

Index

- abortion, spontaneous, *see* spontaneous abortion
- acrosin 361–2, 365
- acrosome reaction 16, 358–9, 361
- actin 76–88
 - mRNA synthesis 40, 41
 - see also* microfilaments
- Actinophrys sol* 6
- activins 223–4
- adenosine 159, 160–3
- adenylate cyclase 154, 161–2
- adrenergic agonists 267, 270
- Aepyornis titan* 12, 13
- age
 - assisted conception and 407
 - chromosomal abnormalities and 101, 316
 - IVF success rates and 204, 281, 315, 317–18
 - male partner 314
 - at menarche 399–400, 401
 - oocyte quality and 277–8, 280–2, 313–18
- ageing
 - ovarian function and 317–18
 - ovulation and 204–5
 - physiological oocyte 119, 284–5; chromosomal abnormalities and 103–4, 285; morphological changes 279
- albumin 13, 14
- alkaline phosphatase staining 120, 121
- alkanols 170
- allopurinol 163
- alpha-1 antitrypsin 283
- alpha 2-macroglobulin 235–6
- alpha fetoprotein 219
- α-amanitin 177, 178
- amenorrhoea
 - chemotherapy-induced 318–19
 - hypothalamic–pituitary dysfunction 202–4, 298–9
 - lactational 400–1
 - polycystic ovary disease 299–300
 - primary 113
- amino acids 47–8
- amphitoky 4, 11
- ampulla (of oviduct) 254, 255
 - oocyte transport 261, 262
- ampullary–isthmic junction (AIJ) 254, 256
 - oocyte transport 261, 263
- androgen receptors 211
- androgenesis 4
- androgens
 - endometriosis 310
 - gonadotrophin therapy and 307
 - oocyte quality and 303
 - ovarian synthesis 211, 215, 221
 - polycystic ovary syndrome 300
- aneuploidy
 - factors affecting frequency 100, 101, 104
 - human oocytes 95–6, 97, 98
- angiogenic factors 222, 223
- animals
 - evolution 1–3
 - gametogenesis 8–10
 - rights 410
- anisogamy 10, 11
- annulate lamellae 33
- anorexia nervosa 299
- anti-sperm antibodies 296, 312
- anti-zona antibodies 366–9
- antrum, follicular 26–7, 138, 139, 151
- apogamy 10
- apoptosis, *see* programmed cell death
- archigonium 12
- arrhenotoky 4, 11
- ascertainment bias 114
- ascites, ovarian hyperstimulation 345
- assisted conception 331–5, 407–8
 - definition 407
 - ethical and legal status 352
 - historical aspects 331–2
 - oocyte recovery techniques 349–51

- assisted conception *continued*
 - ovarian stimulation 335–49
 - physiological considerations 332
 - pregnancy outcome 351–2
 - range of techniques 333–5
 - see also in vitro fertilization*
- ATP 48, 161
 - meiotic maturation and 174
 - oocyte transport and 267
- atresia
 - germ cells in fetal ovaries 126–9
 - primordial follicles 136–8, 316
- Australopithecus afarensis* 2, 3, 19
- autocrine function 210
- autogamy 4, 6
- autoimmune ovarian failure 319–20
- autonomy, commercial surrogacy and 421–3
- autosomes
 - detection of genes 116–17
 - ovarian development and 111–12
 - premature ovarian failure and 113–14
- B-lymphocytes 229
- B1/B2 repeats 43
- Balbiani vitelline body 30
- banking, oocyte 379
- bias, ascertainment 114
- binary fission 4, 5
- bioethics 396–424
- blighted ovum 351
- bovine oocytes
 - centrosome inheritance 75
 - cytoskeletal organization 67–9, 85–7
 - meiotic maturation 156, 158
- BP28 (IGFBP1/PP12) 216–17, 220
- bradykinin 235
- breast cancer 347
- 8-bromo-cAMP (8BrcAMP) 155–6
- bromocriptine 299, 336, 338
 - side effects 348–9
- budding 5
- buserelin 288
 - IVF-related procedures 341
 - polycystic ovary disease 287, 304, 305
- Caenorhabditis elegans* 111
- caffeine 320
- calcium, intracellular 170–3, 197
- calcium ionophores 172
- calphostin C 172
- cancer
 - chemotherapy/radiotherapy 318–19
 - ovarian stimulation and 347–8
- catecholamines 265
- CD4⁺ T-cells 369
- CD8⁺ T-cells 227–9
- cdc2* gene 179
- cell death
 - germ cells 126–9
 - programmed, *see* programmed cell death
- CENP-B protein 65
- centrioles 29–30
- centrosomes
 - inheritance in mammals 73–6
 - mouse fertilization 57, 58, 59, 73–4, 75
 - paternal origin 69, 72–3, 89
- cervical mucus 343
- chemotherapy, cancer 318–19
- children
 - ovarian development 141–2
 - societal attitudes 413, 414–15, 416–17
 - spacing 399–401
- cholera toxin 154, 163, 168, 169
- choline 47–8, 166
- chromosomal abnormalities 95–105, 280
 - aged oocytes 103–4, 285
 - freshly recovered oocytes 95–6
 - inseminated-unfertilized oocytes 96–7
 - maternal age effects 101, 316
 - oocyte maturity and 101
 - ovarian stimulation and 99–100, 308
 - reproduction and 104–5
 - sperm premature chromosome condensation and 102–3
 - type of sterility and 98–9
- chromosomes 6
 - congression 65, 67, 68
 - cryodamage 384
 - lampbrush 28–9, 129
 - pachytene-diplotene oocytes 28–9, 129, 130, 131
 - segregation 65, 67
 - see also* autosomes; X chromosome
 - ciliated cells, oviduct epithelium 255, 266–7
 - cleavage, first, *see* first cleavage
 - cleavage rates 294
 - polycystic ovary disease 301
 - unexplained infertility 296, 312
 - clomiphene (CC) 288, 330, 335–6
 - chromosomal abnormalities and 100
 - oocyte quality and 308–9
 - polycystic ovary disease 287, 304, 305
 - side-effects 348
 - sperm premature chromosome condensation and 102
 - unexplained infertility 338, 339
 - coffee 320
 - colcemid 81, 84
 - concanavalin A 169, 170
 - congenital abnormalities 351–2
 - contraception 405

