Index

Note: references in italic are to figures

acclimatisation: altitude, 58; temperature, 59, 60-1 acculturation: empirical index of, 107; working capacity and, 98-108

adaptability, physiological, 63-5, 71

adaptation to circumpolar regions, 70-1

aerobic power, 4; ageing effect upon, 235-7; altitude upon, 55, 56-7; athlete data, 144-7, 150; comparative exercise mode data, 26-33; circumpolar people, 75-7; environmental factors, 36; genetic influences, 36, 127-8; maximum testing, 42-3; prediction of, 30-2, 39-40; sex and age measurement, variation of, 126; social class and, 209; submaximal testing, 32-3; survey in children, 208-15; in tropics, 65-7; in urban populations, 108, 109; see also individual races, etc.

Africans (in Africa): aerobic power, 66-7; comparative chest size, 95; lung volumes, 96; vital capacity, 95; weight-for-height (children), 196-200; weight (children), 196

Africans (in Europe): weight-for-height (children), 196, 200; weight (children), 196

age: aerobic power and, 76; haemoglobin levels and, 78; sport and, 119

ageing: aerobic power and, 235-7; anaerobic power and, 242, 251; body composition, change with, 237-41; primitive groups and, 248-52

Ainu people: aerobic power in, 76, 77; aerobic power as sex and age of, 126; efficiency, 41; heart rate (max), 45; seasonal activity and, 50; skinfold thickness, 72; standing height, 191

Alcaluf Indians, 74; skinfold thickness, 72

Allen's law on climatic adaptation, 63

anaerobic capacity, swimmers, 156

anaerobic power, 4; Africans, 69; ageing, 242, 251; athletes, 147; circumpolar peoples, 78; interpopulation differences, 221; Italians, 69; in sport, 156, 172-3

Andes, chest shape, 94

anthropometric: data, 5; measurements, 87; prediction of aerobic power, 88

Argentina: athlete data, 151, 162, 164; skinfold thickness, 72

Astrand nomogram, data, 29-31, 44; measurements in children, 182

athletes: the adolescent, 228-32; ageing, effect upon, 244-6; environment, 131; genetic influence, 131; habitual activity, 131; leg length, 149

Australia: data from (Aborigines) see Australian Aborigines; athletes, 144; skinfold thickness, 202-3; time running, 112

Australian Aborigines, 74; skinfold thickness, 65, 72, 204-5

Aymara Indians: aerobic power, 56; aerobic power as sex and age of, 126; ageing in, 247; altitude and, 55; lung volumes, 96; skinfold thickness, 56; sample size, 13

Bantu, 75; aerobic power, 66, 211; ageing in, 247; efficiency, 42; energy expenditure, 117-18; heart rates (max), 45; skinfold thickness, 65; seasonal activity, 51; weight (excess), 68

Belgium: aerobic power, 30; athletes, 157, 163, 165; hand-grip, 220; rural and urban working capacity, 100; skinfold thickness, 202; weight-forheight (children), 194; weight (children), 194

Bergmann's law on climatic adaptation, 63

Bhutanese, lung volumes, 96

biacromial diameter, 151, 156 biassed data, 18-19

blood groupings, 126

blood lactate: in athletes, 144-5, 150; inheritance and, 127-8; in sports, 155, 172-3

blood pressure: environment and, 130; inheritance of, 129-30; phenotypic variation of diastolic, 130

body density, estimates of, 83

body fat: ageing upon, 250; athletes, 149, 151, 170-1; of disabled children, 95; skinfold readings and, 82-3; socio-economic factors, 249; survey in children, 206-8

body temperature (tropical and European), 61 Brazil, athlete data, 157, 162-5

breast-feeding, 89; population size and, 91; replacement, 192

British, see United Kingdom

calf circumference, rural areas and urban areas compared, 103

Canada, 28; aerobic power, 30, 108, 109, 210–11; aerobic power age and sex, 126; (Arctic Indian) aerobic power, 77, skinfold thickness, 72; athlete data, 144, 150–1, 157, 162, 164, 165, 172–3; body fat, 207; fitness data, 110–11; growth spurt (Anglophones), 192–3; hand-grip, 220; lung volumes, 96; muscle strength, 110; physical working capacity (children), 216; skinfold thickness, 110, 202–3; social class and working capacity, 92; weight-for-height (children), 194; weight (children), 194

cardiac output, aerobic power and, 38

Chaamba, 65

chest circumferences, 103

child-rearing: skinfold thickness and, 90; upon working capacity, 90

Chile, 13, 126; aerobic power, 56; lung volume, 96; skinfold thickness, 56

Chinese: vital capacity, 95; weight-for-height, 196-7; weight, 196-7; in Hong Kong, see Hong Kong Chinese; in Singapore, see Singapore circadian rhythms, 79-80

climate: activity patterns and, 47-9; adaptations to, 71; physical activity, 72-8; regions, 58-9 Colombia, calorific deficiency in children, 118

