

Index

- Adenosine nucleotides, 291, 292, 297–299
Akt, 258, 276, 278, 280, 303, 311, 315, 316
Amphians, 331
Amphipaths, 26, 71, 72, 78, 79, 82, 86–89, 91, 92
ATP, 164, 167–169, 182, 184, 235, 241–243, 245, 247, 255, 297, 298, 316
- Bacterial channels, 61, 71, 73, 74
Biaxial stretching, 351, 354–356, 361–363
Bilayer model, 20, 103, 151, 306
Birds, 137, 331, 333, 334, 339, 340, 346
Bone cell, 171, 253–261, 309
Brownian dynamics, 103, 104, 110
- Calcium, 7, 18, 89, 137, 148, 150, 152, 161, 162, 166, 171, 172, 183, 216, 235, 238, 254, 255, 259, 291–293, 295–299, 308–311, 313, 337, 351, 369–371
Cardiac, 10, 11, 18–21, 157, 167, 181, 191, 267–274, 276, 277, 279–283, 303, 309, 313, 331–336, 338–341, 343–346
Cartilage, 157–164, 166–168, 170, 172, 235–239, 242, 245, 248
Cation channel, 6, 8, 9, 21, 135, 159, 170–172, 203, 211, 221, 255, 291–300, 316, 370
Caveolae, 184, 267–283
Cell proliferation, 157, 163, 164, 171, 172, 180, 189, 192, 194, 195, 246, 248, 356, 357, 361, 365
Cells, 3–5, 7, 8, 10–12, 14–16, 18, 19, 22, 26–28, 37, 72, 89, 90, 92, 103, 109, 114, 117, 118, 120–126, 128, 130–136, 138, 147–153, 157, 158, 162, 163, 165, 167, 168, 170–172, 179–194, 204–208, 210–216, 218, 219, 222, 224–226, 235, 237, 239–247, 253–260, 268, 269, 271–283, 291, 292, 296–298, 303–305, 307–310, 312–315, 317, 334, 335, 340, 342, 344, 353–355, 357–371
- Channel reconstitution, 71
Chondrocyte, 157–173, 187, 207, 214, 226, 235–248, 259, 305, 311, 368
Collagen, 15, 27, 131, 134, 149, 159–161, 235, 237, 239, 260, 339, 340, 351–367, 370, 371
Compression, 3, 5, 10, 11, 19–23, 29, 51, 87, 236–246, 248, 260, 340, 345, 352, 360, 364, 367
Connective tissue, 14, 48, 158, 168, 235, 339, 351–354, 363, 365, 367, 368, 371
Cytoskeleton, 4, 6, 16, 17, 19, 21–23, 25, 26, 28, 71, 90, 91, 105, 128, 149, 191, 210–212, 241, 247, 255, 257, 259, 270, 271, 277, 294, 297, 306, 307, 312, 319, 345, 351, 353, 368–371
Cytosolic Cl, 179, 188, 192–196
- Degenerin, 117, 126–128, 130, 133, 134, 136, 137
- ECM (extracellular matrix), 23, 28, 72, 131, 132, 136, 149, 151, 158–162, 179, 189, 191, 235–237, 255, 260, 270, 276, 277, 307, 351–356, 359, 361, 363–369, 371, 372
ENaC (epithelial Na⁺ channel), 24, 25, 92, 117, 120, 126, 127, 135, 137, 138, 162, 172, 179, 182, 192, 193, 195, 242, 255, 295, 296, 298
EPR spectroscopy, 24, 45, 76, 79, 103–105, 107, 304
- Fibroblasts, 10, 11, 15, 16, 19–21, 28, 170, 184, 187, 269, 282, 305, 313–315, 344, 345, 351–372
Fish, 137, 331, 333–342, 344, 346
FRET spectroscopy, 103, 104