- contraceptive vaccines 366–9
- corona-cumulus complexes, oocyte (OCCC) 279, 280
- corpus luteum
 - inhibin synthesis 224
 - leukocytes 225–6, 227, 229
 - prostaglandin actions 234–5
 - TNF α actions 232
- cortical granules 31–2
 - cryodamage 384–5, 386, 387
 - reaction to insemination 293, 359
- cortical region, microfilaments 77–8, 85–7
- cortisol 293–4
- cotinine 322
- cow oocytes, *see* bovine oocytes
- CREST scleroderma 65–7
- Creutzfeldt-Jacob disease 330, 348
- cryobiology 380–82
- cryopreservation
 - embryos 376
 - oocytes 376–9; action of cryoprotectants 380–81; applications 378–9; cellular events 381–2; factors influencing success 382–4; history 377–8; human oocyte study 389–92; possible cryodamages 384–5, 386, 387; pregnancy outcomes after 392; rabbit oocyte study 387–9; survival assessment after 384, 387
 - sperm 383
 - cryoprotectants 7, 377
 - action 380–81
 - duration of exposure 383
 - culture
 - evolution 412–17
 - and fertility 401–5
 - cumulus cell-enclosed oocytes (CEO) 152, 181
 - meiotic arrest 155, 157, 159–60, 161
 - meiotic maturation 165, 166, 168–9, 173–6, 177, 178
 - cumulus cell–oocyte complex 47–8, 155, 166, 180–1
 - cumulus oophorus 151
 - meiotic arrest and 154–5
 - meiotic maturation and 166–8, 173–6, 177, 292
 - oocyte maturity and 279
 - cyclic AMP 26, 150, 153–6, 284
 - follicle cell–oocyte transfer 154–5
 - oocyte quality and 283
 - purine-mediated meiotic arrest and 160–2, 163
 - resumption of meiotic maturation 164–8, 173
 - cyclic GMP 163
 - cyclin 179
 - cyclofenil 348
 - cycloheximide 176
 - cytochalasin 79, 83–5
 - cytochrome P450_{arom} 211, 216, 220
 - cytochrome P450_{sec} 211
 - cytokines 225–33
 - cytoplasmic bridges, oogonia 124, 126
 - cytoplasmic microtubules 57, 71, 73–4
 - cytoplasmic organelles 29–36
 - cytoskeleton 54–89
 - comparisons among mammals 88
 - events mediated 55–6
 - investigations on organization 54
 - microfilament organization 76–88
 - microtubule organization 57–73
 - patterns of centrosome inheritance 73–6, 89
 - cytostatic factor 26
 - D14 protein 44
 - decapeptyl (DTRP6) 287, 305
 - del Castillo phenotype 112
 - denuded oocytes (DO) 152, 181
 - meiotic arrest 154, 155, 157, 161
 - meiotic maturation 165, 173–4
 - deuterotoky 4, 11
 - development, oocyte 23–50, 119–46
 - cytological aspects 27–38
 - molecular aspects 38–46
 - diacylglycerol 171, 172–3
 - dibutyryl cAMP (dbcAMP) 153, 155–6, 165–6, 173–4
 - synergistic interactions 157, 161
 - 5,6-dichloro-1- β -D-ribofuranosylbenimidazole 177
 - dictyotene 28
 - Dicyaema* 7
 - Didelphys* 14
 - 20 α -dihydroxyprogesterone 293
 - dimethyl sulphoxide (DMSO) 377, 378
 - human oocyte cryopreservation 378, 383, 390, 392
 - rabbit oocyte cryopreservation 387–9
 - 6-dimethylaminopurine 179
 - diploidy, human oocytes 96, 97, 99
 - dipotassium 27, 28, 129–31
 - dipyridamole 160–1
 - DNA methylation 133
 - dominant follicles 194, 195
 - dominant genes, premature ovarian failure 113–14
 - donation
 - embryo 335, 419
 - oocyte 335, 417–18; age effects 281–2, 315; oocyte storage for 379
 - donor insemination (DI) 335, 339–40, 346, 418
 - Down's syndrome 141, 316
 - Drosophila* 49, 111
 - duties 397
 - early pregnancy factor (EPF) 272
 - ectopic germ cells 123–4

- ectopic pregnancy
 - assisted conception and 346–7, 351
 - clomiphene and 308–9
 - hormonal influences 269
- EGF, *see* epidermal growth factor
- eggs 12–16
 - embryos
 - cryopreservation 376
 - donation 335, 419
 - mortality 402
 - oviductal transport 271–2
 - primordial germ cells 120–4
 - research on human 409–11
 - uterine retention 272
 - see also* fertilized eggs
 - endocytosis 34, 35, 44–5
 - endogamy 4
 - endometriosis 294–5, 402–3
 - oocyte dysfunction 296–7, 309–10
 - ovarian surgery 317
 - endoplasmic reticulum (ER) 33–4, 36, 37
 - β-endorphin 200, 283
 - endosalpinx 254
 - energy substrates 48, 173–6
 - eosinophils 226–7
 - epidermal growth factor (EGF) 214, 219–20
 - meiotic maturation and 169, 220, 288
 - receptors 219, 223
 - TGF β interactions 219, 222
 - Epostane 212
 - 17 β -estradiol; estrogens, *see* 17 β -oestradiol; oestrogens
 - ethical issues 352, 396–424
 - Eutheria 13, 15–16
 - evolution 1–20
 - family 412–17
 - gametes 6–8
 - human monogamy 398–9
 - outline 1–3
 - extracellular matrix 222
 - family
 - closed domesticated nuclear 413–14
 - cultural evolution 412–17
 - open lineage 413
 - restricted patriarchal nuclear 413
 - family planning, oocyte cryopreservation 379
 - Fasciola hepatica* 5
 - fatty acids 158–9
 - feminism 408–9
 - fertility
 - age effects 204, 281–2, 313–14
 - contraceptive vaccines and 366–9
 - culture and 401–5
 - disability of high 404–5
 - smoking and 321
 - see also* infertility
 - fertilization 9, 56
 - delayed 284–5
 - in vitro*, *see in vitro* fertilization
 - microfilament organization 77–88
 - microtubule organization 57–73
 - oocyte maturity and 278, 293
 - oocyte quality and 293
 - specificity 16–18, 20, 360
 - stages of egg maturation at 13, 15
 - see also* sperm penetration
 - fertilization rates 294–5
 - classes of infertility 295–7
 - endometriosis 296, 309, 310
 - frozen/thawed human oocytes 378, 392
 - maternal age and 315
 - polycystic ovary disease 301
 - smoking and 321–2
 - unexplained infertility 296, 311–12, 313
 - fertilized eggs 56
 - microfilament organization 80, 81–5
 - microtubule organization 57–9, 69, 72–3
 - oviductal transport 270–2
 - research on 409–11
 - see also* embryos
 - fertilizing capacity
 - oocytes 278–9
 - sperm 297–8, 363–6
 - see also* quality, oocyte
 - fetus
 - follicle formation 134–6
 - oocyte development 124, 125–9
 - fibrinogen 283
 - fibroblast growth factor (FGF) 222–3
 - basic (bFGF) 214, 222–3
 - fibronectin 222, 283
 - fibrous lattices 35–6
 - fimbria 254, 255
 - oocyte uptake 256–7
 - first cleavage (mitosis) 56
 - microfilament organization 80, 85
 - microtubule organization 57–9, 60, 72
 - fission, whole-body 4, 5, 19
 - fluorescein diacetate (FDA) 387, 388
 - fluorescent recovery after photobleaching (FRAP) 59–61
 - fodrin 80, 85
 - follicle-stimulating hormone (FSH) 131
 - ageing and 204–5, 281, 317–18
 - control of secretion 199, 201
 - EGF interactions 219, 220
 - FGF interactions 223
 - follicle recruitment and 194–5
 - IGF interactions 215