300 Index

contraception, 89-90; population size and, 91 Cook Islands, skinfold thickness, 204-5

cross-sectional studies: in adolescent athlete, 230; growth/development, 179, 180, 181, 188, 189

cyclists, 137–41; anaerobic capacity, 139; aerobic power, 137; physiological characteristics to ethnic grouping, 137; working capacity, 139

Czechoslovakia, 28; aerobic power, 111, 210-11; athlete data, 151, 157, 162-3, 170-3; body fat, 111, 207; circumferences, 103; muscle strength, 111; physical working capacity in children, 216-17; skinfold thickness, 202-3; urban and rural areas compared indices of fitness, 103-4; weight-for-height in (children), 194; weight (children), 194

Denmark: body fat, 207; hand-grip, 220 dentition, comparative age of, 186

diving, data on, 156

disease, 93-8; chest, 94, 98; physical working capacity and, 92-3

Dominica, skinfold thickness, 204-5

East Africa: aerobic power in children, 214; body fat, 208

Easter Island: aerobic power, 66–7, 214; heart rate (max), 45; weight-for-height, 196; weight (children), 196; weight excess, 68

Egypt: weight-for-height, 196; weight (children),

environment: studies on, 132-5; temperature, 79; physical performance, 224-5

ergometer, type, 40-2

ergometry, bicycle efficiency in compared races. 183

Eskimo (Alaska): aerobic power. 76, 77, 247; anaerobic power. 78; cholesterol level. 86; energy expenditure. 114, 121–2; lung volumes. 97; sample bias. 18; skinfold thickness. 72; standing height. 191

Eskimo (Canadian), 15-17, 71, 75; acculturation, 106; aerobic power, 56, 76, 126, 214, ageing effect, 247, predicted, 41, 42; bias data, 19; body fat, 208; cholesterol levels, 86; efficiency, 41; energy expenditure, 51, 114-15, 122-4; growth spurts, 188; haemoglobin levels, 78; heart rate (max), 45; infant mortality, 93; lung volumes, 96; population growth, 91; respiratory disease in, 98; seasonal activity, 52, 53, 120; skinfold thickness, 56, 72, 204-5; standing height, 191; weightfor-height, 196; weight (children), 196; weight excess, 68

Eskimo (Greenland): cholesterol levels, 86; heart rate (max), 45

Ethiopia: aerobic power, 55, 66 (Highland and Lowland), 126; athlete data, 165; hand-grip strength, 220; muscle strength, 69; sample size, 13; skinfold thickness, 56, 65, 66, 204–5; social class and physical working capacity, 92; weightfor-height (children), 196, 198; weight (children), 196; weight excess, 68

Europeans: athlete data, 151; chest size of African to, 95; (in Israel) survey of, 133; weight-for-height (children), 196; weight (children), 196

family size, 89-92

fat: body content as percentage, 84; as cold adaptation, 71; subcutaneous in infants, 192

Finland: aerobic power, 30; physical working capacity in children, 216-17; twin study, 128

forced expiratory volume, 5; athletes, 148; circumpolar regions, 72-3; ethnic groups data of, 96-7; sampling bias, 17; in swimmers, 152

France: aerobic power, 30; weight-for-height (children), 194; weight (children), 194

Galapagos Islanders, 80

Gambia: weight-for-height (children), 196, 198, 200; weight (children), 196

genetic influences: on population measurement, 95; and secular trend and basis of growth, 190; on vital capacity, 95

genetic markers, 125-6

genetic studies, 3, 125, 131

Germany: aerobic power, 30, 210; athlete data, 144, 150, 157, 163-5, 172-3; body fat (children), 207; physical working capacity (children), 216-17; weight-for-height (children), 194; weight (children), 194

gracilization, 192

grip force, Eskimo and white children's age and, 189

growth, nutrition and, 81

growth spurt, 179, 188-9; Canadian Francophones, 192; rural and urban areas compared in India, 192 Guatemala: energy expenditure, 116; skinfold thickness, 116, 204-5; weight-for-height, 116 Guyana, lung volumes, 96

habitual activity, 7-8; methodology, 7; patterns, 112-13

haemoglobin, 68-9, 85; levels and age, 78

hand-grip, compared races in, 220-1; strength and age, 241

Hawaii, athlete data, 157

heart rate: athletes, 144-6, 150; inheritance and, 127-8; maximum, 45; in sport, 153, 164, 165, 172-3; time of day and, 120

hilar calcification (lungs), 98

Holland: aerobic power, 210; physical working capacity (children), 216; skinfold thickness, 202; weight-for-height (children), 194; weight (children), 194

