Index

Page numbers in <i>italics</i> denote Figures; those in bold	vitamin E deliciency, 375
denote Tables.	warm autoimmune, 359–61, 359, 360
denote lables.	Wilson disease, 373, 374, 375
	aplastic, 381–2
A	blood film, 245, 247–8, 247
Abbott (Cell-Dyn) blood cell counters, 49-52, 49, 50	causes, 246
abetalipoproteinaemia, 87, 88	of chronic disease, 298–9, 298 , 299
acanthocytosis, 86–9, 87, 88, 89	congenital dyserythropoietic, 377-80, 377, 378-80
accessory cephalic vein, 2	congenital haemolytic, 330–359
acid phosphatase, 288, 288	cryohydrocytosis, 330–331
AcT 5diff automated cell counter, 37–8, 38	familial pseudohyperkalaemia, 345–6
acute basophilic leukaemia, 438, 440, 440	hereditary elliptocytosis, 337–40, 338–40
acute lymphoblastic leukaemia, 457–60, 458–60, 459	hereditary pyropoikilocytosis, 340–342, 343
acute monoblastic leukaemia, 184	hereditary spherocytosis, 331–7, 332–6
acute myeloid leukaemia, 109, 113, 118, 432-40, 433, 434-42	hereditary stomatocytosis, 343–4, 343 , 344
blood films, 432, 434–42	hereditary xerocytosis, 344–5, 345
of Down syndrome, 443	red cell enzyme abnormalities, 347–50, 348, 349
FAB classification, 433	sitosterolaemia, 346–7
WHO classification, 433	South-East Asian ovalocytosis, 342–3, 342
acute promyelocytic leukaemia, 52, 288, 292, 433 , 435, 438, 438	stomatin-deficient cryohydrocytosis, 346
adenosine deaminase excess, 355	congenital sideroblastic, 299–301, 300, 301
adenylate kinase deficiency, 355	Diamond–Blackfan, 382
adult T-cell leukaemia/lymphoma, 474–5, 475	dyserythropoietic, 377–80, 377 , 378–80
Alder–Reilly anomaly, 110, 111, 124	Fanconi, 382, 387
aldolase deficiency, 354	iron deficiency, 295–8, 296, 298
alloimmune haemolytic anaemias, 365–7	lead poisoning, 301–2, 302
Alport syndrome, 114	leucoerythroblastic, 247
amegakaryocytic thrombocytopenia, 387	macrocytic, 323–30
amniotic fluid cells, 146	associated with alcoholism and liver disease, 330
anaemia, 245–8, 246 , 247	associated with myelodysplastic syndrome, 330
acquired haemolytic, 359–77	megaloblastic, 118, 323–9, 324 , 325–9
autoimmune, 359–62, 359, 360, 362–3	normocytic normochromic, 246
alloimmune, 365–7	sickle cell, 91, 312–16, 313–15
bacterial and parasitic infections, 375	anisochromasia, 75, 76, 117
cold antibody-induced, 361–2, 362	anisocytosis
combined cold/warm autoimmune, 363	platelets, 139
diabetes mellitus, 375	red cells, 73
drug-induced, 363–4, 364	,
familial autoimmune/lymphoproliferative syndrome, 366	anticoagulants, blood sampling, 5–6
* * *	aplastic anaemia, 381–2
haemolytic disease of newborn, 364–5, 365	arthrogryphosis, renal dysfunction and cholestasis (ARC)
liver disease, 373, 374	syndrome, 388
march haemoglobinuria, 375–6	Auer rods, 109–10, 112
neonatal glutathione peroxidase deficiency, 373	autoimmune haemolytic anaemia, 359–62, 359, 360, 362–3
non-immune, 366–73, 366–7	autoimmune thrombocytopenic purpura, 393–4, 393
oxidant-induced, 371–3, 372, 373	automated blood cell counters, 29–59
paroxysmal cold haemoglobinuria, 362–3, 363	Abbott (Cell-Dyn), 49–52, 49, 50
paroxysmal nocturnal haemoglobinuria, 376, 376	Beckman–Coulter, 30–38, 30, 32, 33, 34 , 36–8
phosphate depletion, 375	erroneous counts, 186, 187 , 188 , 198–205, 199 , 200–203, 204–5
renal disease, 373	Horiba ABX, 52, 53
snake and insect bites, 375, 375	Mindray, 52–3

Blood Cells A Practical Guide, Fifth Edition. By Barbara J. Bain © 2015 John Wiley & Sons, Ltd. Published 2015 by John Wiley & Sons, Ltd. Companion Website: www.wiley.com/go/bain/bloodcells

Nihon Kohden, 52	near-patient testing, 59–60
principles of operation, 29–30	packed cell volume, 17, 19–21
reticulocyte and platelet counts, 53–9, 54–8, 59	microhaematocrit, 20, 20, 21
Siemens, 44–9, 45, 47, 48	plasma trapping, 20–21
Sysmex, 38–44, 39–41	reference method, 21
automated image analysis, 29	platelets, 22–3
see also individual blood cell counters	red cell count, see red cell count
	red cell indices, see red cell indices
В	reticulocytes, 26–9, 26, 27, 27, 28, 28
Babesia divergens, 154 , 165	specimen storage, 60
Babesia equi, 154	units and approved abbreviations, 28-9, 29
Babesia microti, 154 , 164	white cell count, see white cell count
babesiosis, 164–5, <i>164</i> , <i>165</i>	blood film, 7–13, 7–10
bacterial infection, 148–50, <i>148–50</i>	automated spreading, 10
haemolytic anaemia, 375	blood with high Hct, 10
white cell changes, 416–18, 416–18	buffy coat films, 10
bartonellosis, 150	ETDA-anticoagulated blood, 7
basilic vein, 2	examination, 15, 67–71, 67–71
basket cells, 137	fixation, 10–11, 11
basopenia, 251, 251	healthy subjects
basophilia, 240–241, 241	adults, 142
basophilic stippling, 95–6, 96	hyposplenism, 143–4, 144
basophils, 122–3, <i>123</i>	infancy and childhood, 143
normal range	neonate, 143, 144
adults, 217	pregnancy, 143
infants and children, 222	micro-organisms in, 148–68
pregnancy, 223	mounting, 12–13
Batten disease, 124–5	non-anticoagulated blood, 8
Batten–Spielmeyer–Vogt disease, 109, 125	staining, 11–12, 12
Bayer blood cell counters	storage artefacts, 7, 69–71, 69–71
erroneous counts	storage of slides, 13
differential white cell count, 199–200, 199,	thick, 10, 11
200–202	unstained wet preparations, 10
white blood cells, 190	wedge-spread, 8-10, 9, 10
Beckman–Coulter blood cell counters, 30–38, 30, 32, 33, 34 ,	see also individual conditions
36–8	blood sampling, 1–7
AcT 5diff, 37–8, 38	anticoagulant and specimen container, 5-6
erroneous white cell count, 190	capillary blood, 4-5, 4
five-part differential, 31–5, 33, 34	cord blood, 5
Hematoflow platform, 35, 37	effect on haematological variables, 212
Unicel DxH 800, 35, 36–7	fetal blood, 5
Bernard–Soulier syndrome, 388 , <i>391</i>	guidelines, 6
bilirubin crystals, 116	needle-prick injury, 6–7
B-lineage lymphoproliferative disorders, 461–72	peripheral venous blood, 1-4, 2, 3, 4
chronic lymphocytic leukaemia, 461-3, 462,	recommended order, 4
463	specimen mixing, 7
hairy cell leukaemia, 464–6, 465	bone marrow cells, necrotic, 137
monoclonal B-cell lymphocytosis, 463–4	Borrelia, 148
prolymphocytic leukaemia, 464, 464	Brandalise syndrome, 112
B-lineage prolymphocytic leukaemia, 464, 464	Brugia malayi, 154 , 169, 170
blood count, 17–66	buffy coat films, 10
automated blood cell counters, 29–59	Burkitt lymphoma, 469
automated image analysis, 29	butterfly cannula, 2
differential white cell count, 23–5, 24, 25	
imprecision in, 25, 25	С
inaccuracy in, 24–5	Cabot rings, 96, 97
maldistribution of cells, 24, 24	Candida parapsilosis, 142
misidentification of cells, 24–5	capillary blood, 4–5, 4
unidentifiable cells, 25	Capnocytophaga canimorsus, 149
errors in, see erroneous blood counts	CD59 deficiency, inherited, 347
haemoglobin concentration, 17–19, 18	cephalic vein, 2
cyanmethaemoglobin method, 17–19, 18	Chédiak–Higashi anomaly, 111, 112, 121, 123, 124, 131
recommended units, 19	138
hereditary spherocytosis, 333–5, 333–6	children, see infants and children

bindex 483 25 October 2014 9:44 AM

chronic eosinophilic leukaemia, 451, 457	dyserythropoietic anaemia, 377–80, 377 , 378–80
not otherwise specified, 450–452, 451, 452	acquired, 380–381
chronic lymphocytic leukaemia, 117, 129, 461–3, 462,	congenital, 377–80, 377 , 378–80
463 chronic lymphocytic leukaemia/lymphoma, 460–463,	dysmegakaryopoietic thrombocytopenia, 387
460, 461	E
chronic myelogenous leukaemia, 446–50, 447–9, 449	echinocytosis, 69, 84-6, 85, 85, 86
chronic myeloid leukaemia, 114	ehrlichiosis, 150
atypical, 452–4, 453, 454	elliptocytosis, 82–3, 83
chronic myelomonocytic, 116, 454–5, 454	hereditary, 337–40, 338–40
juvenile myelomonocytic, 455–6, 455, 456	blood film and count, 338-40, 338-40
see also chronic myelogenous leukaemia	differential diagnosis, 340
chronic myelomonocytic leukaemia, 116, 454–5, 454	further tests, 340
chronic neutrophilic leukaemia, 450, 450	endothelial cells, 145, 145
Churg–Strauss syndrome, 239	enolase deficiency, 339
cocaine-induced hyperthermia, 107	eosinopenia, 251, 251
colchicine toxicity, 111–12	eosinophilia, 236–40, 236–40
cold agglutinin, 67	idiopathic hypereosinophilic syndrome, 426–8, 427
cold antibody-induced haemolytic anaemia, 361-2, 362	parasitic infections, 237–8
combined cold/warm autoimmune haemolytic anaemia, 363	with pulmonary infiltration, 240
combined esterase, 287	reactive, 425–6, 425, 426 The sell mediated hypersocional biline 426
congenital dyserythropoietic anaemia, 377–80, 377, 378–80	T-cell mediated hypereosinophilia, 426
congenital erythropoietic porphyria, 97	eosinophils, 112–15, 112–15
congenital sideroblastic anaemia, 299-301, 300, 301	normal range adults, 217
Coulter blood cell counters, erroneous differential white cell count,	infants and children, 222
200–203, 204–5	neonate, 219
crenation, 69	pregnancy, 223
cryoglobulin crystals, 70	epithelial cells, 145, <i>146</i>
cryoglobulinaemia, 115, 132	Epstein–Barr virus 127, 241, 242 , 257 , 381, 394, 418-9
cryohydrocytosis, 346	Epstein syndrome, 114, 389
cutaneous T-cell lymphoma, 473–4, 473	erroneous blood counts, 186–210
cyanmethaemoglobin method, 17–19, 18	automated blood counts, 186–8
cyclical neutropenia, 431–2	automated differential counts, 198-205, 199, 200-203, 204-5
cytochemical techniques, 277–88, 277	haemoglobin concentration, 191-4, 191-3
diagnosis and classification of leukaemia, 280–288	MHC, MCHC, and RDW, 192 , 195
glucose-6-phosphate dehydrogenase, 280	platelet count, 195-7, 195, 196, 198
haemoglobin F-containing cells, 279, 279	red cells, MCV and haematocrit, 178, 192, 194-5
haemoglobin H inclusions, 278–9, 278	reticulocyte count, 205–6, 205
Heinz bodies, 277–8, 277	sources of error, 187, 188
Perls reaction for iron, 279–80, 280	white cell count, 188–91, 189, 190
cytogenetic analysis, 291–2	erythrocytes, see red cells
cytomegalovirus, 128	Escherichia coli, 152
D	essential thrombocythaemia, 395–7, 396
dacrocytes, 84, 84	evacuated containers, 3
diabetes mellitus, 375	F
Diamond–Blackfan anaemia, 382	familial autoimmune/lymphoproliferative syndrome, 366
differential white cell count, 23–5, 24, 25	familial pseudohyperkalaemia, 345–6
imprecision in, 25, 25	familial thrombocytosis, 395
inaccuracy in, 24–5	Fanconi anaemia, 382, 387
maldistribution of cells, 24, 24	fat cells, 146, <i>146</i>
misidentification of cells, 24–5	Fechtner syndrome, 389
unidentifiable cells, 25	fetal blood sampling, 5
DiGeorge syndrome, 388	fetus
dimorphism, 76, 76	normal ranges, 218–20, 220
2,3-diphosphoglycerate deficiency, 355	thrombocytopenia, 256
discocytes, 80	fibrin strands, 69
disintegrated cells, 136–7, 136	filariasis, 168–9, 169–71
disintegrated cells, 136–7, <i>136</i> Döhle bodies, <i>106</i> , 113–14, <i>113</i>	filariasis, 168–9, <i>169–71</i> five-part differential automated cell counters, 31–5, <i>33</i> , 34
-	
Döhle bodies, 106, 113–14, 113	five-part differential automated cell counters, 31–5, 33, 34
Döhle bodies, <i>106</i> , 113–14, <i>113</i> Dorfman–Chanarin syndrome, 112	five-part differential automated cell counters, 31–5, 33, $\bf 34$ fixation of blood films, $\bf 10$ – $\bf 11$, $\bf 11$
Döhle bodies, <i>106</i> , 113–14, <i>113</i> Dorfman–Chanarin syndrome, 112 Down syndrome, <i>142</i>	five-part differential automated cell counters, 31–5, 33, 34 fixation of blood films, 10–11, <i>11</i> flow cytometry, 288–9, <i>289</i> , 290–291 , <i>291</i> , <i>292</i>