- IGFBP interactions 217, 218
- meiotic arrest and 153, 157, 158, 161
- meiotic maturation and 169, 170, 174–5
- myocardial cell responses 47
- oocyte quality and 282
- pituitary desensitization 341
- recombinant 343
- TGF β interactions 222
- therapy 339; chromosomal abnormalities and 100; fertilization/implantation rates and 295; normal ovulatory women 305; oocyte quality and 307; polycystic ovary syndrome 287, 304, 305; sperm premature chromosome condensation and 102
- TNF α antagonism 231–2
- follicles 133–41
 - dominant 194, 195
 - flushing 350
 - formation (folliculogenesis) 133–6
 - gate theory of selection 194
 - Graafian 138, 151
 - growth 136–41
 - inhibition of oocyte maturation 25–7, 156–9, 283–4
 - oocyte interactions 46–9, 135–6
 - oocyte release 256–7
 - postnatal dynamics 141–3, 144
 - primordial, *see* primordial follicles
 - recruitment 136–41, 193–5
 - removal of oocytes from 151–2
 - steroidal autocrine/paracrine regulation 210–12
 - zona antigen immunization and 367–9
 - see also* granulosa cells; theca cells
- follicular fluid (FF)
 - composition; endometriosis 310; oocyte quality and 282–3, 293–4
 - cytokines 230
 - EGF 219
 - IGFBPs 217–18
 - inhibins 224
 - inhibition of oocyte maturation 156–9, 160
 - lymphocytes 227–9
 - purines 159
 - TGF β 221
- follicular phase
 - early 193–4
 - inhibin secretion 199
 - mid- 194–5
- foot processes, granulosa cells 28, 30, 38, 47
- forskolin 153, 154, 155, 157, 161, 165
- fossil record 1–3
- freezing, *see* cryopreservation
- FSH, *see* follicle-stimulating hormone
- fucoidan 361
- G proteins 154, 163, 197
- β -1,4-galactosyltransferase (gal-transferase) 46, 360, 361
- gamete intrafallopian transfer (GIFT) 343, 346, 351
- gamete manipulation techniques 334, 335
- gametogenesis, animals 8–10
- gametophyte 12
- gamma-aminobutyric acid 265
- gap junctions 47
 - biosynthesis 44
 - meiotic arrest and 154–5, 164
 - resumption of meiotic maturation and 166–8
- gate theory of follicle selection 194
- gcd (*germ-cell deficient*) mutation 122
- genetic polymorphism 6
- genetics
 - oocytes 95–105
 - ovarian development 108–17
- genito-palato-cardiac syndrome 108
- genome
 - imprinting 11
 - reprogramming 133
- germ-cell determinant 8–9
- germ cell failure in both sexes 112, 116
- germ cells
 - early history 120–4
 - establishment of population 124–33
 - growth and death 124–5
 - numbers 125–9
 - primordial, *see* primordial germ cells
 - sexual differentiation 132–3
- germ-plasm theory 9, 119, 120
- germinal epithelium 129
- germinal vesicle 27–8, 29, 150
 - breakdown (GVB) 55, 56, 151; *see also* maturation, meiotic
- glucose 48, 174–5
- glucose-6-phosphate dehydrogenase (G6PD) 44, 133
- glucose phosphate isomerase (GPI) 44
- glycerol 377, 378
- glycrrhetic acid 170
- glycolysis 175
- glycosaminoglycans 283
- GnRH, *see* gonadotrophin releasing hormone
- Golgi apparatus 28, 30–1
- gonadal dysgenesis
 - XX 111–12, 113, 116
 - XY 108
- gonadal ridge 120, 121
- gonadotrophin releasing hormone (GnRH; LHRH) 299
 - clinical deficiency 202–4, 299
 - LH surge regulation 196–7
 - pituitary receptors 197

