- compensatory Class III malocclusions 711–716, 711–724
- facemasks 581, 589–595, 596, 613–618
- genetic-environmental Class III malocclusions 675–710, 676–681, 683–710
- genetic mandibular excess: the chin cup 597–598, 598
- horizontal growth and maxillary deficiency 617–662, 647–661
- mouth breathing 605–607, 607
- open bite 607, 716, 716–724
- pseudo-Class III malocclusions 585–587, 586, 646–647
- standard mesial step 608–609, 608–613, 611–612, 648
- vertical growth and maxillary deficiency 663–674, 663–675
- when to remove the appliance 629–638, 630–638
- maxillary arch
- cranial base 125
- craniofacial growth and development 14, 26, 28
- occlusion and oral function 158, 158, 168–182, 168–182, **175–176**
- maxillary complex
- alveolar bone 133, 135
- alveolar process 133, 134
- clinical case 133–135, 134–138
- dentition and occlusion 133
- drift and displacement of the maxilla 132–139
- maxillary height 132, 132
- maxillary length 133
- maxillary width 133, 133
- role of muscles in vertical/horizontal patients 139, 139
- teeth and muscles 135–139, 136–139
- maxillary constriction
- Class II malocclusions 431–433, 431–433, 517, 517, 557
- Class I malocclusions 277, 283–285, 334–343, 334–343
- craniofacial growth and development 16–17
- diagnostic tools 236
- maxillary expansion
- activation 268, 268–269, 279–281, 283–285, 287–295, 289–290
- bilateral posterior crossbite 315–324, 318–324
- bimaxillary and bilateral crowding 360–378, 361–389
- bonded appliances 271
- changing eruption path of maxillary canines 407, 408
- Class III malocclusions 623, 623–624, 625, 639, 642, 644, 651, 655–657, 663–668, 675, 677, 682, 687–689, 702–706, 713
- Class II malocclusions 446, 447, 460–488, 460–488, 495–515, 496–515, 517, 518
- Class I malocclusions 266–418
- clinical cases 296–418
- clinical implications and philosophy 268–270
- common problems and recalls 291–294, 292–294
- cranial base 128, 131
- craniofacial growth and development 29
- creating space 270–271, 270–271
- decision to observe minor problem 301–306
- dens in dente 408, 408
- first time insertion and adjustment 288–289, 289–290
- Haas expanders 270, 275, 276, 276–277, 276–281, 281, 307, 325–333, 325–333
- Hyrax expanders 280, 281, 301–304
- indications 276
- instructions to children 291
- lateral and antero posterior expansion 334–343, 334–343
- lateral expansion for crowding 325–333, 325–333
- lateral expansion to free the mandible 466–470, 467–481
- leaving nature to do its job 353–359, 354–358
- male face shapes/phenotypes 391–399, 391–401
- missing permanent laterals 409, 409–417
- non-nutritive sucking 296, 296–297
- occlusion and oral function 179–180
- Quadhelix appliance 270–271, 270–271, 298
- Sagittal expanders 270–271, 276, 276, 278, 281–295, 283–286, 289–294, 311–324, 312–324, 334–398, 334–401, 407, 408
- selection of appliance type 276–277, 277–278
- temporomandibular joint disorders 734, 734
- tongue habits 297–300, 297–300

maxillary expansion (*cont'd*)
 visual inspection of the face 344–352, 345–351
 when extractions are needed 402–406, 403–406
 when mandible doesn't follow expansion 286–287, 287
 when to start 307–310, 309–312
 maxillary hyperplasia 89, 93
 maxillary hypoplasia
 craniofacial growth and development 23, 23
 cranium 93
 maxillary protrusion
 Class II malocclusions 421, 556
 nasomaxillary complex 132
 maxillary retrusion
 cephalogram and cephalometrics 199, 211
 Class III malocclusions 578, 581–582, 600
 Class II malocclusions 557
 Class I malocclusions 262
 cranial base 125
 diagnostic tools 217, 231
 maximum mouth opening 775, 776
 Mayan cranial modification 40–42, 40–52, 95–97, 96
 Meccano model 9, 9
 mentalis muscle 438, 438, 496–497, 497–500
 menton 198
 mesoprosopic facial phenotype 397
 midface 123, 123
 midline deflection/deviation 785
 midline palatal screws 812
 midline shift 753–765, 754–765
 MIH *see* molar incisor hypomineralization
 missing teeth
 Class I malocclusions 409, 409–417
 maxillary complex 135, 136–138
see also anodontia; hypodontia
 mixed dentition
 Class III malocclusions 578–724
 craniofacial growth and development 5, 78
 diagnostic tools 233
 management of Class II malocclusions 420–575
 management of Class I malocclusions 260–418
 maxillary complex 135, 136–138
 occlusion and oral function 162–165, 162–166, 186
 temporomandibular joint disorders 747–753, 749–752
 molar incisor hypomineralization (MIH) 386
 molar relationships 252, 253, 255
 Morales facemasks 613, 615