bindex 484 25 October 2014 9:44 AM

G	haemolytic anaemia
G6PD, see glucose-6-phosphate dehydrogenase	acquired, 359–77
ghost cells, 82	alloimmune, 365–7
giant platelets, 390	bacterial and parasitic infections, 375
glucose phosphate isomerase deficiency, 354 , 357	cold antibody-induced, 361–2, 362
glucose-6-phosphate dehydrogenase, 280	combined cold/warm autoimmune, 363
deficiency, 350–352, 350, 351, 356	diabetes mellitus, 375
blood film and count, 350–352, 350, 351	drug-induced, 363-4, 364
differential diagnosis, 352	familial autoimmune/lymphoproliferative syndrome,
further tests, 352	366
γ-glutamate cysteine synthase deficiency, 356	haemolytic disease of newborn, 364–5, 365
glutathione peroxidase deficiency, 356 , 358	liver disease, 373, 374
glutathione reductase deficiency, 356	march haemoglobinuria, 375–6
glutathione synthetase deficiency, 356	neonatal glutathione peroxidase deficiency, 373
granulocyte precursors, 133–5, <i>134</i> , <i>135</i>	non-immune, 366–73, 366–7
metamyelocytes, 135, 135	oxidant-induced, 371-3, 372, 373
myeloblasts, 134	paroxysmal cold haemoglobinuria, 362-3, 363
myelocytes, 134, 135	paroxysmal nocturnal haemoglobinuria, 376, 376
promyelocytes, 134, 134	phosphate depletion, 375
granulocytes	renal disease, 373
morphology, 99–123	snake and insect bites, 375, 375
basophils, 122-3, 123	vitamin E deficiency, 375
eosinophils, 119–22, 119–22	warm autoimmune, 359-61, 359, 360
neutrophils, 99–118, 99	Wilson disease, 373, 374, 375
normal range in adults, 217	congenital, 330–359
grape cells, 127	cryohydrocytosis, 346
grey platelet syndrome, 388, 392	familial pseudohyperkalaemia, 345–6
Griscelli syndrome, 138	hereditary elliptocytosis, 337–40, 338–40
	hereditary pyropoikilocytosis, 340-342, 343
Н	hereditary spherocytosis, 331-7, 332-6
haematocrit	hereditary stomatocytosis, 343-4, 343, 344
errors in, 192	hereditary xerocytosis, 344-5, 345
high, 10	red cell enzyme abnormalities, 347-50, 348, 349
haemoflagellates, 165–7, 166, 167	South-East Asian ovalocytosis, 342–3, 342
haemoglobin Bart's hydrops fetalis, 311–12, 311	stomatin-deficient cryohydrocytosis, 346
haemoglobin C disease, 82, 318–19, 319	congenital non-spherocytic, 339, 354-9, 354-6, 357,
haemoglobin C trait, 319–20, 320	358
haemoglobin C/β-thalassaemia, 320, 320	congenital sitosterolaemia, 346-7
haemoglobin concentration, 17–19, 18, 29	microangiopathic, 90, 366-71, 367-8, 368-71
cyanmethaemoglobin method, 17–19, 18	see also specific types
errors in, 191–4, 191–3	haemolytic disease of newborn, 364-5, 365
normal range	haemolytic-uraemic syndrome, 89, 369
adults, 216	hairy cell leukaemia, 464–6, 465
fetus, 220	variant, 466, 466
infants and children, 221	heel puncture, 4
neonate, 218	Heinz bodies, 27 , <i>82</i> , <i>373</i>
pregnancy, 223	cytochemical techniques, 277-8, 277
preterm infants, 223	Hematoflow platform, 35, 37
recommended units, 19	hereditary stomatocytosis, 343-4, 343, 344
haemoglobin Constant Spring, 95	hereditary xerocytosis, 344–5, 345
haemoglobin distribution width, 216	Hermansky–Pudlak syndrome, 124, 138
haemoglobin E disease, 320–321, 321	hexokinase deficiency, 354
haemoglobin E trait, 321–2, 321	Histoplasma capsulatum, 153
haemoglobin E/β-thalassaemia, 322, 322	HIV/AIDS, 422–3, 422, 423
haemoglobin F-containing cells, 279, 279	Hodgkin lymphoma, 476–7
haemoglobin H disease, 309–11, 310, 311	Horiba ABX blood cell counter, 49
haemoglobin H inclusions, 27	Howell–Jolly bodies, 27, 91, 94–5, 150
cytochemical techniques, 278-9, 278	human T-cell lymphotropic virus, 424
haemoglobin S, 317	hyperchromia, 76
haemoglobin S-Oman, 95	hypercoagulability, 69
haemoglobinopathies, 312–23	hyperlipidaemia, 71
see also individual conditions	hyperthermia, cocaine-induced, 107
haemoglobin, unstable, 322–3, 323	hypochromia, 75–6, 75
haemolysis, 377	hyposplenism, 143–4, 144