- gonadotrophin releasing hormone agonists (GnRH-a)
 chromosomal abnormalities and 100
 IVF-related procedures 341–2, 343
 LH hypersecretion and 287, 288, 304–5
 oocyte quality and 307–8
 polycystic ovary syndrome 287, 304–5
 pulsed therapy 202–3, 302
 side effects 349
 sperm premature chromosome condensation and 102
see also pituitary desensitization
- gonadotrophin releasing hormone antagonists 343, 349
- gonadotrophin therapy 330, 335–6
 chromosomal abnormalities and 100
 LH hypersecretion 304–5
 maternal age and 314–15
 normal ovulatory women 305–7
 oocyte quality and 307
 polycystic ovary disease 301–2, 304–5
 side effects 349
 unexplained infertility 338
- gonadotrophins 129–31
 deficiency 298–9
 meiotic maturation and 150, 163, 164–8
see also follicle-stimulating hormone; human chorionic gonadotrophin; human menopausal gonadotrophins; luteinizing hormone
- Graafian follicles 138, 151
- granulocytes 226–7
- granulosa cells 28, 133–4, 136, 146
 autoimmune ovarian failure 319
 cancer chemotherapy and 319
 EGF actions 220
 FGF actions 223
 foot processes 28, 30, 38, 47
 IGF-binding proteins 216–17, 218
 IL-1 actions 230
 inhibin synthesis 224
 insulin-like growth factors (IGFs) 213–15
 meiotic maturation and 157–8
 oocyte interactions 46–9, 136
 polycystic ovary disease 301
 regulation of oestriodiol synthesis 210–11
 TGF β and 221, 222
 TNF α actions 232
 zona pellucida synthesis 362–3
- growth
 follicles 136–41
 oocytes 25–7, 150
- growth factors
 ovarian responses 214
 stimulation of meiotic maturation 168, 221
- see also* epidermal growth factor; fibroblast growth factor; transforming growth factor- β
- growth hormone (GH) 213–15
 recombinant 342
- growth releasing factor (GRF) 100
- GTP γ S 154, 163
- guanosine 161
- guanyl compounds 162, 163
- gynogenesis 4, 11
- hamster oocytes 14
 cryopreservation 377
 cytoskeletal organization 83, 86
 oviductal transport 262, 271
- HCG, *see* human chorionic gonadotrophin
- hemi-zona assay (HZA) 298, 363–4
- heterogamy 11–12
- heterosis 18
- heterotopic pregnancy 346–7, 351
- hexokinase 175
- hirsutism 300–1
- histamine 226, 235
- histone H1 kinase 179
- hMG, *see* human menopausal gonadotrophins
- hologamy 11
- Hominidae 2, 3
- Homo erectus* 2, 3, 19
- horse, oocyte transport 271, 272
- hox genes 49
- human chorionic gonadotrophin (HCG) 337
 insemination treatments 340
 IVF-related procedures 341, 342, 343–4
 meiotic maturation and 165, 167, 168, 292–3
 side effects 349
 TGF β interactions 222
 unexplained infertility 338, 339
- human leucocyte antigen (HLA) homozygosity 312
- human menopausal gonadotrophins (hMG) 330
 chromosomal abnormalities and 100
 insemination treatments 340
 IVF-related procedures 340–1, 342
 normal ovulatory women 305
 polycystic ovary syndrome 287, 305
 side effects 349
 sperm premature chromosome condensation and 102
 unexplained infertility 338, 339
- human oocytes 14, 16, 23–4
 centrosome inheritance 76
 chromosomal abnormalities 95–105
 cryopreservation 376, 379–80, 393; applications 378–9; pregnancy outcomes 392; studies 378, 389–92
 cytology 32–3
 cytoskeletal organization 54, 71–3, 86, 88

- development 124, 125–9
- oviductal transport 269–70
- protein synthesis 44
- quality, *see* quality, oocyte
- size 25
- human pituitary glands (hPG) 330, 348
- humans, evolution 2, 3, 19
- hybrid vigour 18
- hybridization 18–19, 20
- 11β -hydroxysteroid dehydrogenase 293–4
- hyperprolactinaemia 299, 336
- hypothalamic–pituitary axis 196–7
- hypothalamic–pituitary dysfunction 202–4, 298–9
- hypoxanthine 159–63
- hypoxanthine guanine phosphoribosyl transferase (HPRT) 44, 162, 163
- IGFs, *see* insulin-like growth factor I; insulin-like growth factor II
- immaturity, oocyte, *see* maturity, oocyte
- immotile cilia syndrome 266
- implantation rates 294–5
 - classes of infertility 295–7
 - endometriosis 296, 309
 - maternal age and 315–16
- in vitro* fertilization (IVF) 277, 407–9
 - assessment of oocyte quality 278–80
 - embryo research and 409–11
 - ethical and legal status 352
 - frozen/thawed oocytes 377, 378, 389
 - history 331–2
 - indices of success 294–5
 - maternal age and 204, 281, 315, 317–18
 - natural cycle 297
 - oocyte storage 376, 378–9
 - ovarian stimulation 340–4; luteal phase support 343–4; timing of hCG trigger injection 343
 - pituitary desensitization 306, 341–2
 - pregnancy outcomes 351–2
 - related techniques 335
 - smoking and 321–2
 - sperm function assays 364, 365, 366
 - surrogacy 335
 - timing of insemination 279
- inbreeding 19, 20
- incorporation cone 82, 83, 88
- individualism, effective 412
- indomethacin 235
- infertility 405–11
 - aetiology 329–30
 - chromosomal abnormalities and 98–9, 104–5
 - fertilization/implantation rates and 295–7
 - male 296, 363–6
 - paradox 402–4
- polycystic ovary syndrome 286
- range of treatments 333–5
- relative 406
- sperm premature chromosome condensation and 103
- treatment 330–1, 407–9
- tubal 294–5, 296, 312
- unexplained 295, 296–7, 406–7; LH
 - hypersecretion 285–6; oocyte quality 311–13;
 - ovarian stimulation 311, 337–9
- see also* assisted conception; fertility
- infundibulum (of oviduct) 254, 255
- inhibin 199–200, 201, 223–4
 - control of synthesis 211
 - effects of ageing 204–5
- inosine monophosphate (IMP) 162
- inosine monophosphate (IMP) dehydrogenase 162
- inositol trisphosphate (IP_3) 171–2, 197
- insemination
 - artificial, by husband (AIH) 340
 - delayed 284
 - donor (DI) 335, 339–40, 346, 418
 - intrauterine (IUI) 340
 - methods 335
- insulin 213, 216, 217
- insulin-like growth factor I (IGF-I) 212–16, 217, 220, 221
 - receptors 212
- insulin-like growth factor II (IGF-II) 212–13, 214, 216
 - receptors 212
- insulin-like growth factor-binding protein-1 (IGFBP-1; PP12) 216–17, 220
- insulin-like growth factor-binding protein-2 (IGFBP-2) 217–18
- insulin-like growth factor-binding protein-3 (IGFBP-3) 217–18
- insulin-like growth factor-binding proteins (IGFBPs) 216–18
- integrin 38
- interferon-gamma (IFN- γ) 228, 229, 232–3
- interferons (IFNs) 232–3
- intergeneric crosses 18
- interleukin-1 (IL-1) 228, 229–31
- interleukin-1 receptors 229–30
- interleukin-6 (IL-6) 228, 231
- intracytoplasmic sperm injection (ICSI) 280, 296, 366
- intramural segment (of oviduct) 254, 256
- intrauterine insemination (IUI) 340
- iodoacetate 174
- irradiation 318–19
- 3-isobutyl-1-methylxanthine (IBMX) 153, 160–1, 165, 180
- isogamy 10, 11, 12