mouth breathing
 Class III malocclusions 582, 605–607, 607, 613, 661
 Class II malocclusions 437
 Class I malocclusions 263
 cranial base 125
 craniofacial growth and development 10, 11, 26, 30–32, 34
 diagnostic tools 236–240, 236–240, 244
 temporomandibular joint disorders 747
 mouth guards 775, 779, 779, 781, 784–785, 787–789, 799–800
 mouth props 847
 MRI *see* magnetic resonance imaging
 musculature
 Class II malocclusions 436–437, 438, 438, 496–497, 497–498
 craniofacial growth and development 10
 mandible 149, 150–152
 maxillary complex 135–139, 136–139
 occlusion and oral function 184, 184–185, 187
 temporomandibular joint disorders 777–779, 778, 831–834

n

nasal cavity 128, 132
 nasion 195
 nasomaxillary complex
 achondroplasia 129, 129–132
 anatomy and growth 126–128
 cranial base 113, 114, 118, 120, 122–123
 negative overjet 578–579, 596, 597, 605, 640–642, 647, 663
 neoplasms 16–20, 18, 18
 neurocranium 93–94
 neurodevelopment 99
 neuromusculature
 Class II malocclusions 436–437, 438, 438, 496–497, 497–498
 mandible 149, 150–152
 maxillary complex 135–139, 136–139
 occlusion and oral function 184, 184–185, 187
 temporomandibular joint disorders 831–834
 neuro-proprioception 734
 neurosensory induction 10
 non-compliant patient 873
 non-cooperative patient 869
 non-responsible children 873–876
 non-synostotic plagiocephaly *see* deformational plagiocephaly

o

occipital flattening 105
 occlusal radiography 75

occlusion and oral function 153–188
 arch development with anodontia 158, 158
 Baume Type I arch 166, 166
 Class III malocclusions 582, 582, 601, 604–607, 605–607, 629, 631, 633
 clinical case 176–182, 177–182
 development of occlusion 184–185, 184–185
 diagnostic tools 252–255, 253–255
 ectodermal dysplasia 153, 154–160
 eruption of permanent teeth 186
 genetics of space 161, 161, 184–185, 184–186
 how nature creates space 166–169, 166–171
 creating more maxillary than mandibular space 172–182, 172–182, 175–176
 increase in arch length 168, 168–169
 increase in arch length and width and depth 169, 170–171
 increase in arch width 169, 169
 leeway space 175–176, 176
 molar occlusion in primary teeth 182, 182–183
 muscles and growth 187
 oral function 186–187
 primary dentition 153, 158, 158, 162, 182–185, 182–185
 primate spaces 166, 167
 space creation for permanent anterior teeth 162–165, 162–166
 temporomandibular joint and teeth 186–187
 temporomandibular joint disorders 765, 768–769
 tooth replacement in anterior or incisor area 166–168
 vertical changes 172–175, 172–175
 OI *see* osteogenesis imperfecta
 open bite
 Class III malocclusions 607, 716, 716–724
 Class II malocclusions 439–574, 439–575
 Class I malocclusions 266, 296–299, 296–299
 cranial base 125
 craniofacial growth and development 72
 cranium 106
 temporomandibular joint disorders 824–826, 833
 opening and closing clicks 780, 781
 optic microscopy 60
 oral hygiene
 Class II malocclusions 461
 Class I malocclusions 280, 281

orbitale 195
 orthodontics
 Class III malocclusions 593, 643, 674, 680, 699, 708–709, 712–715, 721–724
 Class II malocclusions 435, 474, 488, 512, 515, 570–574
 Class I malocclusions 311–317, 376, 384–386, 400, 409, 412–417
 communication 865
 craniofacial growth and development 3, 7, 7, 12, 12–13
 cranium 88–89
 diagnostic tools 216–218, 219, 256, 256
 mandible 149
 occlusion and oral function 177, 180–181
 temporomandibular joint disorders 743, 820–821, 837, 848–853
 orthognathic growers 201
 orthognathic surgery 845, 852–853
 orthotic helmets 99–100, 99–102
 ossification *see* bone
 osteoblasts 59–60, 59–60
 osteoclasts 61, 61
 osteocytes 60, 60–61
 osteogenesis imperfecta (OI) 73–75, 74
 otorhinolaryngologist (ENT) evaluation 610, 676
 overbite
 Class III malocclusions 629
 cranium 88–89
 overjet
 Class III malocclusions 578–579, 601, 604–605, 605, 629, 634–638, 640–644, 655–656, 676, 679, 703, 712–713
 Class II malocclusions 420, 423, 434, 463, 488, 497, 511, 517, 556, 570–571
 craniofacial growth and development 17, 26–28
 cranium 88–89
 diagnostic tools 230, 236
 occlusion and oral function 177
 temporomandibular joint disorders 772