bindex 485 25 October 2014 9:44 AM

indopathic hypereosinophilic yndrome, 110, 119, 426–8, 427 immunocytechemistry, 239, 292 immunocytechemistry, 239, 292 applications, 290–291 infantile phycorytos, 288–289, 291, 292 applications, 290–291 infantile phycorytos, 288 infants and children blood film, 143 normal ranges, 220–223, 221–3 basophilis, 222 cosinophis, 222 cosinophis, 222 abareoglobib, 221, 223 large unstained cells, 232 lymphocyte, 232 mean cell haemoglobin, 221 mean cell volume, 221 med cell count, 232 packed cell volume, 221 infectious monomourclossh, 418–22, 419, 420, 430 421 Jordans anomaly, 112, 124 jordans	I	chronic eosinophilic, 451, 457
immunopchenything, 289, 292 immunopchenything, 289, 292 immunopchenything, 289, 292, 291, 292 applications, 290–291 infantile pyknocytosis, 88 infants and children blood filin, 143 normal ranges, 220–223, 221–3 basophils, 222 basemojkbin, 221, 223 basophils, 222 bamenojkbin, 221, 223 bare men cell haemoglobin, 221 mean cell haemoglobin, 221 mean cell haemoglobin, 221 mean cell haemoglobin, 221 mean cell haemoglobin, 221 monocytes, 222 neutrophils, 222 packed cell volume, 221 red cell count, 222 reached cell, 242 plasma cell, 470–472, 471 rorollymphocyte B lineage, 464, 464 T-lineage, 464, 464 T-lineage, 464, 464 T-lineage, 464, 464 T-lineage, 245, 469 T-lineage, 245, 469 T-lineage, 246, 464 T-lineage, 246 Rologian, 346-red lineage, 346 Rologian, 347-red, 348 Rologian, 347-red, 34		
immuncytochemistry, 289, 292 immunophenotyping, 284-9, 289, 292, 1, 292 applications, 290-291 infantile pyknoyrosis, 88 infans and children blood film, 143 normal ranges, 220-223, 221-3 basophib, 222 cosinophils, 222 cosinophib, 222 cosinophib, 222 cosinophib, 222 man cell baemoglobin, 221 impace, 222 mean cell baemoglobin, 221 monocytes, 222 mean cell baemoglobin, 221 monocytes, 222 neturophibis, 222 packed cell volume, 221 monocytes, 225 packed cell volume, 221 monocytes, 226 infectious monomulcosis, 418-22, 419, 420, 421 jumphocyte, 287 Infectious monomulcosis, 418-22, 419, 420, 421 Jordans anomaly, 112, 124 juvenile myelomonocytic letukaemia, 455-6, 455, 456 Ikeratocytes, 89, 90 Kibisidia anytau, 157 K K K Kibisidie avytau, 157 Kibisidie avytau, 157 Liacata dehydrogenase deliciency, 355 large granular lymphocyte, 128-9, 129, 129, 129 large unstained cells normal range adults, 217 infants and children, 222 lead poisoning, 310-2, 302 Leichtamid adonovani, 154, 166, 167, 168 plocytes, 56 leucocytes, 58e white cells leucocytish, 234-42, 234 leucocytish, 234-42, 241 leucocytribolastic inanemia, 247 leucocytribolas		-
immunophenotyping, 284-9, 289, 291, 292 applications, 290-931 infanite pythocyrosis, 88 infants and children blood film, 143 normal ranges, 220-223, 221-3 basophils, 222 haemoglobin, 221, 223 harge unstained cells, 222 lymphocyres, 222 mean cell haemoglobin, 221 mean cell volume, 221 monocyres, 222 nemoncytis, 222 nemoncytis, 222 nemoncytis, 223 nonocyres, 222 nemoncytis, 221 nonocyres, 222 nemoncytis, 221 red cell count, 231 red cell count, 241 insect bites, 375 fron deficiency anaemia, 295-8, 296, 298 tregularly contracted red cells, 81, 82, 83 Joadans anomaly, 112, 124 juvenitle myclomonocytic leukaemia, 455-6, 455, 456 large granular lymphocyte, 475, 475 for deficiency anaemia, 295-8, 296, 298 tregularly contracted red cells, 81, 82, 83 TK Keratocytes, 89, 90 Kribsidia vayoza, 151 Kleinaeri ests, 248 krizocytes, 99, 90 Kribsidia vayoza, 152 Letamari dans and children, 222 lead poisoning, 301-2, 302 Letamari dans and children, 222 lead poisoning, 301-2, 302 Letamari dans and children, 222 lead poisoning, 301-2, 302 Letamaria domovant, 154, 166, 167, 168 leptocytes, 76 leucocytes, 82, 94-14, 257 basophilia, 240-241, 241 cosinophilia, 234-24, 241 cosinophilia, 234-24, 241 cosinophilia, 234-24, 247 leucocyrinbollastic lobol flins, 135-6 leucocytrinbollastic inaemia, 247 leucocyrinbollastic inaemia, 247 leucocyrinbollastic inaemia, 247 leucocyrinbollastic inaemia, 247 leucocyrinbollastic, 188 acute myelold, 109, 118, 434-44 acute lympholytes, 466-7, 467 mantie cell, 469, 469 splinic with villous lymphopytes, 466-7, 467 mantie cell, 469, 469 splinic with villous lymphopytes, 466-7, 467 mantie cell, 469, 469 splinic with villous lymphopytes, 466-7, 467 mantie cell, 469, 469 splinic with villous lymphopytes, 466-7, 467 man		
applications, 290-291 infantile pythocytosis, 88 infants and children blood film, 143 normal ranges, 220-223, 221-3 basophils, 222 cosinophils, 222 cosinophils, 222 aharengolibin, 221, 223 large unstained cells, 222 lymphocytes, 222 mean cell haemoglobin, 221 menoncytes, 222 mean cell haemoglobin, 221 menoncytes, 222 mean cell haemoglobin, 221 menoncytes, 222 netrophils, 222 packed cell volume, 221 menoncytes, 222 packed cell volume, 221 menoncytes, 222 packed cell volume, 221 metorophils, 222 packed cell volume, 221 metorophils, 222 packed cell volume, 221 metorophils, 225 prindic count, 221 infectious mononucleosis, 418-22, 419, 420, 421 jurnel employmonocytic leukaemia, 455-6, 455, 456 Ivyrenile myelomonocytic leukaemia, 455-6, 455, 456 K K K K K K K K K K K K K K K K K K	* * * * * * * * * * * * * * * * * * * *	
infamile pyknocytosis, 88 infamisans and children blood film, 143 chronic myclomonocytic, 116, 454–5, 454 chronic myclomonocytic, 116, 454–5, 454 chronic meutrophilic, 450, 450 chronic neutrophilic, 450, 450 chronic neutrophilic and phopolitic, 450 chronic neutrophilic and phopolitic, 450 chronic neutrophilic neutrophilic, 450 chronic neutrophilic,		
inlams and children blood film, 143 normal ranges, 220–223, 221–3 basophils, 222 eosinophils, 222 eosinophils, 222 eosinophils, 222 nating unstained cells, 222 hymphocytes, 222 mean cell volume, 221 mean cell volume, 221 men cell volume, 221 men cell volume, 221 men cell volume, 221 monocytes, 222 neutrophils, 223 neutrophils, 224 neutrophils, 225 naphthol A5-D chloroacetate esterase, 286, 286, 286, 287, 287 neutrophil alkaline phosphatases, 82, 824–2, 281, 282, 283, 284 non-specific esterases, 286–7, 287 neutrophil alkaline phosphatases, 281–2, 281, 282, 283, 284 non-specific esterases, 286–7, 287 periodic acid-Schiff reaction, 273, 287–8, 287 sudan black, 272, 284–5, 285 large granular lymphocyte, 475, 475 large unstained cells, 81, 82, 83 L keratocytes, 89, 90 keratocytes, 89, 80 keratocytes, 80 kerat	7.7	
bbood film, 143 normal ranges, 200–223, 221–3 basophils, 222 cesinophils, 222 harmoglobin, 221, 223 large unstained cells, 222 lymphory, cest, 222 mean cell hacmoglobin, 221 mean cell volume, 231 mean cell volume, 231 mean cell volume, 231 mean cell volume, 231 mean cell volume, 241 mean cell volume, 242 mean cell volume, 241 mean cell volume, 241 mean cell volume, 242 mean cell volume, 242 mean cell volume, 241 mean cell volume, 242 mean cell volume, 241 mean cell volume, 242 mean cell volume, 242 mean cell volume, 243 mean cell volume, 244 mon-specific estrace, 286, 286, mon-specific estrace, 286, 286, mon-specific estrace, 286, 286, mon-specific estrace, 286, 287, 287 sudan black B, 272, 284-5, 285 hairy cell volume, 241 mon-specific estrace, 286, 245, 245 mon-specific estrace, 286-7, 287 mast cell volume, 241 mon-specific estrace, 286-7, 287		
normal ranges, 220–232, 221–3 basophils, 222 eosinophils, 222 eosinophils, 222 eosinophils, 222 eosinophils, 222 large unstained cells, 222 large unstained cells, 222 lymphocytes, 222 mean cell baemoglobin, 221 mean cell volume, 221 mean cell volume, 221 monovyers, 222 neurophils, 222 eosinophile, 201 monovyers, 222 neurophils, 222 neurophils, 222 neurophils, 221 red cell count, 222 red cell count, 221 red cell count, 222 red cell count, 221 red cell count, 222 red cell count, 222 red cell count, 222 red cell count, 223 red cell cell cell red		
basophils, 222 cosinophils, 222 haemoglobin, 221, 223 haemoglobin, 221, 223 large unstained cells, 222 lymphocytes, 222 men cell haemoglobin, 221 men cell volume, 221 men cell volume, 221 men cell volume, 221 monocytes, 222 packed cell volume, 221 packed cell volume, 222 packed cell volume, 221 packed cell volume, 222 packed cell volume, 231 packed cell volume, 247 packed cell volume, 248 packed cell volume, 24		
combined setrase, 287	_	_
hammeglobin, 221, 223 large unstained cells, 222 lymphocytes, 222 mean cell hammoglobin, 221 mean cell volume, 221 packed cell volume, 221 red cell count, 221 white cell count, 221 infectious monoutcoiss, 418–22, 419, 420, 421 data to the cell state of t	-	
large unstained cells, 222 man pathol AS-D chloroacetate esterase, 286, 286, 286, 287 mena cell haemoglobin, 221 mena cell haemoglobin, 221 mena cell volume, 221 monoves, 222 meutrophils 222 packed cell volume, 221 monoves, 222 monoves, 222 monoves, 222 monoves, 222 monoves, 223 monoves, 221 monoves, 221 monoves, 221 monoves, 221 monoves, 222 monoves, 222 monoves, 222 monoves, 222 monoves, 223 monoves, 224 monoves, 221 monoves, 222 monoves, 222 monoves, 223 monoves, 224 monoves, 224 monoves, 225 monoves, 224 monoves, 225 monoves, 225 monoves, 226 monoves, 226 monoves, 227 monoves, 228		
hymphocytes, 222 287 283, 284 281, 282, 284 283, 284, 284 283, 284, 284, 284 283, 284, 284, 284, 284, 284, 284, 284, 284		
mean cell haemoglobin, 221 mean cell volume, 221 monocytes, 222 neutrophils, 222 red cell count, 221 red cell count, 221 white cell count, 222 infectious mononucleosis, 418–22, 419, 420, 421 insect bites, 375 iron deficiency anaemia, 295–8, 296, 298 irregularly contracted red cells, 81, 82, 83 Jordans anomaly, 112, 124 juvenile myclomonocytic leukaemia, 455–6, 455, 456 Jordans anomaly, 112, 124 juvenile myclomonocytic leukaemia, 455–6, 455, 457 K Ke laupus erythematosus, 116 Ke laupus erythematosus, 116 Keishauer test, 248 Kizibauer test, 248 Kizibauer test, 248 Kizibauer test, 248 La lau, 154, 169, 171 K Ke laupus erythematosus, 116 Kizibauer test, 248 La laupus erythematosus, 116 Riphocytes, 92 La laea dehydrogenase deficiency, 355 large unstained cells normal range adults, 217 large unstained cells normal range adults, 218 laupus erythematosus, 116 l	_	
menn cyley. 222 neutrophils, 222 neutrophils, 222 neutrophils, 222 neutrophils, 222 packed cell volume, 221 red cell count, 221 white cell count, 221 infectious monoucleosis, 418–22, 419, 420, 421 iron deficiency anaemia, 295–8, 296, 298 irregularly contracted red cells, 81, 82, 83 Jordans anomaly, 112, 124 juvenile myelomonocytic leukaemia, 455–6, 455, 456 Iliverdiness anomaly, 112, 124 juvenile myelomonocytic leukaemia, 455–6, 455, 457 K K Keratocytes, 89, 90 Kkesidia ayavea, 151 Kkeitalea ayavea, 151 Kleihauer test, 248 kinżocytes, 92 lactate dehydrogenase deficiency, 355 large granular lymphocyte leukaemia, 475, 475 large unstained cells normal range adults, 217 infants and children, 222 lead poisoning, 301–2, 302 lez depósoning, 402–401, 241 cosinophilia, 236–40, 236–40 leucocytrosis, 234–41, 235 leucocopythroblastic anaemia, 247 leucocytrosis, 244–41, 241 cosinophilia, 438, 440, 440 acute myeloid, 109, 118, 432–40, 443 anue myeloid, 109, 118, 432–40		