- isthmus (of oviduct) 254, 256
- oocyte transport 261
- K*-selection 400
- kallikreins 212
- Kallmann's syndrome (olfactogenital dysplasia) 194, 202, 299
- kinetochores 65–7, 68
- c-kit* proto-oncogene 122, 123, 141
- lactate 48, 175
- lactate dehydrogenase (LDH) 44, 48
 - heart-type (β -LDH) 42
- lactational amenorrhoea 400–401
- lamellae, annulate 33
- lampbrush chromosomes 28–9, 129
- laparoscopic oocyte recovery 349–50
- latrunculin 79, 81–2, 85
- lattices, fibrous 35–6
- leukocytes 225–33
- leukotrienes 233–4
- leuprolide acetate (Lucrin) 102, 341–2
- LH, *see* luteinizing hormone
- linoleic acid 158–9
- lipoxygenase products 233–4
- lithium 172
- luteal phase
 - inhibin secretion 199, 224
 - support, IVF-related procedures 341, 343–4
- luteinization 196
 - EGF and 220
 - premature 306–7
- luteinizing hormone (LH) 131
 - effects of ageing 204, 317
 - endometriosis 310
 - hypersecretion 302–5; mechanism of action 303–4; oocyte quality and 285–8; polycystic ovary disease 286–7, 300–1, 302, 303; treatment 304–5
 - normal cycle 337
 - oocyte quality and 282
 - pituitary desensitization and 341
 - prostaglandin actions 234
 - suppression, *see* pituitary desensitization
 - surge 337; inhibin and 199–200, 201; oocyte maturation and 284–5, 292–3, 303–4; progesterone and 197–9; regulation 196–200
 - therapy 307
- luteinizing hormone releasing hormone (LHRH), *see* gonadotrophin releasing hormone
- lymphocytes 227–9
- M-phase (maturation) promoting factor (MPF) 26, 102, 179–80
- Macaca mulatta* (rhesus monkeys) 72–3, 86, 88
- macrogametes 12–16
- macromolecules, biosynthesis and uptake 38–46
- macrophages 225–6
- male factor infertility 296, 363–6
- male partner
 - age 314
 - smoking 322
- mammalian oocytes 13–16, 23
 - size 13–14, 15, 25
 - see also* bovine oocytes; hamster oocytes; human oocytes; mouse oocytes; primate oocytes; rabbit oocytes; rat oocytes
- mammals
 - centrosome inheritance 73–6
 - evolution 2–3
 - gametogenesis 9–10
 - parthenogenesis 11
 - marriage 396–7, 412–13
 - companionate 414
 - mast cells 226
 - mate choice 397–8
 - maturation, meiotic 25–7, 150–81
 - cytological changes 27–38
 - cytoskeletal organization 55, 56, 57–73, 77–88
 - delayed fertilization after 284–5
 - EGF and 169, 220
 - energy substrates 173–6
 - factors disturbing 292–4, 303–4
 - inhibition by cAMP 153–6, 284
 - inhibition by follicular components 25–7, 156–9, 283–4
 - inhibition by purines 159–63
 - resumption 163–73, 196; loss of inhibitory input 164–8; positive stimulation 168–73, 179–80; spontaneous versus ligand-induced 151–3
 - RNA and protein synthesis 176–8
 - TGF β and 221
 - maturation promoting factor (MPF) 26, 102, 179–80
- maturity, oocyte
 - assessment 278–9
 - chromosomal abnormalities and 101
 - cryopreservation and 379–80, 382–3
 - at fertilization in different animals 13, 15
 - fertilizing capacity and 278, 293
 - micromanipulation and 280
- megalecithal eggs 12–13
- meiosis I 9–10
 - abnormalities 127
 - completion 151
 - cytoskeletal organization 55, 56, 77–8
 - metaphase 278–9
 - prophase, *see* prophase of meiosis I
- meiosis II 10, 55, 56, 151
 - metaphase, *see* metaphase II oocytes

- microfilament organization 78–9
- microtubule organization 57, 59–62, 69, 70, 71–2
- meiosis-inducing substance (MIS) 132
- meiosis-preventing substance (MPS) 132
- meiotic maturation, *see* maturation, meiotic
- meiotic spindles
 - bovine oocytes 69, 70
 - cryodamage 383
 - human oocytes 71–2
 - mouse oocytes 55, 56, 57, 59–62, 77–9
- membrana granulosa
 - cumulus oophorus separation 166–8
 - meiotic maturation and 175–6
- menarche, age at 399–400, 401
- menopause
 - incipient 204–5, 317–18
 - ovarian follicles 142–3, 144
 - premature (POF) 113–14, 194
- menstrual cycle
 - oviduct epithelial changes 266
 - see also* ovarian cycle
- mesonephric cells 128, 134–5
- mesosalpinx 254
- metaphase I oocytes 278–9
- metaphase II oocytes 55, 151
 - assessment 278–9
 - insemination 279
 - microtubule organization 69, 70, 71
- metastatic tumour cells 121–2
- Metatheria 13, 15–16
- 1-methyadenine 168
- methylamine 170
- microfilament inhibitors 79, 81–2, 83
- microfilaments 76–88
 - other mammalian species 85–8
 - rodent oocytes 77–85
- microgametes 11–12
- microlecithal eggs 12–13
- microtubule inhibitors 74, 79
- microtubule organizing centres (MTOCs), *see* centrosomes
- microtubules 57–73, 86, 88
 - bovine oocytes 67–9
 - cryodamage 384
 - cytoplasmic 57, 71, 73–4
 - mouse oocytes 57–67
 - post-translational modification 62–5
 - primate oocytes 71–3
- microvilli 28, 31, 38
- mid-follicular phase 194–5
- mifepristone 197, 198–9
- migration, primordial germ cells 9, 120–3
- miscarriage, *see* spontaneous abortion
- mitochondria 28, 30, 32–3, 36
- mitogen activated protein kinase 170
- mitosis
 - first, *see* first cleavage
 - oogonia 124–5
- mitotic spindles
 - bovine eggs 69, 70
 - mouse eggs 59
 - MOM-1 41, 42
 - monkey oocytes, *see* primate oocytes
 - monocytes 225–6
 - monogamy 398–9
 - Monotremata (Prototheria) 13, 14–15
 - moral standards 413, 415, 416
 - morphology, oocyte 280
 - c-mos proto-oncogene 26, 178
 - mouse
 - follicle recruitment and growth 136–7, 138
 - primordial germ cells 120–4
 - zona antigen immunization 367
 - mouse oocytes 24–5, 55, 56
 - centrosome origins 57, 58, 59, 73–4, 75
 - chromosomal abnormalities 101, 104
 - cryopreservation 377, 383, 393
 - cytological changes 27–38
 - cytoskeletal organization 57–67, 77–85, 86
 - development 124–5
 - growth 25–7
 - meiotic maturation 150–1, 153, 154, 155–6, 177, 179
 - oviductal transport 258, 262, 268
 - synthesis and uptake of macromolecules 38–46
 - mRNAs 40, 41–3
 - multiple pregnancy 345–6
 - mutations 6, 19
 - myosalpinx 254
 - oocyte transport 263–6, 270
 - naked mole rats 18–19
 - naltrexone 202, 203–4
 - natural killer cells 229
 - neomycin 172–3
 - neuropeptides 265
 - neutrophils 227
 - nicotine 320, 321
 - nocodazole 74
 - non-disjunctions 95, 96, 97
 - factors affecting frequency 101
 - noradrenaline (norepinephrine) 47, 265
 - ‘nuage’ 33
 - nucleoli 29
 - nucleotides 48
 - numbers
 - follicles 141–3
 - germ cells 125–9
 - oocytes 10, 141