p

pacifiers
 Class II malocclusions 431–432, 431–432, 445
 Class I malocclusions 265, 296, 296
 communication 865–867, 867
 diagnostic tools 236, 245
 temporomandibular joint disorders 731, 734
 palatal inclined plane 451, 453–455, 459
 panoramic radiography
 cephalogram and cephalometrics 191, 193–194
 Class III malocclusions 609, 665, 668, 671, 673, 679, 681, 685–686

Class II malocclusions 433, 463, 468, 484, 566
 Class I malocclusions 261, 275, 305, 310, 318, 335, 345, 354, 357, 362, 371, 380, 383, 386, 389–390, 392, 407, 408–418
 cranial base 121–122, 126
 craniofacial growth and development 19–20, 34, 62, 65–66
 cranium 84, 86, 88–89, 108
 diagnostic tools 232, 236, 237–238, 240, 243, 245–247
 mandible 151
 maxillary complex 135–136
 nasomaxillary complex 132
 occlusion and oral function 155
 temporomandibular joint disorders
 facial asymmetry 731, 742, 743, 746–747, 751, 756
 joint problems 787
 mandibular growth and development 792–796, 798, 803–806, 807–809, 816, 820, 823, 826, 832, 836, 838, 841–842, 850, 856
 Parry Romberg syndrome 85, 87, 87–89
 PDL *see* periodontal ligament
 peak velocity curves 79
 pelvic radiography 105
 periodontal ligament (PDL) 57–58
 periosteum 57–58, 58–59
 Petit facemasks 613, 614
 pharyngeal arch 136–139
 phasic muscles 777–778, 778
 piezoelectric theory 58, 61
 plagiocephaly 95
 Planas indirect tracks 806
 PNS *see* posterior nasal spine
 pogonion 198
 point A 196
 point B 196
 Polykleitos 224
 porion 195
 positional plagiocephaly 97, 98
 posterior nasal spine (PNS) 196
 postero-anterior radiography
 mandible 150
 temporomandibular joint disorders 817, 827, 832, 836, 848
 primary dentition
 Class III malocclusions 578–724
 diagnostic tools 233, 252–255, 254–255
 management of Class II malocclusions 420–575
 management of Class I malocclusions 260–418
 occlusion and oral function 153, 158, 158, 162, 182–185, 182–185
 temporomandibular joint disorders 746, 746–747
 primate spaces 166, 167

proclined teeth
 Class III malocclusions 579, 661, 720
 Class II malocclusions 437, 451, 472–473, 488, 512
 Class I malocclusions 278, 279, 284, 355, 371, 378
 cranial base 128, 132
 craniofacial growth and development 33
 progressive hemifacial atrophy (AHP) 85, 87, 87–89
 prosthodontics 158
 proteoglycans 74
 pseudo-ankylosis 810–811, 815–816
 pseudo-Class III malocclusions 585–587, 586, 646–647
 Pythagoras 226

q

Quadhelix appliance 270–271, 270–271, 298

r

radiological bone age 78–79, 80–81
 ramus 149–150, 150–152
 restorations 775
 retainers
 Class I malocclusions 268–269
 diagnostic tools 216–217
 retroclined teeth
 Class III malocclusions 579, 586, 604, 701, 705, 711
 Class II malocclusions 433, 434, 436–437, 451, 456, 463, 483–494, 483–494, 501–503
 Class I malocclusions 278, 278, 285, 311, 334–343, 334–354, 366, 376, 387
 craniofacial growth and development 16–17, 18
 retrognathic chin/mandible
 Class II malocclusions 422–430, 427–429, 437, 466–494, 467–494, 517–519, 517–519, 528, 544–546, 550, 550–555, 574
 communication 870–871, 871
 cranial base 118, 119
 craniofacial growth and development 2, 26–28, 72
 cranium 105
 diagnostic tools 231
 temporomandibular joint disorders 817, 838
 rheumatoid arthritis 72
 rhizomelia 130

s

Sagittal expanders
 Class III malocclusions 639
 Class II malocclusions 460–464, 460–465, 470, 477–488, 483–488, 495–515, 496–515