monocytes, 222 neutrophills, 222 packed cell volume, 221 red cell count, 221 white cell count, 221 white cell count, 221 white cell count, 222 infectious mononucleosis, 418–22, 419, 420, 421 inscet bites, 375 422 inscet bites, 375 projumphocyte, 475, 475 421 inscet bites, 375 projumphocyte, 475, 475 mast cell, 464–40, 465, 466 421 inscet bites, 375 projumphocyte, 475, 477 mast cell, 464–42, 442, 442 plasma cell, 470–472, 471 projumphocytic projumphocytic projumphocytic plasma anomaly, 112, 124 juvenile myelomonocytic, 466 projumphocytic projumphocytic projumphocytic plasma anomaly, 112, 124 juvenile myelomonocytic jetukaemia, 455–6, 455, 456 juvenile myelomonocytic jetukaemia, 455–6, 455, 456 projumphocyte, 470–472, 471 projumphocytic projumphocytic projumphocytic plasma anomaly, 112, 124 juvenile myelomonocytic jetukaemia, 455–6, 455, 456 projumphocyte, 123–30, 428–31 juvenile myelomonocytic jetukaemia, 455–6, 455, 456 projumphocyte, 123–30, 123–30 projumphocyte, 125–8, 126–9 projumphocyte, 125–8, 126–9 projumphocyte, 126, 126, 126, 126 projumphocyte, 126, 126 projumphocyte, 126, 126 projumphocyte, 126, 126 projumphocyte,	_	
neurophils, 222 packed cell volume, 221 packed cell volume, 222 packed cell volume, 221 packed cell volume, 222 packed cell volume, 223 packed cell volume, 224 packed cell volume, 225 packed cell volume, 226 packed cell volume, 227 packed cell volume, 226 packed cell volume, 226 packed cell volume, 226 packed cell volume, 227 packed cell volume, 228 packed cell volume, 228 packed cell volume, 229 packed cell volume, 229 packed cell volume, 229 packed cell volume, 226 packed cell volume, 226 packed cell volume, 226 packed cell volume, 226 packed cell volume, 227 packed cell volume, 226 packed cell volume, 227 packed cell volume, 228 packed cell volume, 229 packed cell volume, 229 packed cell volume, 229 packed cell volume, 236 packed cell vo		
packed cell volume, 221 red cell count, 221 white cell count, 221 white cell count, 221 white cell count, 221 infectious mononucleosis, 418–22, 419, 420, 421 insect bites, 375 421 insect bites, 375 plasmate, 295–8, 296, 298 irregularly contracted red cells, 81, 82, 83 irregularly contracted red cells, 81, 82, 83 Jordan anomaly, 112, 124 juvenile myelomonocytic leukaemia, 455–6, 455, 456 Jovenile myelomonocytic leukaemia, 455–6, 455, 456 Keratocytes, 89, 90 Klebisella avytoa, 151 Klehauer test, 248 knizocytes, 92 Late dehydrogenase deficiency, 355 large granular lymphocyte leukaemia, 475, 475 large granular lymphopyte leukaemia, 475, 475 large granular lymphocyte leukaemia, 475, 475 large granular lymphocyte leukaemia, 475, 475 large granular lymphocyte leukaemia, 475, 475 large unstained cells normal range adults, 217 infants and children, 222 lead poisoning, 301–2, 302 Łetkimania donovant, 154, 166, 167, 168 leptocytes, 5e leucocytes, 5e leucocytes, 234–41, 235 basophilia, 240–241, 241 cosinophilia, 234, 236, 236 leucocythroblastic donovant, 154, 166, 167, 168 leucocytes, 5e leucocytes, 5e leucocytes, 5e leucocytes, 5e leucocytes, 5e leucocytes, 5e leucocythroblastic abaema, 247 leucocythroblastic donor limphocyte leukaemia, 247 leucocythroblastic donor limphocyte, 248 leucocythroblastic donor limphocyte, 249, 450 acute lymphodiae, 248 leucocythroblastic donor limphocyte, 240, 450 acute lymphocyte, 463 lymphocyte, 467–8, 467 lymphoplasmacytic, 467–8, 467 leucocythroblastic, 437–90, 488		
red cell count, 221 white cell count, 222 infectious mononucleosis, 418–22, 419, 420, 421 insect bites, 375 insect bites, 375 insect bites, 375 iron deficiency anaemia, 295–8, 296, 298 irregularly contracted red cells, 81, 82, 83 Jordans anomaly, 112, 124 juvenile myelomonocytic leukaemia, 455–6, 455, 456 Jordans anomaly, 112, 124 juvenile myelomonocytic leukaemia, 455–6, 455, 456 liver disease, 373, 374 Loa loa, 154, 169, 171 Ke keratocytes, 89, 90 Kebisiella oxytoar, 151 Kleihauer test, 248 knizocytes, 92 Loa cate dehydrogenase deficiency, 355 large granular lymphocyte leukaemia, 475, 475 large unstained cells normal range adults, 217 infants and children, 222 lead poisoning, 301–2, 302 Lelachmania domauni, 154, 166, 167, 168 leiptocytes, 76 leucocytes, 824–41, 235 basophilia, 240–241, 241 eucotyotis, 234–41, 235 basophilia, 234–24, 236–40 neurophilia, 234, 236, 236 leucocythroblastic anaemia, 247 leucoerythroblastic anaemia, 248 acute myoloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 lymphoplasmacut, 147–6, 465 large granular lymphonyte, 445 large unstained and thildren, 249 lymphoplasmacut, 467–8, 467 large distributed and the properties of the prop		
infectious mononucleosis, 418–22, 419, 420, 421 insect bites, 375 infectious mononucleosis, 418–22, 419, 420, 421 insect bites, 375 insect bites, 375 insect bites, 375 iron deficiency anaemia, 295–8, 296, 298 irregularly contracted red cells, 81, 82, 83 Jordans anomaly, 112, 124 juvenile myelomonocytic leukaemia, 455–6, 455, 456 Jordans anomaly, 112, 124 juvenile myelomonocytic leukaemia, 455–6, 455, 456 Keratocytes, 89, 90 Ktebiella oxytoca, 151 Kleihauer test, 248 Kleihauer test, 248 Kleihauer test, 248 Kleihauer test, 248 Kleinauer della oxytoca, 151 Iarge granular lymphocyte leukaemia, 475, 475 large granular lymphocyte leukaemia, 475, 475 large granular lymphocyte leukaemia, 475, 475 large unstained cells normal range adults, 217 infants and children, 222 lead poisoning, 301–2, 302 Leakimania domovani, 154, 166, 167, 168 leptocytes, 76 lepto	-	
infectious mononucleosis, 418–22, 419, 420, 421 insect bites, 375 iron deficiency anaemia, 295–8, 296, 298 irregularly contracted red cells, 81, 82, 83 J J Jordans anomaly, 112, 124 juvenile myelomonocytic leukaemia, 455–6, 455, 456 K keratocytes, 89, 90 Klebsiella oxytoca, 151 Kleihauer test, 248 knizocytes, 92 L lactate dehydrogenase deficiency, 355 large unstained cells normal range adults, 217 large unstained cells normal range adults, 217 large unstained cells normal range adults, 217 larges white cells leucocytes, 8e white cells leucocytes, 8e white cells leucocytosis, 234–41, 235 Lectorytosis, 234–41, 235 Lectorytosis, 234–41, 235 Lectorytosis, 234–41, 241 cosinophilia, 234, 236, 236 leucocytrythroblastic anaemia, 247 leucoerythroblastic blood films, 135–6 leucoperythroblastic anaemia, 247 leucoerythroblastic blood films, 135–6 leucoperythroblastic anaemia, 247 leucoerythroblastic anaemia, 247 leucoerythroblastic blood films, 135–6 leucopythroblastic, 184 acute myeloid, 428–9, 426, 466 T-lineage, 440, 440 acute lymphodytosis, 241–2, 242 lymphodytosis, 241–2, 242 lymphodytosis, 241–2, 242 lymphodytosis, 241–2, 246 lymphodytosis, 241–2, 246 lymphodytosis, 241–2, 246 leucopythroblastic anaemia, 247 leucoerythroblastic blood films, 135–6 leucopythroblastic anaemia, 247 leucoerythroblastic blood films, 135–6 leucopythroblastic anaemia, 247 leucoerythroblastic		
### 121 insect bites, 375 iron deficiency anaemia, 295–8, 296, 298 irregularly contracted red cells, 81, 82, 83 Jordans anomaly, 112, 124 juvenile myelomonocytic leukaemia, 455–6, 455, ### 456 #### 456 #### 456 #### 456 #### 456 #### 456 ##### 456 ####################################		
plasma cell. 470-472, 471		
iron deficiency anaemia, 295–8, 296, 298 irregularly contracted red cells, 81, 82, 83 J B-lineage, 464, 464 T-lineage, 472–3, 472 leukaemoid reactions, 428–31 Jordans anomaly, 112, 124 juvenile myelomonocytic leukaemia, 455–6, 455, 456 456 168 189 180 180 180 180 180 180 18		
B-lineage, 464, 464 T-lineage, 472-3, 472 Jordans anomaly, 112, 124 lymphoid, 430-431, 430, 431 iuvenile myelomonocytic leukaemia, 455-6, 455, and 456 liver disease, 373, 374 Loa loa, 154, 169, 171 lupus erythematosus, 116 lymphocytes, 123-30, 123-30 Kleibiauel rest, 248 liver disease, 373, 374 Loa loa, 154, 169, 171 lupus erythematosus, 116 lymphocytes, 123-30, 123-30 Kleibiauel rest, 248 liver disease, 373, 374 Loa loa, 154, 169, 171 lupus erythematosus, 116 lymphocytes, 123-30, 123-30 morphological abnormalities, 124-5, 124, 125, 126 in lymphoproliferative disorders, 129-30, 129, 130 Lactate dehydrogenase deficiency, 355 anormal range adults, 217 infants and children, 222 neonate, 219 arge unstained cells normal range adults, 217 infants and children, 222 prepnancy, 209 lead poisoning, 301-2, 302 lymphocytopenia (lymphopenia), 251-2, 252 lymphocytopenia (lymphopenia), 251-2, 252 lymphocytes, 234-41, 235 lymphoid cells, apoptotic, 129, 129 lymphoid leukaemoid reactions, 430-431, 430, 431 leucocytes, see white cells leucocytosis, 234-41, 235 lymphoid myeloid neoplasms with abnormalities of PDGFRA, PDGFRB or FGFR1, 457 lymphoma adult T-cell leukaemia/lymphoma, 474-5, 475 leucocytrhroblastic anaemia, 247 leucocythroblastic anaemia, 247 leucocytrhroblastic anaemia, 248 leukaemia load, 430, 440 leucocythroblastic anaemia, 248 leukaemia load, 430, 440 leucopenia, 248 leukaemia load, 430, 440 leucopenia, 248 leukaemia load, 430, 440 leucopenia, 248 leukaemia load, 443 leukaemia leukaemia load, 467 leucopenia, 468 leukaemia		*
Tilineage, 472–3, 472 leukaemoid reactions, 428–31 lymphoid, 430–431, 430, 431 juvenile myelomonocytic leukaemia, 455–6, 455, 456 liver disease, 373, 374 Loa lea, 154, 169, 171 K lupus crythematosus, 116 lupus crythematosus, 117 lupus crythematosus, 117 lupus crythematosus, 118 lupus crythemat		
Dordans anomaly, 112, 124 lymphoid, 430–431, 430, 431 mymboid, 428–9, 439, 430 mymboid, 438–9, 439, 430 mymboid, 438–9, 439, 430 mymboid, 428–9, 468 mymboid, 428–9, 467 mymboid, 429–40, 437 mymboid, 467–8, 467 mymboid, 467–8, 467 mymboid, 469–8, 467	, , , , , ,	
Jordans anomaly, 112, 124 Iymphoid, 430–431, 430, 431 myeloid, 428–9, 429, 430 456	J	
juvenile myelomonocytic leukaemia, 455–6, 455, 456 456 1iver disease, 373, 374 Loa loa, 154, 169, 171 K keratocytes, 89, 90 Klebisella oxytoca, 151 Kleihauer test, 248 knizocytes, 92 Loa loa, 154, 169, 179 Loa loa, 154, 169, 179 Loa loa, 154, 166, 167, 168 leptocytes, 76 leucocytes, 89, 90 Leisonphilia, 236–241, 241 eosinophilia, 236–40, 236–40 neutrophilia, 236–40, 236–40 neutrophilia, 234, 236, 236 leucocythroblastic anaemia, 247 eucue monoblastic, 184 acute basophilic, 438, 440, 440 acute lymphoplasmacytic, 467–8, 467 acute lymphoplasmacytic, 147–8, 467 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 lupus erythematosus, 116 lupus lupus erythematosus 116 lupus erythematosus, 116 lupus erythematosus, 116 lupus e	Jordans anomaly, 112, 124	
Loa loa, 154, 169, 171		
Loa loa, 154, 169, 171 K		