- Oct-3* gene 133
- 17 β -oestradiol (E_2)
 - ageing and 281
 - chromosomal abnormalities and 101
 - cyclic secretion 195, 196–7, 201, 337
 - endometriosis 310
 - meiotic arrest and 158
 - oocyte quality and 282, 283, 293
 - oocyte transport and 264–5, 269–70
 - regulation of synthesis 210–11, 215
 - smoking and 321
 - stimulated cycles 338, 339, 341–2, 343
 - unexplained infertility 311
- oestrogen receptors 211, 264
- oestrogens
 - gonadotrophin therapy and 307
 - oocyte quality and 303
 - oocyte transport and 264–5, 266, 267, 268–70
 - two-cell, two gonadotrophin model of synthesis 210–11
- okadaic acid 179–80
- olfactogenital dysplasia (Kallmann's syndrome) 194, 202, 299
- oligomenorrhoea 298, 299–300
 - chemotherapy-induced 318–19
- oligospermia 404
- oocyte corona–cumulus complexes (OCCC) 279, 280
- oocyte–cumulus cell complex 47–8, 155, 166
- oogenesis 9–10, 23–50
 - cytological aspects 27–38
 - molecular aspects 38–46
- oogonia 9, 124–5, 126
 - atresia 126–7
 - cytoplasmic bridges 124, 126
- oolemma 31, 38
 - depolarization 359
 - endocytosis 34, 35, 44–5
- ootid 9
- opioid peptides 200–2, 203–4
- organelles, cytoplasmic 29–36
- Ornithorhynchus anatinus* 15
- ovarian artery 256
- ovarian cancer 347–8
- ovarian cycle
 - disordered, ovarian stimulation 337–9
 - early follicular phase 193–4
 - mid-follicular phase 194–5
 - normal hormonal changes 337
 - opioid peptides and 200–2
 - regulation of LH surge 196–200
- ovarian development 120–46
 - autosomal control 111–12
 - genetic control 108–17
- molecular strategies 114–17
- postnatal 141–3
- prenatal 120–41
- X chromosome control 109–11
 - see also* development, oocyte
- ovarian failure
 - autoimmune 319–20
 - complete 113
 - incipient 204–5, 317–18
 - premature (POF) 113–14, 194
- ovarian follicles, *see* follicles
- ovarian hyperstimulation syndrome 344–5, 378
- ovarian stimulation 334, 335–49
 - chromosomal abnormalities and 99–100
 - effects of ageing 317–18
 - hazards 344–9
 - insemination treatments 339–40
 - IVF-related procedures 340–4
 - LH hypersecretion 304–5
 - oocyte quality and 282, 295, 307–9
 - sperm premature chromosome condensation and 102
 - unexplained infertility 311, 337–9
- see also* clomiphene; gonadotrophin therapy
- ovarian wedge resection 304
- ovariectomy, unilateral 317
- ovaries
 - age-related changes in function 317–18
 - cauterization 304
 - enlarged, ovarian stimulation inducing 347
 - paracrine regulation 210–36
 - zona antigen immunization and 367–9
- oviduct
 - anatomy 254–6
 - blood supply 256
 - epithelium 254–5
 - innervation 256
 - oocyte transport 257–72; at ampullary–isthmic junction 263; duration and time course 261–2; mechanical effector cells 263–7; methods of study 257–60; regulation 267–72
- ovigerous cords 134
- ovulation 9, 196
 - bradykinin and 235
 - clinical disorders 298–309
 - cytokines and 230, 232
 - effect of ageing 204–5
 - endocrinology 193–205
 - histamine and 226, 235
 - induction, *see* ovarian stimulation
 - monocytes/macrophages and 226
 - oocyte uptake by fimbria 256–7
 - progesterone and 197–9, 200, 201, 211–12
 - prostaglandins and 196, 233–4, 235
 - relaxin and 236