- Growth factors, 179, 188, 190, 239, 253, 257, 258, 276, 312–314, 316, 351–354, 356, 357, 361, 363, 365, 366, 368, 371
- Integrins, 3, 15, 16, 29, 159, 171, 187–191, 212, 241, 255, 257, 258, 270, 271, 276, 277, 279, 304, 307, 351, 353, 368, 369, 371
- Ion channels, 3, 4, 25, 117, 126, 133, 134
- K₂P channels, 61, 71, 89, 90, 151
- K_{Ca} channel, 147, 152, 185, 186
- Lipid bilayer mechanics, 37–67
- Lipid rafts, 254, 267, 270–273, 276, 277
- Mammals, 135, 137, 147, 149, 151, 303, 304, 311, 331, 333–338, 340, 344, 346
- Mechanical loading, 158–162, 170, 236, 238, 243, 253–255, 257, 259, 260, 351–353, 355, 356, 361–368, 370
- Mechanically gated channels, 3, 133, 134
- Mechanical stimulus, 3, 4, 7, 27, 38
- Mechanical stretch, 20, 27, 171, 189, 191, 303, 304, 311, 313–319, 363, 370
- Mechanoreceptor, 23, 71, 125, 126, 131, 159, 171, 253, 254, 317
- Mechanosensitive channels, *see* MS channels
- Mechanosensitive ion channels, 21, 37, 38, 41, 61, 125–127, 138, 147–153, 170, 171, 254, 291, 303, 304, 311, 312, 314, 316, 344, 353, 370
- Mechanosensitive potassium channel, 147
- Mechanosensitivity, 6, 8, 21, 42, 61, 66, 81, 105, 119, 152, 278, 309, 331, 332, 345
- Mechanosensory transduction, 18, 103, 114, 117–138
- Mechanotransduction, 117–120, 122, 126, 131, 134–138, 157–160, 162, 164, 171, 172, 187, 189, 235–238, 241, 242, 246, 248, 253–261, 267–283, 291, 303–305, 307, 310–312, 314, 318, 353, 368, 370–372
- Membrane blebs, 3, 26, 297
- Membrane potential, 14, 21, 78, 90, 111, 112, 151, 157, 159, 161–163, 165–167, 171, 172, 180, 181, 210, 225, 254, 255, 291–295, 297, 305, 310, 343, 344
- Membrane-protein interactions, 37, 47
- Membrane tension, 3–6, 10, 11, 15–17, 24, 26, 28, 37, 38, 40, 42, 45, 59, 60, 66, 71–94, 105–107, 109, 113, 118, 172, 203, 220, 254, 270, 291, 292, 294, 304–306
- Metabolic regulation, 157, 159, 164, 168, 172
- Mitogen-activated protein kinase (MAPK), 211, 257, 258, 269, 303, 310–314, 316, 317, 352, 368, 369
- MMPs, 351, 352, 354, 356, 358–360, 362–364, 367, 371
- Molecular dynamics, 44, 103, 104, 106–108, 111, 112, 114, 304
- MS channels, 3–29, 37–40, 42–45, 47, 59–61, 66, 71–94, 103–114, 117, 137, 147, 170, 171, 203–226, 255, 293, 295, 298, 299, 304, 306, 331, 332, 339, 343–345, 352, 366
- MscL, 18, 24–26, 37, 44–47, 49, 50, 52, 53, 57–64, 66, 71, 73–87, 89, 91, 93, 94, 103–109, 113, 114, 304–306
- MscS, *see* MS channels
- NF-kappa, 259, 303, 310, 311, 314
- Nociceptor, 120, 121, 136, 151, 203, 204
- Odontoblast, 147–153
- Osmolality, 179–181, 185, 187, 188, 192, 193, 203, 206, 211, 216, 220, 221, 223
- Osteoarthritis (OA), 157, 161, 167–170, 173, 248
- Paramagnetic microbeads method, 3, 15, 29
- Patch clamp, 3, 4, 24, 25, 27, 73, 75, 79, 81, 82, 89, 103, 111, 136, 150, 170, 192, 254, 295, 304, 309, 312
- Potassium channel, 89, 112, 147, 151, 157, 162–164, 166, 167, 169–172, 255, 259, 316
- Pressure, 3–9, 15, 24, 28, 44, 45, 59–61, 66, 72–74, 77–79, 82, 85–89, 92, 93, 105–107, 109, 118, 122, 136, 137, 149, 152, 158, 159, 161, 171, 180, 187, 192, 203, 204, 206, 210, 213, 216–220, 225, 237, 238, 240, 242, 268, 292–295, 297, 303–306, 308, 318, 332, 335, 337–339, 342, 343
- Proprioception, 117, 118, 120, 132, 135, 304
- Purine receptors, 235, 241, 242, 245, 247
- Reconstituted system, 3, 23, 79
- Reptiles, 331, 333, 334, 338–340, 342, 343
- RVD, 179–188, 191–194, 224, 270
- SACs, *see* Stretch-activated channels
- Sensory system, 91, 151, 203, 205
- Signal transduction, 148, 149, 153, 162, 213, 223, 267, 272, 283, 299, 369
- Signal transduction pathway, 253–261, 303–319
- Single channel recording, 3, 4, 192, 291, 292

- Spheroplasts, 3, 26, 73, 74, 89, 103
- Statistical mechanics, 37–40, 42
- Stretch, 3, 7, 10–15, 18–23, 46, 51, 52, 72, 78, 83, 90, 92, 125, 132–135, 147, 150–152, 159, 171, 179, 185, 187–193, 203, 241, 258, 268–270, 272–281, 283, 293–296, 304, 306, 308, 314–319, 331, 333–339, 341–345, 359, 363, 364, 370
- Stretch-activated channels, 3, 6–9, 15, 21, 28, 71, 268, 270, 276, 292, 296, 303, 305, 306, 308, 312, 351, 352, 368, 370, 371
- Stretch-activation, 27, 72, 134, 152, 157, 276, 278, 279, 281
- Swelling, 3, 14, 15, 29, 91, 118, 126, 133, 151, 179–182, 184–193, 204, 208, 212–215, 224, 235, 255, 267, 268, 270, 275–277, 281, 293, 295, 313, 345
- Teeth, 147
- Temperature, 39, 91, 119, 130, 131, 135, 151, 203, 204, 207, 208, 212, 215, 216, 221, 222, 226, 332, 346
- Tissue engineering, 237, 245, 253, 254, 260, 261, 351, 353, 355, 365–367, 372
- Tooth pain, 147, 149, 152
- Touch receptor neurons, 117, 120, 122–127, 129, 131, 132, 135–137
- TREK-1 channel, 90, 147, 151, 171
- TRP channels, 71, 72, 91, 117, 120, 121, 135, 203–205, 209, 224, 291, 292, 296, 299, 345
- Uniaxial stretching, 317, 351, 354–357, 361–363
- Voltage-gated sodium channel, 147, 150, 162, 172
- Volume-sensitive Cl^- channel, 179–196