K lupus erythematosus, 116 keratocytes, 89, 90 lymphocytes, 123–30, 123–30 Klebiala wytora, 151 morphological abnormalities, 124–5, 124, Kleihauer test, 248 125, 126 knizocytes, 92 in lymphoproliferative disorders, 129–30, 129, 130 L reactive changes, 125–8, 126–9 lactate dehydrogenase deficiency, 355 normal range large granular lymphocyte leukaemia, 475, 475 adults, 217 large unstained cells infants and children, 222 normal range pregnancy, 209 adults, 217 infants and children, 222 lead poisoning, 301–2, 302 lymphocytopenia (lymphopenia), 251–2, 252 lead poisoning, 301–2, 302 lymphoid cells, apoptotic, 129, 129 Leptocytes, 76 lymphoid leukaemoid reactions, 430–431, 430, leucocytes, see white cells 431 leucocytosis, 234–41, 235 lymphoid/myeloid neoplasms with abnormalities of PDGFRA, PDGFRB or FGFRI, 457 basophilia, 240–241, 241 eosinophilia, 236–40, 236–40 adult T-cell leukaemia/lymphoma, 474–5, 475 leucocrythroblastic anaemia, 247 Burkitt, 469 Burkitt, 469 leucocrythroblastic blood films, 135–6 cutane		
keratocytes, 89, 90 lymphocytes, 123–30, 123–30 Klebisla avytoca, 151 morphological abnormalities, 124–5, 124, Kleinhauer test, 248 125, 126 knizocytes, 92 in lymphoproliferative disorders, 129–30, L reactive changes, 125–8, 126–9 lactate dehydrogenase deficiency, 355 normal range large granular lymphocyte leukaemia, 475, 475 adults, 217 large unstained cells infants and children, 222 ead pisoning, 301–2, 302 lymphocytopenia (lymphopenia), 251–2, 252 lead poisoning, 301–2, 302 lymphocytosis, 241–2, 242 Leishmania donovani, 154, 166, 167, 168 lymphoid leukaemoid reactions, 430–431, 430, leucocytes, 56 lymphoid leukaemoid reactions, 430–431, 430, leucocytosis, 234–41, 235 lymphoid/myeloid neoplasms with abnormalities of PDGFRA, basophilia, 240–241, 241 PDGFRB or FGFRI, 457 eosinophilia, 234, 236, 236 lymphoma leucocythroblastic anaemia, 247 Burkit, 469 leucoerythroblastic blood films, 135–6 Cutaneous T-cell, 473–4, 473 leucoepnia, 248 Hodgkin, 468–9, 468 leukaemia Hodgkin, 476–7 lymphoplasmacytic, 467–8	K	
Klebsiella oxytoca, 151morphological abnormalities, 124–5, 124,Kleihauer test, 248125, 126knizocytes, 92in lymphoproliferative disorders, 129–30, 129, 130Lreactive changes, 125–8, 126–9lactate dehydrogenase deficiency, 355normal rangelarge granular lymphocyte leukaemia, 475, 475adults, 217large unstained cellsnormal rangeadults, 217neonate, 219infants and children, 222pregnancy, 209lead poisoning, 301–2, 302lymphocytopenia (lymphopenia), 251–2, 252leptocytes, 76lymphoid cells, apoptotic, 129, 129leucocytes, see white cells431leucocytes, see white cells431leucocytes, see white cells431leucocytes, 324–41, 235lymphoid/myeloid neoplasms with abnormalities of PDGFRA, PDGFRB or FGFR1, 457basophilia, 234, 236, 236adult 7-cell leukaemia/lymphoma, 474–5, 475leucocythroblastic anaemia, 247Burkitt, 469leucocythroblastic blood films, 135–6cutaneous T-cell, 473–4, 473leucopenia, 248follicular, 468–9, 468leukaemiaHodgkin, 476–7acute basophilic, 438, 440, 440lymphoplasmacytic, 467–8, 467acute myeloid, 109, 118, 432–40, 433, 434–42T-cell, 469, 469acute myeloid, 109, 118, 432–40, 433, 434–42T-cell, 469, 469acute myeloid, 109, 118, 432–40, 433, 434–42T-cell, 475–6, 476of Down syndrome, 443lymphoplasmacytic lymphoma, 467–8, 467	keratocytes, 89, 90	
Kleihauer test, 248 125, 126 knizocytes, 92 in lymphoproliferative disorders, 129–30, L 129, 130 L reactive changes, 125–8, 126–9 lactate dehydrogenase deficiency, 355 normal range large granular lymphocyte leukaemia, 475, 475 adults, 217 large unstained cells neonate, 219 normal range neonate, 219 adults, 217 pregnancy, 209 infants and children, 222 lymphocytopenia (lymphopenia), 251–2, 252 lead poisoning, 301–2, 302 lymphocytosis, 241–2, 242 Leishmania donovani, 154, 166, 167, 168 lymphocytosis, 241–2, 242 leptocytes, 76 lymphotid leukaemoid reactions, 430–431, 430, leucocytes, see white cells 431 leucocytes, see white cells 431 leucocytosis, 234–41, 235 lymphoid/myeloid neoplasms with abnormalities of PDGFRA, basophilia, 240–241, 241 PDGFRB or FGFR1, 457 eosinophilia, 236–40, 236–40 lymphoma neutrophilia, 234, 236, 236 adult T-cell leukaemia/lymphoma, 474–5, 475 leucoerythroblastic blood films, 135–6 cutaneous T-cell, 473–4, 473 leucoerythroblastic blood films, 135–6 cutaneous T-cell, 473–4, 473	Klebsiella oxytoca, 151	
L reactive changes, 125–8, 126–9 lactate dehydrogenase deficiency, 355 large granular lymphocyte leukaemia, 475, 475 large unstained cells normal range adults, 217 infants and children, 222 lead poisoning, 301–2, 302 lead poisoning, 301–2, 302 leteishmania donovani, 154, 166, 167, 168 leucocytes, 56 leucocytes, 524–41, 235 basophilia, 240–241, 241 eosinophilia, 236–40, 236–40 neutrophilia, 236–40, 236–40 neutrophilia, 234, 236, 236 leucocytyroblastic anaemia, 247 leucoprinoblastic anaemia, 247 leucopenia, 248 leukaemia acute basophilic, 438, 440, 440 acute lymphoplastic, 457–60, 458–60, 459 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 Letshmania denovari, 154, 166, 167, 168 lymphocytosis, 241–2, 242 lymphocytosis, 241–2, 242 lymphocytosis, 241–2, 242 lymphoid cells, apoptotic, 129, 129 lymphoid cells, apoptotic, 129, 129 lymphoid leukaemioid reactions, 430–431, 430, 431 lymphoid/myeloid neoplasms with abnormalities of PDGFRA, PDGFRB or FGFR1, 457 lymphoma adult T-cell leukaemia/lymphoma, 474–5, 475 leucoerythroblastic anaemia, 247 lymphoplasmacytic, 467–8, 467 acute basophilic, 438, 440, 440 acute lymphoblastic, 457–60, 458–60, 459 acute monoblastic, 184 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 lymphoplasmacytic lymphoma, 467–8, 467	Kleihauer test, 248	
Lactate dehydrogenase deficiency, 355 large granular lymphocyte leukaemia, 475, 475 large unstained cells normal range adults, 217 infants and children, 222 neonate, 219 pregnancy, 209 infants and children, 222 lymphocytopenia (lymphopenia), 251–2, 252 lead poisoning, 301–2, 302 leich processes white cells leucocytes, 76 leucocytes, see white cells leucocytes, see white cells leucocytosis, 234–41, 235 basophilia, 240–241, 241 eosinophilia, 236–40, 236–40 neutrophilia, 234, 236, 236 leucocythroblastic anaemia, 247 leucocrythroblastic anaemia, 247 leucocrythroblastic anaemia, 247 leucocrythroblastic blood films, 135–6 leucoerythroblastic blood films, 135–6 leuchaemia acute basophilic, 438, 440, 440 acute pymphoblastic, 457–60, 458–60, 459 acute monoblastic, 184 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 lymphoglasmacytic lymphoma, 467–8, 467 lymphoplasmacytic lymphootytes, 466–7, 467 lymphoplasmacytic lymphoplasmacytic lymphoma, 467–8, 467 lymphoplasmacytic lymphoma, 467–8, 467	knizocytes, 92	in lymphoproliferative disorders, 129-30,
lactate dehydrogenase deficiency, 355 large granular lymphocyte leukaemia, 475, 475 large unstained cells normal range adults, 217 infants and children, 222 lead poisoning, 301–2, 302 lead poisoning, 301–2, 302 letishmania donovani, 154, 166, 167, 168 letucocytoss, 241–2, 242 leticytoss, 244–1, 235 leucocytoss, 234–41, 235 leucocytosis, 234–41, 235 leucocytosis, 234–41, 235 leucocytosis, 234–41, 241 eosinophilia, 236–40, 236–40 neutrophilia, 234, 236, 236 leucocythroblastic anaemia, 247 leucocythroblastic blood films, 135–6 leucocythroblastic blood films, 135–6 leucoenia, 248 leukaemia acute basophilic, 438, 440, 440 acute lymphoblastic, 184 acute monoblastic, 184 acute monoblastic, 184 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 normal range adults, 217 infants and children, 222 nenonate, 219 pregnancy, 209 lymphocytosis, 219 lymphocytosis, 241–2, 242 lymphocytosis, 241–2, 242 lymphoid cells, apoptotic, 129, 129 lymphoid elukaemoid reactions, 430–431, 430, lymphoid/myeloid neoplasms with abnormalities of PDGFRA, PDGFRB or FGFR1, 457 lymphoma adult T-cell leukaemia/lymphoma, 474–5, 475 leucoerythroblastic anaemia, 247 leucoerythroblastic blood films, 135–6 cutaneous T-cell, 473–4, 473 leucopenia, 248 leukaemia acute basophilic, 438, 440, 440 acute lymphoblastic, 457–60, 458–60, 459 acute monoblastic, 184 acute monoblastic, 184 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 lymphoplasmacytic lymphoma, 467–8, 467		129, 130
large granular lymphocyte leukaemia, 475, 475 large unstained cells normal range adults, 217 infants and children, 222 neonate, 219 pregnancy, 209 infants and children, 222 lymphocytopenia (lymphopenia), 251–2, 252 lead poisoning, 301–2, 302 leishmania donovani, 154, 166, 167, 168 leucocytes, 76 leucocytes, see white cells leucocytosis, 234–41, 235 basophilia, 240–241, 241 eosinophilia, 236–40, 236–40 neutrophilia, 234, 236, 236 leucocythroblastic anaemia, 247 leucocythroblastic blood films, 135–6 leucopenia, 248 leucopenia, 248 leukaemia acute basophilic, 438, 440, 440 acute lymphoblastic, 457–60, 458–60, 459 acute monoblastic, 184 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 lymphoglasmacytic lymphoma, 467–8, 467 lymphoplasmacytic lymphoma, 467–8, 467 lymphoplasmacytic lymphoma, 467–8, 467 lymphoplasmacytic lymphoma, 467–8, 467 lymphoplasmacytic lymphoma, 467–8, 467	L	reactive changes, 125–8, 126–9
large unstained cells normal range adults, 217 infants and children, 222 lead poisoning, 301–2, 302 lead poisoning, 301–2, 302 letishmania donovani, 154, 166, 167, 168 leticocytes, 76 leticocytes, see white cells leticocytosis, 234–41, 235 basophilia, 240–241, 241 eosinophilia, 236–40, 236–40 neutrophilia, 234, 236, 236 leticocrythroblastic anaemia, 247 leucocythroblastic abod films, 135–6 leucocythroblastic blood films, 135–6 leucophilia, 248 leukaemia acute basophilic, 438, 440, 440 acute lymphoblastic, 457–60, 458–60, 459 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 lymphoplasmacytic lymphoocyte (lymphoocytes), 229 lymphootid (lymphopia), 251–2, 252 lymphoid cells, apoptotic, 129, 129 lymphoid leukaemiod reactions, 430–431, 430, lymphoid leukaemiod reactions, 430–431, 430, lymphoid leukaemiod reactions, 430–431, 430, lymphoma adult T-cell leukaemia/lymphoma, 474–5, 475 leucoerythroblastic anaemia, 247 lymphoma acute basophilic, 438, 440, 440 acute lymphoblastic, 457–60, 458–60, 459 acute monoblastic, 184 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 lymphoplasmacytic lymphoma, 467–8, 467	lactate dehydrogenase deficiency, 355	normal range
normal range adults, 217 infants and children, 222 lead poisoning, 301–2, 302 lead poisoning, 301–2, 302 lephocytes, 76 leucocytes, 76 leucocytes, 82 white cells leucocytosis, 234–41, 235 basophilia, 240–241, 241 eosinophilia, 236–40, 236–40 neutrophilia, 236, 236 leucocrythroblastic anaemia, 247 leucocythroblastic auemia, 248 leucoerythroblastic, 457–60, 458–60, 459 acute monoblastic, 457–60, 458–60, 459 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 lymphoplasmacytic lymphoma, 267–8, 467 lymphoplasmacytic lymphocytes, 466–7, 467 lymphoplasmacytic lymphoplasmacytic lymphoma, 474–8, 467	large granular lymphocyte leukaemia, 475, 475	adults, 217