- ovum 12–16
 - blighted 351
- oxygen radicals 234–5
- oxytocin 234
- p34^{cdc2} 179, 180
- p39^{mos} 178
- paedogenesis 4, 11
- papaverine 160–1
- paracentesis, abdominal 345
- paracrine regulation, ovarian function 210–36
- Paramecium aurelia* 7
- Parascaris equorum* 8–9
- parthenogenesis 4, 10–11, 19–20
- parthenogenetic activation 76
 - bovine oocytes 69
 - mouse oocytes 74, 75
- partial zona dissection/drilling (PZD) 280, 366
- periovarian bursa 257
- Perrault syndrome 112
- phorbol esters 168, 169, 172, 173
- phosphodiesterase (PDE)
 - cAMP 154, 161, 163, 166
 - inhibitors 153, 154, 160–1
- phosphoenolpyruvate 173
- phosphofructokinase 175
- phosphoinositide metabolites 170–3
- phospholipase A₂ 235
- phospholipase C 170–1, 172–3
- phyto-oestrogens 320
- pig oocytes
 - meiotic maturation 157, 158, 176–7
 - microfilament organization 85–7
 - uterine transport 272
 - zona pellucida 45
- pigs, zona antigen immunization 367
- pituitary desensitization 295, 309
 - IVF-related procedures 306, 341–2
 - ‘long’ protocols 305–6, 307–8
 - normal ovulatory women 305–7
 - polycystic ovary disease 304, 305
 - ‘short’ protocols 305, 307–8, 342
- placental protein 12 (PP12; IGFBP-1) 216–17, 220
- plasminogen activator 47
 - ovulation and 196, 212
 - tissue-type (tPA), mRNA synthesis 41–2
- Plasmodium vivax* 5
- platelet activating factor (PAF) 272
- platelet-derived growth factor (PDGF) 214, 223
- polar body
 - first 10, 55, 56; morphological assessment 280;
 - oocyte maturity and 279
 - second 56, 78–9, 81
- poly(A)+RNA 38–40
- polycyclic aromatic hydrocarbons 320–1
- polycystic ovary disease (PCOD) 299–302, 337–8, 403
- IGF-binding proteins 218
- inhibin and 224
- insulin-like growth factors 215–16
- LH hypersecretion 286–7, 300–1, 302, 303
- oocyte quality 301–2
- ovarian hyperstimulation syndrome 344
- spontaneous abortions 301–2, 303
 - treatment 304–5
- polyembryony 5
- polyploidy
 - factors affecting frequency 100, 101, 104
 - oocyte cryopreservation and 384–5, 390, 392, 393
- polyspermy
 - humans 76
 - mechanism of prevention 359
 - mouse oocytes 74
 - ovarian stimulation and 100
- postmature oocytes 279
 - see also* ageing, physiological oocyte
- pregnancy
 - ectopic, *see* ectopic pregnancy
 - heterotopic 346–7, 351
 - multiple 345–6
 - outcomes: assisted conception 351–2; oocyte cryopreservation 392
- α_1 -pregnancy-associated endometrial globulin (α_1 -PEG; IGFBP-1; PP12) 216–17, 220
- pregnancy rates
 - insemination treatments 340
 - IVF 332, 345, 346
 - pituitary desensitization and 306
 - polycystic ovary disease 301
 - unexplained infertility 313
- pregnant mares' serum gonadotrophins (PMSG) 100
- premature chromosome condensation (PCC), sperm 102–3
- premature ovarian failure (POF) 113–14, 194
- preterm delivery 345–6, 351
- primary oocytes 9, 150
 - fertilization 15
- primate oocytes
 - centrosome inheritance 76
 - cryopreservation 378
 - cytology 30, 36
 - cytoskeletal organization 71–3, 86, 88
- primates, evolution 2–3
- primordial follicles 25, 135–6, 146
 - atresia (attrition) 136–8, 316
 - gate theory of selection 194
 - recruitment 136–41, 193–5
 - zona antigen immunization and 369

- primordial germ cells (PGCs) 8–9, 19, 120–4, 145–6
 - ectopic 123–4
 - migration 9, 120–3
 - origins 9, 119, 120, 145–6
 - reprogramming of genome 133
 - proacrosin 361
- production line hypothesis 138–40
- progesterone 196, 226
 - control of ovulation 197–9, 200, 201, 211–12
 - endometriosis 310
 - luteal phase support 341, 343–4
 - meiotic maturation and 158, 168
 - normal cycle 337
 - oocyte quality and 282, 283, 293
 - oocyte transport and 264–5, 267, 268–70
 - receptors 264
 - TGF β and 221
 - unexplained infertility 311
- programmed cell death (apoptosis)
 - follicles 136–8
 - at ovulation 196
- prolactin 283
- pronuclear apposition 83–5
- pronuclear envelope breakdown 56
- pronuclear formation 82
- 1,2-propanediol 378, 383, 387, 391
- prophase of meiosis I 9, 129–33, 150
 - fertilizing capacity 278
- prorenin 236
- prostaglandin E₁ (PGE₁) 265–6
- prostaglandin E₂ (PGE₂) 266, 271
- prostaglandin F_{2 α} (PGF_{2 α}) 234, 265–6
- prostaglandins 233–5
 - oocyte transport and 265–6, 267, 271–2
 - ovulation and 196, 233–4, 235
- protein kinase A (PKA) 153, 156, 169
- protein kinase C (PKC) 169, 171, 172, 197
- protein phosphorylation, meiotic maturation 179–80
- protein synthesis inhibitors 176–7
- proteins
 - biosynthesis 43–6
 - meiotic maturation and 176–8
 - storage 36, 37, 45, 50
 - uptake 44–5
- Prototheria (Monotremata) 13, 14–15
- Protozoa/Protista 5, 6–7, 11, 19
- purines
 - mechanisms of action on oocyte maturation 160–3
 - meiotic arrest and 159–60
 - metabolic pathways 162
- puromycin 176, 177
- pyruvate 48, 173–4, 175, 176
- quality, oocyte 24, 277–88
 - assessment 278–80, 297–8
 - autoimmune ovarian failure 319–20
 - clinical disorders affecting 292–322
 - clinical indices 294–5
 - endocrine influences 283–8
 - endometriosis 309–10
 - follicular microenvironment and 282–3, 293
 - irradiation and cancer chemotherapy 318–19
 - maternal age and 277–8, 280–2, 313–18
 - ovarian stimulation and 282, 295, 307–9
 - polycystic ovary syndrome 301–2
 - smoking/environmental toxins and 320–2
 - unexplained infertility 311–13
- r*-selection 400
- rabbit oocytes 14, 86
- centrosome inheritance 76
- cryopreservation 377–8, 383, 384, 387–9
- oviductal transport 259, 260, 262, 268, 270
- radiation therapy 318–19
- rat oocytes
 - chromosomal abnormalities 104
 - meiotic maturation 154, 155–6, 157, 177
 - microfilament organization 79
 - oviductal transport 258, 259, 262, 268, 270–2
- rats, pre-ovulatory LH surge 196–7
- recessive genes, premature ovarian failure 113
- recovery, oocyte 349–51
 - laparoscopic 349–50
 - ultrasound-directed 350–1
- relaxin 236
- religion 413, 415
- reproduction
 - assisted, *see* assisted conception
 - chromosomal abnormalities and 104–5
 - diverse ways 3–6
 - sexual 6–8, 11–16, 20
- reproductive choice 396–424
- research
 - human embryos 409–11
 - oocytes and spermatozoa 409–11
 - rete ovarii 134, 146
 - retrovirus-like particles 34
 - rhesus monkeys (*Macaca mulatta*) 72–3, 86, 88
 - rhodanide 322
 - ribonucleic acids, *see* RNA
 - ribosomal protein genes 40–1
 - ribosomal RNA 38–40
 - ribosomes 35
 - rig* gene 41
 - rights 397
 - animals 410