Sagittal expanders (*cont'd*)
 Class I malocclusions 270–271, 276, 276, 278, 281–295, 283–286, 289–294, 311–324, 312–324, 334–398, 334–401, 407, 408, 695–700, 696–700
 scanning electron microscopy (SEM) 59–60
 sella turcica 195, 199–200, 208–210
 SEM *see* scanning electron microscopy
 silastic implants 845, 845–853
 sinus pneumatization 583, 584, 613
 skin sensitivity 619–622, 621
 sleeping head position 265–268
 SNA angle 198, 198–201
 SNAID *see* syndrome of nutritional acquired immune deficiency
 SNB angle 198, 198–201
 SOS *see* spheno-occipital synchondrosis
 spheno-ethmoidal synchondrosis 112–113, 113, 115, 116, 127
 spheno-occipital synchondrosis (SOS) 111–112, 112, 115–117, 116–118
 standard mesial step 608–609, 608–613, 611–612, 648
 Steiner angle 203, 207
 stereolithography 151
 supernumerary teeth 121–122
 suppurative osteomyelitis 61–65, 63–66
 syndrome of nutritional acquired immune deficiency (SNAID) 61–65, 63–66
 synostotic plagiocephaly 95, 102–108

t

tabular cephalic deformation 40, 40
 temporal flattening 101
 temporalis muscle 777–778, 778
 temporomandibular joint (TMJ) disorders
 allowing facial asymmetry to develop 729–731, 729–731
 ankylosis in adolescence 845, 845–853
 anterior and lateral disk displacement with recapture 782, 782–783
 bionator to open/close the bite 737–738, 739–740, 752, 757–759, 770–772
 cephalogram and cephalometrics 192, 193, 209
 clicks and pops 776, 779–780
 closed lock 786, 786–789
 condylar aplasia 822, 822, 840, 840–844
 condylar fractures 790–814, 791–821

craniofacial growth and development 71, 72–73
 crossbite caused by other factors 733–742, 733–743
 early diagnosis of facial asymmetry 728, 728
 early management of genetic malformations 853–860, 854
 facial asymmetry 727–774
 forward displacement of the disk 777–779, 778–779
 hemifacial microsomia 822–839, 823–839, 853–860, 854
 joint problems 775–789
 late onset diagnosis/treatment 744–745, 744–745
 lateral disk displacement with reduction 782, 784–785
 mandibular growth and development 790–861
 mandibular lateral shift 727–728, 728, 733–734, 746–747
 maximum mouth opening 775, 776
 midline deflection *versus* midline deviation 785
 midline shift 753–765, 754–765
 mixed dentition 747–753, 749–752
 mouth breather in early dentition 747
 new technologies 854
 noises felt during palpation 776
 normal temporomandibular joint 776–777
 occlusion and oral function 186–187
 opening and closing clicks 780, 781
 permanent dentition 765–773, 767–773
 posterior crossbite 727–728, 731, 732, 744–747, 745–747
 primary dentition 746, 746–747
 third molars
 diagnostic tools 216
 occlusion and oral function 169, 186
 thumb sucking
 Class II malocclusions 431–432, 431–432, 445, 460–464, 460–465
 Class I malocclusions 265, 266, 296, 296
 communication 865–867, 867
 craniofacial growth and development 14, 14–15, 20, 21–22
 diagnostic tools 236, 245
 temporomandibular joint disorders 731, 734, 744–745, 744–745
 TMJ *see* temporomandibular joint
 tongue cribs
 Class I malocclusions 277

temporomandibular joint disorders 763
 tongue habits
 Class II malocclusions 437
 Class I malocclusions 297–300, 297–300
 tonic muscles 778, 778–779
 tonsillar overgrowth
 Class III malocclusions 582–583, 607
 craniofacial growth and development 30
 diagnostic tools 231–232
 tooth movement 58–59, 59
 transpalatal arch 155–156, 179, 182
 traumatic injury
 Class III malocclusions 580, 608–609, 608–613, 611–612
 condylar fractures 790–821, 845, 845–805
 trigeminal nerve 137
 turbinate hypertrophy
 Class III malocclusions 608
 temporomandibular joint disorders 746, 746–747
 Tweed angle 207
 twin block appliance
 Class II malocclusions 550, 550–555
 temporomandibular joint disorders 820

v

vertical growers
 cephalogram and cephalometrics 201, 204, 208, 208, 210
 Class III malocclusions 601–603, 663–674, 663–675, 716, 716–724
 Class II malocclusions 421, 438, 439, 557, 561
 diagnostic tools 232
 musculature 138, 139
 occlusion and oral function 177
 virtual morphology 223
 vomero-premaxillary synostosis 126, 126–128

w

wax construction bite 444, 444
 whiplash 209
 Wits appraisal 203–207
 Class III malocclusions 212, 663
 Class II malocclusions 420–421, 429
 Class I malocclusions 310, 311, 324

z

ZMS *see* zygomaticomaxillary synostosis
 zygomaticomaxillary synostosis (ZMS) 124–125, 124–126