adults, 217 infants and children, 222 lead poisoning, 301–2, 302 Leishmania donovani, 154, 166, 167, 168 leptocytes, 76 leucocytes, see white cells leucocytosis, 234–41, 235 basophilia, 240–241, 241 eosinophilia, 236–40, 236–40 neutrophilia, 234, 236, 236 leucocythroblastic anaemia, 247 leucocythroblastic blood films, 135–6 leucocythroblastic blood films, 135–6 leukaemia acute basophilic, 438, 440, 440 acute lymphoblastic, 457–60, 458–60, 459 acute monoblastic, 184 acute myeloid, 109, 118, 432–40, 433, 434–42 ilymphogy pregnancy, 209 lymphocytosia, (lymphopenia), 251–2, 252 lymphocytosis, 241–2, 242 lymphoid cells, apoptotic, 129, 129 lymphoid reactions, 430–431, 430, 431 lymphoid/myeloid neoplasms with abnormalities of PDGFRA, PDGFRB or FGFR1, 457 lymphoma adult T-cell leukaemia/lymphoma, 474–5, 475 leukaemia adult T-cell leukaemia/lymphoma, 474–5, 475 leucopenia, 248 leukaemia Hodgkin, 476–7 acute lymphoblastic, 438, 440, 440 acute lymphoblastic, 457–60, 458–60, 459 acute monoblastic, 184 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 lymphoplasmacytic lymphoma, 467–8, 467	large unstained cells	infants and children, 222
infants and children, 222 lead poisoning, 301–2, 302 Leishmania donovani, 154, 166, 167, 168 leptocytes, 76 leucocytes, see white cells leucocytes, see white cells leucocytes, 234–41, 235 basophilia, 240–241, 241 eosinophilia, 236–40, 236–40 neutrophilia, 234, 236, 236 leucocythroblastic anaemia, 247 leucocythroblastic blood films, 135–6 leucopenia, 248 leukaemia leucopenia, 248 leukaemia acute basophilic, 438, 440, 440 acute lymphoblastic, 457–60, 458–60, 459 acute monoblastic, 184 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 lymphoptics, 241–2, 242 lymphootic cells, apoptotic, 129, 129 lymphoid leukaemiod reactions, 430–431, 430, 431 lymphoid/myeloid neoplasms with abnormalities of PDGFRA, PDGFRB or FGFR1, 457 lymphoma adult T-cell leukaemia/lymphoma, 474–5, 475 leukaemia/lymphoma adult T-cell leukaemia/lymphoma, 474–5, 475 leukaemia Hodgkin, 476–7 lymphoplasmacytic, 467–8, 467 mantle cell, 469, 469 splenic with villous lymphocytes, 466–7, 467 T-cell, 475–6, 476 lymphoplasmacytic lymphoma, 467–8, 467	normal range	neonate, 219
lead poisoning, 301–2, 302 Leishmania donovani, 154, 166, 167, 168 leptocytes, 76 leptocytes, see white cells leucocytes, see white cells leucocytosis, 234–41, 235 basophilia, 240–241, 241 eosinophilia, 236–40, 236–40 neutrophilia, 234, 236, 236 leucocythroblastic anaemia, 247 leucocythroblastic blood films, 135–6 leucocythroblastic blood films, 135–6 leucophilia, 248 leukaemia leucophilia, 248, 440, 440 acute basophilic, 438, 440, 440 acute lymphoblastic, 457–60, 458–60, 459 acute monoblastic, 184 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 lymphocytosis, 241–2, 242 lymphoid cells, apoptotic, 129, 129 lymphoid leukaemoid reactions, 430–431, 430, 431 lymphoid leukaemoid reactions, 430–431, 430 lymphoma of leukaemoid reactions, 430–431, 430 lymphoma adult T-cell pleukaemia/lymphoma, 474–5, 475 leukaemia/lymphoma adult T-cell leukaemia/lymphoma, 474–5, 475 leukaemia leukaemia lymphoplasmacytic, 469 cutaneous T-cell, 473–4, 473 follicular, 468–9, 468 lymphoplasmacytic, 467–8, 467 mantle cell, 469, 469 splenic with villous lymphocytes, 466–7, 467 T-cell, 475–6, 476 lymphoplasmacytic lymphoma, 467–8, 467	adults, 217	pregnancy, 209
Leishmania donovani, 154, 166, 167, 168 leptocytes, 76 leptocytes, 56 leucocytes, 56 leucocytes, 52 leucocytesis, 234–41, 235 basophilia, 240–241, 241 eosinophilia, 236–40, 236–40 neutrophilia, 234, 236, 236 leucocythroblastic anaemia, 247 leucoerythroblastic blood films, 135–6 leucopenia, 248 leukaemia acute basophilic, 438, 440, 440 acute lymphoblastic, 457–60, 458–60, 459 acute monoblastic, 184 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 lymphoid cells, apoptotic, 129, 129 lymphoid leukaemoid reactions, 430–431, 430, 431 lymphoid cells, apoptotic, 129, 129 lymphoid cells, 430 auth T-cell leukaemia lymphoma, 474–5, 475 lymphoplasmacytic, 467–8, 467 lymphoplasmacytic lymphoma, 467–8, 467	infants and children, 222	lymphocytopenia (lymphopenia), 251–2, 252
leptocytes, 76 leucocytes, see white cells leucocytosis, 234–41, 235 basophilia, 240–241, 241 eosinophilia, 236–40, 236–40 neutrophilia, 234, 236, 236 leucocythroblastic anaemia, 247 leucoerythroblastic blood films, 135–6 leucopenia, 248 leukaemia lymphoplastic, 468 leukaemia lymphoplasmacytic, 467–8, 467 mantle cell, 469, 469 acute monoblastic, 184 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 lymphoplasmacytic lymphoma, 467–8, 467	lead poisoning, 301–2, 302	lymphocytosis, 241–2, 242
leucocytes, see white cells leucocytosis, 234–41, 235 lymphoid/myeloid neoplasms with abnormalities of PDGFRA, basophilia, 240–241, 241 eosinophilia, 236–40, 236–40 neutrophilia, 234, 236, 236 leucoerythroblastic anaemia, 247 leucoerythroblastic blood films, 135–6 leucopenia, 248 leukaemia leucheamia lymphoplasmacytic, 467–8, 468 leukaemia lymphoplasmacytic, 467–8, 467 mantle cell, 469, 469 acute monoblastic, 184 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 lymphoplasmacytic lymphoma, 467–8, 467	Leishmania donovani, 154 , 166, 167, 168	lymphoid cells, apoptotic, 129, 129
leucocytosis, 234–41, 235 basophilia, 240–241, 241 eosinophilia, 236–40, 236–40 neutrophilia, 234, 236, 236 leucoerythroblastic anaemia, 247 leucoerythroblastic blood films, 135–6 leucopenia, 248 leukaemia leuche basophilic, 438, 440, 440 acute basophilic, 438, 440, 440 acute monoblastic, 457–60, 458–60, 459 acute monoblastic, 184 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 lymphoplasmacytic lymphoma, with abnormalities of PDGFRA, PDGFRB or FGFR1, 457 lymphoma adult T-cell leukaemia/lymphoma, 474–5, 475 Burkit, 469 cutaneous T-cell, 473–4, 473 loucateneous T-cell, 473–4, 473 loucateneous T-cell, 476–7 lymphoplasmacytic, 467–8, 467 mantle cell, 469, 469 splenic with villous lymphocytes, 466–7, 467 T-cell, 475–6, 476 lymphoplasmacytic lymphoma, 467–8, 467	leptocytes, 76	lymphoid leukaemoid reactions, 430-431, 430,
basophilia, 240–241, 241 eosinophilia, 236–40, 236–40 neutrophilia, 234, 236, 236 leucoerythroblastic anaemia, 247 leucoerythroblastic blood films, 135–6 leucopenia, 248 leukaemia leucopenia, 248 leukaemia acute basophilic, 438, 440, 440 acute lymphoblastic, 457–60, 458–60, 459 acute monoblastic, 184 acute myeloid, 109, 118, 432–40, 433 , 434–42 of Down syndrome, 443 PDGFRB or FGFR1, 457 Burkitt, 469 cutaneous T-cell eukaemia/lymphoma, 474–5, 475 leucopenia, 248 follicular, 468–9, 468 leukaemia Hodgkin, 476–7 lymphoplasmacytic, 467–8, 467 mantle cell, 469, 469 splenic with villous lymphocytes, 466–7, 467 T-cell, 475–6, 476 lymphoplasmacytic lymphoma, 467–8, 467	leucocytes, see white cells	431
eosinophilia, 236–40, 236–40 neutrophilia, 234, 236, 236 leucoerythroblastic anaemia, 247 leucoerythroblastic blood films, 135–6 leucopenia, 248 leukaemia lymphoplasmacytic, 467–8, 468 leukaemia lymphoplasmacytic, 467–8, 467 acute lymphoblastic, 457–60, 458–60, 459 acute monoblastic, 184 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 lymphoplasmacytic lymphoma, 467–8, 467	leucocytosis, 234–41, 235	lymphoid/myeloid neoplasms with abnormalities of PDGFRA,
neutrophilia, 234, 236, 236 leucoerythroblastic anaemia, 247 leucoerythroblastic blood films, 135–6 leucopenia, 248 leukaemia leucopenia, 248 leukaemia leucopenia, 248 leukaemia leucopenia, 248 leukaemia Hodgkin, 476–7 acute basophilic, 438, 440, 440 acute lymphoblastic, 457–60, 458–60, 459 acute monoblastic, 184 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 acute myeloid, 109, 118, 432–40, 433, 434–42 bloom adult T-cell leukaemia/lymphoma, 474–5, 475 leukaemia leukaemia/lymphoma, 468–9 cutaeeous T-cell, 473–4, 473 lymphoplasmacytic, 467–8, 467 mantle cell, 469, 469 splenic with villous lymphocytes, 466–7, 467 T-cell, 475–6, 476 lymphoplasmacytic lymphoma, 467–8, 467	basophilia, 240–241, 241	PDGFRB or FGFR1, 457
leucoerythroblastic anaemia, 247 leucoerythroblastic blood films, 135–6 cutaneous T-cell, 473–4, 473 leucopenia, 248 leukaemia dute basophilic, 438, 440, 440 acute lymphoblastic, 457–60, 458–60, 459 acute monoblastic, 184 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 Burkitt, 469 folicular, 469 follicular, 468–9, 468 Hodgkin, 476–7 lymphoplasmacytic, 467–8, 467 mantle cell, 469, 469 splenic with villous lymphocytes, 466–7, 467 T-cell, 475–6, 476 lymphoplasmacytic lymphoma, 467–8, 467	eosinophilia, 236–40, 236–40	lymphoma
leucoerythroblastic blood films, 135–6 cutaneous T-cell, 473–4, 473 leucopenia, 248 follicular, 468–9, 468 leukaemia Hodgkin, 476–7 acute basophilic, 438, 440, 440 acute lymphoblastic, 457–60, 458–60, 459 acute monoblastic, 184 acute myeloid, 109, 118, 432–40, 433, 434–42 of Down syndrome, 443 cutaneous T-cell, 473–4, 473 lymphoplasmacytic, 467–8, 467 mantle cell, 469, 469 splenic with villous lymphocytes, 466–7, 467 T-cell, 475–6, 476 lymphoplasmacytic lymphoma, 467–8, 467	neutrophilia, 234, 236, 236	adult T-cell leukaemia/lymphoma, 474–5, 475
leucopenia, 248 follicular, 468–9, 468 leukaemia Hodgkin, 476–7 acute basophilic, 438, 440, 440 lymphoplasmacytic, 467–8, 467 acute lymphoblastic, 457–60, 458–60, 459 mantle cell, 469, 469 acute monoblastic, 184 square myeloid, 109, 118, 432–40, 433, 434–42 T-cell, 475–6, 476 of Down syndrome, 443 lymphoplasmacytic lymphoma, 467–8, 467	leucoerythroblastic anaemia, 247	Burkitt, 469
leukaemia Hodgkin, 476–7 acute basophilic, 438, 440, 440 lymphoplasmacytic, 467–8, 467 acute lymphoblastic, 457–60, 458–60, 459 mantle cell, 469, 469 acute monoblastic, 184 splenic with villous lymphocytes, 466–7, 467 acute myeloid, 109, 118, 432–40, 433, 434–42 T-cell, 475–6, 476 of Down syndrome, 443 lymphoplasmacytic lymphoma, 467–8, 467	leucoerythroblastic blood films, 135-6	cutaneous T-cell, 473–4, 473
acute basophilic, 438, 440, 440 lymphoplasmacytic, 467–8, 467 acute lymphoblastic, 457–60, 458–60, 459 mantle cell, 469, 469 acute monoblastic, 184 splenic with villous lymphocytes, 466–7, 467 acute myeloid, 109, 118, 432–40, 433 , 434–42 T-cell, 475–6, 476 of Down syndrome, 443 lymphoplasmacytic lymphoma, 467–8, 467	leucopenia, 248	follicular, 468–9, 468
acute lymphoblastic, 457–60, 458–60, 459 acute monoblastic, 184 acute myeloid, 109, 118, 432–40, 433 , 434–42 of Down syndrome, 443 mantle cell, 469, 469 splenic with villous lymphocytes, 466–7, 467 T-cell, 475–6, 476 lymphoplasmacytic lymphoma, 467–8, 467	leukaemia	Hodgkin, 476–7
acute monoblastic, 184 splenic with villous lymphocytes, 466–7, 467 acute myeloid, 109, 118, 432–40, 433 , 434–42 T-cell, 475–6, 476 lymphoplasmacytic lymphoma, 467–8, 467	acute basophilic, 438, 440, 440	lymphoplasmacytic, 467–8, 467
acute myeloid, 109, 118, 432–40, 433 , 434–42 T-cell, 475–6, 476 of Down syndrome, 443 lymphoplasmacytic lymphoma, 467–8, 467	acute lymphoblastic, 457-60, 458-60, 459	mantle cell, 469, 469
of Down syndrome, 443 lymphoplasmacytic lymphoma, 467–8, 467	acute monoblastic, 184	splenic with villous lymphocytes, 466-7, 467
		T-cell, 475–6, 476
adult T-cell leukaemia/lymphoma, 474–5, 475 lymphoproliferative disorders, 129–30, <i>129</i> , <i>130</i>		
	adult T-cell leukaemia/lymphoma, 474–5, 475	lymphoproliferative disorders, 129–30, 129, 130