- RNA 29, 38–43
 transcription, meiotic maturation 176–8
 rodenticide 410
- sea urchin eggs 76, 86
 seasonal breeding 401
 secondary oocytes 9, 151
 fertilization 15
 secretory cells, oviduct epithelium 255, 267
 seeding, cryopreservation 381, 383
 Seitz's dictum 136
 self-fertilization 7
 Sertoli-cell only syndrome 112
 Sertoli cells 133–4, 146
 sex 398–9
 sex cords 134
 sex steroids, *see* androgens; oestrogens;
 progesterone
 sexual differentiation 132–3
 sexual maturation 399–400
 sexual reproduction 6–8, 11–16, 20
 sheep oocytes 14, 69
 centrosome inheritance 75–6
 cytoskeletal organization 85–7, 88
 meiotic maturation 176–7
 shell 14, 15
 shell membrane 14, 15
 size, oocyte 12, 13
 cryopreservation and 380, 383
 mammals 13–14, 15, 25
 smoking 320–2
 smooth muscle (cells), oviduct 254, 256, 263–6
 SP-56 protein 360–1
Spalacinae 18–19
 speciation 18–19
 species specificity, fertilization 16–18, 20, 360
 sperm
 acrosome defects 312
 assessment of function 297–8, 363–6
 cryopreservation 382
 donation 335, 339–40
 premature chromosome condensation (PCC)
 102–3
 sperm aster 57, 69, 70
 sperm dysfunction 296
 endometriosis and 310
 unexplained infertility 311, 312
 sperm penetration 16, 55–6
 blockage 312
 microfilaments and 81–3, 84, 88
 see also fertilization
 sperm–oocyte fusion test 365–6
 sperm–zona interaction 16, 46, 357–62
 sperm–zona penetration tests 297, 365
 sperm–zona recognition assays 298, 363–5
- spironolactone 338
 spontaneous abortion (miscarriage) 294–5
 clomiphene and 308–9
 LH hypersecretion and 286, 287, 303
 pituitary desensitization and 304, 305
 polycystic ovary disease 301–2, 303
SRY (Sry) gene 132–3
staufen gene 49
 staurosporine 172
steel (Sl) gene 122, 123
 stem cell factor (SCF) 122, 123
 sterility 405–6
 chromosomal abnormalities and 98–9
 sperm premature chromosome condensation and
 103
 see also infertility
 storage, oocyte 376–93
 storage materials 36, 37
 stress, oocyte transport and 270
 sub-zonal insemination (SUZI; SZI) 280, 366
 surrogacy 419–23
 altruistic 419–20, 421
 commercial 420–21, 422–3
 exploitation and autonomy 421–3
 gestational 420–21, 423
 IVF 335
 traditional (genetic-plus-gestational) 420, 422–3
 sympathetic nerves 256
 oocyte transport and 265, 270
 synaptonemal complexes 129
 syngamy 4, 8
- T lymphocytes 227–9
Tachyglossus aculeatus 14, 15
 tamoxifen 348
 teratomas 123
 testicular cords 133–4
 testosterone
 meiotic arrest and 158
 oocyte quality and 282
 polycystic ovary syndrome 300
 tetrahydrocannabinol 288
 TGF β , *see* transforming growth factor β
 theca cells 136
 autoimmune ovarian failure 319
 EGF and 219
 meiotic maturation and 158
 regulation of oestriodiol synthesis 210–11
 TGF α synthesis 220
 theca-interstitial cells
 IL-1 actions 230
 insulin-like growth factors (IGFs) 213
 TGF β and 221–2
 TNF α actions 232
 thelytoky 4, 11

- toxins, environmental 143, 320–2
- transduction 8
- transformation 8
- transforming growth factor α (TGF α) 214, 219, 220, 221
- transforming growth factor β (TGF β) 214, 220–2, 223
 - EGF interactions 219, 222
 - germ cell migration and 122
 - transport, oocyte 253–73
 - oviducts 257–72
 - uterus 272
 - transvaginal oocyte recovery 350–1
- triploidy
 - factors affecting frequency 100, 308
 - humans 76
- trisomy 21 (Down's syndrome) 141, 316
- tubal infertility 294–5, 296, 312
- tubulin
 - post-translational modification 62–5
 - turnover in meiotic II spindle 59–60
- γ -tubulin 73
- tumour necrosis factor-alpha (TNF- α) 228, 231–2
- Turner's syndrome (45,X individuals) 108, 113, 127–8
- twinning, identical 5
- tyrosine kinase activity 361
- ultrasound-directed oocyte recovery 350–1
- uridine 47–8, 166
- uterine artery 256
- uterine lavage 419
- uterine tube, *see* oviduct
- utero-tubal junction (UTJ) 254, 256
 - oocyte transport 261
- uterus
 - age changes 315–16
 - oocyte transport 272
- vaccines, contraceptive 366–9
- vasa* gene 49
- vegetative reproduction 5
- vesicles 34–5
- virus-like particles 34
- W* (*White-spotting*) gene 122, 123
- weight loss 401
- wet-nursing 404–5
- X chromosome 108
 - detection of genes 115
 - inactivation/reactivation 133
 - ovarian maintenance determinants 109–11
 - premature ovarian failure and 113
- xanthine oxidase 162, 163
- Xenopus* oocytes 38–9
- XO karyotype 108, 113, 127–8
- XX gonadal dysgenesis 111–12, 113, 116
 - with somatic anomalies 112
- XY gonadal dysgenesis 108
- Y chromosome 108, 132
- yolk 15
 - mammalian 36, 50
 - 'yolk nucleus' 30
- zona-free hamster egg penetration 297, 365–6
- zona-free human egg penetration 366
- zona pellucida 14, 15–16, 31, 37, 357–70
 - adhesion proteins 360–2
 - biochemistry 359–60
 - contraceptive vaccines and 366–9
 - hardening (zona reaction) 359
 - human salt-stored 298, 363
 - protein synthesis 45–6, 362–3
 - specificity of fertilization and 16, 360
 - sperm function tests 298, 363–6
 - sperm–zona interaction 16, 46, 357–62
- ZP1 45, 46, 359
- ZP2 45, 46, 359
 - sperm interaction 46, 359, 361–2, 365
- ZP3 45, 46, 359–60
 - immunization 367–9
 - mRNA synthesis 41, 42–3, 362
 - sperm interaction 46, 358–9, 360–1, 363