bindex 486 25 October 2014 9:44 AM

M	monocyte precursors, 131–2
McLeod phenotype, 349	monocytes, 130–131, 131, 132
macrocytic anaemias, 323–30	normal range
associated with alcoholism and liver disease, 330	adults, 217
associated with myelodysplastic syndrome, 330	infants and children, 222
megaloblastic anaemia, 323-9, 324 , 325-9	neonate, 229
macrocytosis, 74–5, 74	pregnancy, 223
causes, 75	monocytopenia, 251
macrophages, 132-3, 133	monocytosis, 242–3, 243
macropolycytes, 116–17, 117	mononuclear cells, 217
malaria, 114, 115, 132, 140, 152–64, 153 , 154–63	Montreal platelet syndrome, 390
malaria parasites, staining for, 12	morphology of blood cells, 67-185
malignant melanoma, 116	blood film in healthy subjects, 142-5, 144, 144
Mansonella ozzardi, 154 , 169	megakaryocytes, 140-142, 141, 142
Mansonella perstans, 154 , 169, 171	micro-organisms in blood films, 148-68
mantle cell lymphoma, 469, 469	non-haemopoietic cells, 145-8
march haemoglobinuria, 375–6	platelets, 137-40, 138-40, 138
Maroteaux-Lamy syndrome, 110, 131	red cells, 72-98
mast cell leukaemia, 440–442, 442, 442	white cells, 98–123
mast cells, 136, 136	see also individual conditions
mastocytosis, 452, 453	Morquio syndrome, 124
May–Hegglin anomaly, 111, 114, 389	morular cells, 127
mean cell haemoglobin (MCH), 17, 29	Mott cells, 127
errors in, 193 , 195	multiple myeloma, 67, 68, 470-472, 471
normal range	myeloblasts, 134
adults, 216	myelocytes, 134, 135
infants and children, 221	myelodysplasia, 106
mean cell haemoglobin concentration (MCHC), 17,	myelodysplastic syndromes, 443-6, 444-6, 444
29	FAB classification, 444
errors in, 193 , 195	macrocytic anaemia associated with, 330
normal range in adults, 216	WHO classification, 444
mean cell volume (MCV), 17, 29	myelodysplastic/myeloproliferative neoplasms,
errors in, 192 , 193 , 194–5	452-7
normal range	unclassifiable, 456–7
adults, 216	myelofibrosis, primary, 397–8, 398
infants and children, 221	myeloid leukaemoid reactions, 428-9, 429, 430
neonate, 218	myeloperoxidase, 282-4, 285
pregnancy, 223	myeloproliferative neoplasms, 446–8, 446, 447, 448
mean platelet volume (MPV), 29	
median cubital vein, 2	N
Medich giant platelet syndrome, 389	naphthol AS-D chloroacetate esterase, 286, 286,
Mediterranean stomatocytosis/macrothrombocytopenia, 93, 138 ,	287
344, 388	Napoleon hat cells, 95
megakaryocytes, 140–142, 141, 142	near-patient testing, 59–60
megaloblastic anaemia, 118, 323–9, 324 , 325–9	non-invasive methods, 59–60
blood film and count, 324–8, 324–8	needle-prick injury, 6–7
causes, 324	Neisseria meningitidis, 149
differential diagnosis, 328–9	neonate
micro-organisms in blood films, 148–68	blood film, 143, 144
babesiosis, 164–5, 164, 165	glutathione peroxidase deficiency, 373
bacteria, 148–50, 148–50	haemolytic disease of newborn, 364–5, 365
filariasis, 168–9, 169–71	normal ranges, 218–20, 218 , 219
fungi, 151, <i>153</i>	eosinophils, 219
haemoflagellates, 165–7, 166, 167	haemoglobin, 218, 221
parasites, 152–65, 154 , <i>156–65</i>	lymphocytes, 219
toxoplasmosis, 165	mean cell volume, 218
microangiopathic haemolytic anaemia, 90, 366–71, 367–8 ,	monocytes, 219
368–71 microcytosis 73 4 73 73–4	neutrophils, 219
microcytosis, 73–4, 73, 73–4 microscopes, setting up and using, 13–15, 14	nucleated red blood cells, 219 packed cell volume, 218
Miller ocular micrometer, 28, 28	red cell count, 218
Mindray blood cell counters, 52–3	white cell count, 219
molecular genetic analysis, 292	thrombocytopenia, 256
monoclonal B-cell lymphocytosis, 463–4	neuroacanthocytosis, 349
monocionai b cen ijinphoejiosis, 103-1	neuroacaninocytosis, 247

bindex 487 25 October 2014 9:44 AM

neutropenia, 248–9, 249 , 250	plasma trapping, 20–21
acquired disorders, 250	reference method, 21
cyclical, 431–2	pancytopenia, 184, 256–8, 257
inherited disorders, 249	blood film, 257–8
severe congenital, 431	Pappenheimer bodies, 27, 96, 96
neutrophil alkaline phosphatase, 281-2, 281 , 282, 283 , 284	parasitic infections, 152–65, 154 , <i>156–65</i>
neutrophilia, 234, 236, 236	eosinophilia, 237–8
neutrophils, 99–118, 99	haemolytic anaemia, 375
aggregation, 118, 118, 119	malaria, 152–64, 153 , <i>154–63</i>
cytoplasmic abnormalities, 107–14, 108	Paris-Trousseau thrombocytopenia, 140, 387
Auer rods, 109–10, 112	paroxysmal cold haemoglobinuria, 362-3, 363
Döhle bodies, 113–14, <i>113</i>	paroxysmal nocturnal haemoglobinuria, 376, 376
exogenous inclusions, 114-16, 115, 116	pattern-recognition automated differential counters, 29
increased granulation, 109, 109, 110	Pelger-Huët anomaly, 103, 104, 104, 105, 120, 122, 389
reduced granulation, 107, 109	Penicillium marneffei, 142
vacuolation, 111–13, <i>113</i>	periodic acid-Schiff reaction, 287-8, 287
fragments, 112	Perls reaction for iron, 279–80, 280
necrobiotic, 117, 118	persistent polyclonal B-cell lymphocytosis, 424-5, 425
normal range	phosphate depletion, 375
adults, 217	phosphofructokinase deficiency, 354
infants and children, 222	phosphoglycerate deficiency, 355
neonate, 219	pincer cells, 94, 94
pregnancy, 223	plasma cells, 130
nuclear abnormalities	plasma cell leukaemia, 470–472, 471
band form and left shift, 99–100, 100, 103	plasmacytosis, 243, 243
botryoid nucleus, 103	Plasmodium falciparum, 114, 115, 132, 140, 154 , 156–7, 160
dense chromatin clumping, 103	Plasmodium knowlesi, 151–2, 154 , 162–3
detached nuclear fragments, 103	Plasmodium malariae, 154 , 156–7, 161
drumsticks, 100, 101-2, 102	Plasmodium ovale, 154 , 156–7, 159
hypersegmentation, 103	Plasmodium vivax, 154 , 156–7, 158–9
hyposegmentation, 103	platelet count, 22–3, 29
lobe count and right shift, 100–101, 101	automated, 57–9
Pelger–Huët anomaly, 104, 104, 105, 120, 122	errors in, 195–7, 195 , 196 , <i>198</i>
ring nuclei, 103, 106	normal range, 224–5, 224 , 225
sessile nodules, 102, 102	pregnancy, 223
Niemann–Pick disease, 124	plateletcrit, 29
Nihon Kohden blood cell counter, 52–3	platelet disorders, 386–98
non-haemopoietic malignant cells, 146–8, 147, 148	thrombocytopenia, 252-6, 253-6 , 386-93, 386-90 , 391, 392
non-Hodgkin lymphoma, 130	thrombocytosis, 243–5, 244 , 245
non-specific esterases, 286–7, 287	platelets, 137–40, 138–40, 138
normal ranges, 211–32	abnormal distribution, 137–40, 139, 140
adults, 216–18, 216 , 217	abnormalities of size, 137, 138, 138, 139
haematological variables affecting, 212, 214, 215	aggregation, 68
infants and children, 220–223, 221–3	reticulated, 57–9
neonate and fetus, 218–20, 218 , 219 , <i>220</i>	satellitism, 140, 140
pregnancy, 223, 223	volume, 29
reticulocyte count, 225–6, 226	poikilocytosis, 78–97, 78, 79
nucleated red blood cells, 69	see also individual types
normal range in neonates, 219	polychromasia, 76–8, 77
	polycythaemia, 232, 233 , 234 , 383–6
0	relative, 383, 386
Onchocerca volvulus, 154	secondary, 385–6
Oroya fever, 150	true, 383
ovalocytosis, 82–3, 83	vera, 383, 384
South-East Asian, 342–3, 342	Pompe disease, 124
oxidant-induced haemolytic anaemia, 371–3, 372, 373	post-infection immune thrombocytopenic purpura, 394
P	pregnancy
packed cell volume (PCV), 17, 19–21, 29	blood film, 143
microhaematocrit, 20, 20, 21	normal ranges, 223, 223
normal range	promyelocytes, 134, 134
infants and children, 221	pyrimidine nucleotidase deficiency, 355 , 358
neonate, 218	pyropoikilocytosis, hereditary, 78, 340–342, 343
pregnancy, 223	pyruvate kinase deficiency, 352–4, 353, 355

bindex 488 25 October 2014 9:44 AM

Q	red cells
quantitative changes in blood cells, 232-76	agglutination, 72, 97-8, 98
anaemia, 245–8, 246 , 247	aplasia, 247
basopenia, 251, 251	budding, 70
eosinopenia, 251, 251	circulating nucleated, 97
leucocytosis, 234–41, 235	crystals, 97, 97
leucopenia, 248	fragmentation, 70, 366–7
lymphocytopenia (lymphopenia), 251–2, 252	inclusions, 94–5
lymphocytosis, 241–2, 242	membrane, 332
monocytopenia, 251	membrane defects, 347–59, 347
monocytosis, 242–3, 243	micro-organisms in, 97
neutropenia, 248–9, 249 , 250	morphology, 72–98
pancytopenia, 256–8, 257	see also various types
plasmacytosis, 243, 243	nucleated, 69
polycythaemia, 232, 233 , 234	rosetting, 97–8, 98
reticulocytopenia, 248, 248	rouleaux formation, 97–8, 98
reticulocytosis, 232, 234	Reed–Sternberg cells, 148
thrombocytopenia, 252–6, 253–6	renal disease, 373
thrombocytosis, 243-5, 244 , 245	reticulocyte count, 26–9, 26, 27, 27, 28, 28, 29
Quebec platelet disorder, 387	automated, 53–5, 54–8, 59
	errors in, 205–6, 205
R	normal range, 225–6, 226
reactive eosinophilia, 425–6, 425, 426	reticulocyte immaturity, 55–7
red cell aplasia, 382–3	reticulocyte index, 28
red cell count, 22–3, 29	reticulocytopenia, 248, 248
errors in, 192 , 194–5	reticulocytosis, 232, 234
normal range	Rh deficiency syndrome, 349
adults, 216	rheumatoid arthritis, 119
infants and children, 221	
neonate, 218	S
pregnancy, 223	Sanfilippo syndrome, 125
red cell disorders, 295–415	schistocytes, 89–91, 90
anaemia, 245–8, 246 , 247	Sebastian syndrome, 389
acquired haemolytic, 359–77	severe congenital neutropenia, 431
aplastic, 381–2	Sézary syndrome, 473–4, 473
of chronic disease, 298–9, 298 , 299	sickle cells, 93–4, 94, 95
congenital haemolytic, 330–350	sickle cell anaemia, 312-15, 313-15
congenital sideroblastic, 299–301, 300, 301	blood film and count, 312-14, 313-15
dyserythropoietic, 377–80, 377 , 378–80	differential diagnosis, 314–15
iron deficiency, 295–8, 296, 298	further tests, 315
lead poisoning, 301–2, 302	sickle cell/haemoglobin C disease, 317-18, 318
leucoerythroblastic, 247	sickle cell/β thalassaemia, 316–17, 317
macrocytic, 323–30	sickle cell trait, 316
aplasia, 382–3	sideroblastic anaemia
haemoglobin Bart's hydrops fetalis, 311-12, 311	acquired, 331
haemoglobin H disease, 309-11, 310, 311	congenital, 299–301, 300, 301
haemoglobinopathies, 312–23	Siemens Advia blood cell counters, erroneous counts, 199-200,
polycythaemia, 218, 219 , 220 , 383–6	199 , <i>202</i> , <i>203</i>
α thalassaemia trait, 308–9, 309	Siemens blood cell counters, 44-9, 45, 47, 48
β thalassaemia intermedia, 307, 307, 308	sitosterolaemia, 346–7
β thalassaemia major, 305–7, 306	slides, storage of, 13
β thalassaemia trait, 302–5, 303, 304	snake bites, 375, 375
see also individual conditions	South-East Asian ovalocytosis, 342-3, 342
red cell distribution width	specimen containers, 5–6
errors in, 193 , 195	evacuated, 3
normal range, adults, 216	specimen mixing, 7
red cell enzyme abnormalities, 347–50, 348, 349	spherocytosis, 79–81, 80, 80 , 81
congenital non-spherocytic haemolytic anaemia, 354–9, 354–6 ,	hereditary, 331–7, 332–6
357, 358	blood film and count, 333-5, 333-6
glucose-6-phosphate dehydrogenase deficiency, 350–352, 350, 351	differential diagnosis, 336
pyruvate kinase deficiency, 352–4, 353	further tests, 337
red cell indices, 23	spheroechinocytes, 84, 86
red cell sedimentation rate 29	spiculated cells 84

bindex 489 25 October 2014 9:44 AM

thrombotic thrombocytopenic purpura, 394-5

thrombotic thrombocytopenic purpura, 394-5

triose phosphate isomerase deficiency, 355, 357

X-linked, 386, 389

blood film, 244-5

Tropheryma whipplei, 150

tourniquet, 2 toxoplasmosis, 165

thrombocytosis, 243-5, 244, 245

Trypanosoma brucei gambiense, 154, 166-7 Trypanosoma brucei rhodesiense, 154, 166 Trypanosoma cruzi, 154, 166, 167, 167 Trypanosoma evansi, 167 Trypanosoma gambiense, 154, 166-7 Trypanosoma rangeli, 154, 166 Trypanosoma rhodesiense, 154, 166 tuberculosis, white cell changes, 418 tumour cell aggregates, 68 U ultrastructural examination, 292-3, 293 Unicel DxH 800 automated cell counter, 35, 36-7 unstable haemoglobins, 322-3, 323 vein patency, 2 velocardiofacial syndrome, 388 venepuncture, 1-4, 2, 3, 4 evacuated container, 3 needle and syringe, 2, 3 viral infections, white cell disorders, 418-24 vitamin E deficiency, 375 von Willebrand disease, 390 warm autoimmune haemolytic anaemia, 359-61, 359, 360 wedge-spread films, 8-10, 9, 10 problems with, 10 Whipple disease, 150 white cell count, 29, 222 differential, 23-5, 24, 25 errors in. 198-205, 199, 200-203, 204-5 errors in, 188-91, 189, 190 normal range adults, 217 ethnic differences, 217 infants and children, 222 neonate 219 pregnancy, 223 white cell disorders, 416-81 adult T-cell leukaemia/lymphoma, 454, 474-5, 475 bacterial infection, 416-18, 416-18 B-lineage lymphoproliferative disorders, 461-72 monoclonal B-cell lymphocytosis, 463-4 chronic lymphocytic leukaemia/lymphoma, 460-463, 460, 461 Hodgkin lymphoma, 476-7 idiopathic hypereosinophilic syndrome, 426-8, 427 leukaemia acute basophil, 438, 440, 440 acute lymphoblastic, 457-60, 458-60, 459 acute myeloid, 432-40, 433, 434-42 acute myeloid of Down syndrome, 443 chronic eosinophilic, not otherwise specified, 450-452, 451, chronic lymphocytic, 117, 461-3, 462, 463 chronic myelogenous, 446-50, 447-9, 449 chronic myeloid, atypical, 452-4, 453, 454 chronic myelomonocytic, 116 chronic neutrophilic, 450, 450 hairy cell, 464-6, 465, 466 large granular lymphocyte, 475, 475 mast cell, 440-442, 442, 442

bindex 490 25 October 2014 9:44 AM

```
plasma cell, 470-472, 471
                                                                       splenic lymphoma with villous lymphocytes, 466-7, 467
  prolymphocytic, 441–3
                                                                       T-cell mediated hypereosinophilia, 426
  T-lineage prolymphocytic, 472-3, 472
                                                                       T-lineage lymphoproliferative disorders, 472–7
leukaemoid reactions, 428-31, 428
                                                                       transient abnormal myelopoiesis of Down syndrome, 441,
lymphoid/myeloid neoplasms with abnormalities of PDGFRA,
                                                                          442-3
                                                                       viral infection, 418-24
  PDGFRB or FGFR1, 457
lymphoma, 469-70, 469
                                                                     white cells
  cutaneous T-cell, 472-3, 472
                                                                       morphology, 98-123
                                                                          see also different types
  follicular, 468-9, 468
  lymphoplasmacytic, 467-8, 467
                                                                     white platelet syndrome, 388
  mantle cell, 469, 469
                                                                     Wilson disease, 373, 374, 375
  splenic with villous lymphocytes, 466–7, 467
                                                                     Wiskott-Aldrich syndrome, 138, 139, 386
  T-cell, 475-6, 476
                                                                     Wuchereria bancrofti, 154, 169, 170
mastocytosis, 452, 453
multiple myeloma, 67, 68, 470-472, 471
                                                                     X
myelodysplastic/myeloproliferative neoplasms, 452-7
                                                                    X-linked thrombocytopenia, 386, 389
  unclassifiable, 456-7
myelodysplastic syndromes, 443-6, 444-6, 444
myeloproliferative neoplasms, 446-8, 446, 447, 448
                                                                     Yersinia pestis, 151
neutropenia
                                                                     York platelet syndrome, 389
  cyclical, 431-2
  severe congenital, 431
persistent polyclonal B-cell lymphocytosis, 424-5, 425
                                                                     Zieve syndrome, 374
reactive eosinophilia, 425-6, 425, 426
```

bindex 491 25 October 2014 9:44 AM

bindex 492 25 October 2014 9:44 AM

bindex 493 25 October 2014 9:44 AM

bindex 494 25 October 2014 9:44 AM