Hong Kong Chinese: hand-grip strength, 220; skinfold thickness, 202-3

hookworm, 94

Hoto: aerobic power, 67, 126; lung volumes, 97; weight (excess), 68

Hungary: body fat (children), 207; weight-forheight (children), 194; weight (children), 194

hunting: energy expenditure in, 115; seasonal variation, 20; traditional, transitional and accultured,

India: aerobic power, 56, 247; athlete data, 144-5, 149-50; cholesterol levels, 86; energy expenditure, 116; lung volumes (North and South Indians), 96; skinfold thickness, 56, 66; sample size, 13; vital capacity, 95; weight-for-height (children), 196-8; weight (children), 196-7

Index 301

Israel, 13; aerobic power, 210–11; cholesterol levels, 86; energy expenditures, 117; ethnic differences in physical working capacity, 133; immigrant data, 86; heart rate (max), 45; seasonal activity, 50; skinfold thickness, 66–7; weightfor-height (children), 194; weight (children), 194; weight excess, 68

Italy: aerobic power, 36, 105, 210, 214, 247; anaerobic power, 105; athlete data, 149, 150, 157; body fat (children), 207, 208; skinfold thickness, 202–3; weight-for-height (children), 196; weight (children), 196

Jamaica: energy expenditure, 114, (in Lawrence Tavern), 117; lean body mass, 69; lung volumes, 96; maximum heart rates, 45; sample size, 13; skinfold thickness, 66–7; urban and rural differences in energy expenditures, 99; urban and rural differences in working capacity, 99; weightfor-height (children), 196, 199, 200; weight (children), 196; weight excess, 68

Japan: aerobic power, 77, 126, 210, 214; athlete data, 144, 149, 150–1, 157, 162, 163, 170–1; handgrip, 220; lung volumes, 96; maximum heart rates, 45; sample size, 13; skinfold thickness, 72; weight-for-height (children), 194; weight (children), 194

Kalahari Bushmen, 74, 75; aerobic power, 66; maximum heart rates, 45; skinfold thickness, 65

Kenya, cholesterol levels, 85

Kirghiz (Russia): aerobic power, 57; skinfold thickness, 57

knee extension force, children's age and, 189 Kofranyi-Michaelis respirometer, 113

Korea, 74; hand-grip, 220; skinfold thickness, 72 !Kung Bushmen, energy expenditure, 117; habitual activity and survival, 120-2, 135

Kurds: energy expenditure, 114, 117, seasonal activity, 50; skinfold thickness, 66-7; weight excess, 68

lactation, 89-90

lactic acid accumulation, 34

Lapps: aerobic power, 76, 77, 214, 247; maximum heart rates, 45; mechanical efficiency, 41; secular trend, 190; skinfold thickness, 72, 204-5; standing height, 191

lean body mass, 69

Libya, skinfold thickness, 204

longitudinal studies: in adolescent athletes, 230-2; in growth and development, 179, 180, 181, 188-9 lung volumes, selected ethnic groups, 96-7

Malaya, aerobic power, 214; maximum heart rates, 45; skinfold thickness, 66, 204; weight-for-height (in Chinese), 197; weight (in Chinese), 197; weight excess, 68

maturation: hand, 186; wrist, 186 maturity, radiographic assessment of, 185-6 maximum oxygen intake, see aerobic power maximum testing in children, 182 measles, 93

methodology, 4; standardization, 22-3; validity, 36-46

Mexico: aerobic power, 57; skinfold thickness, 57 Morocco, skinfold thickness, 204

muscle phosphofructokinase, adult and child content, 227

muscle strength, 69; ageing and, 241-2, 251; athletes, 147, 150, 155-6; chest disease and, 98; child-rearing and, 90; circumpolar peoples, 78; European and Asian comparison in, 155; survey in children, 219-21; team sports, 167-9, 171

natural selection, 93-4; weak, 134-5

Navajo Indians, 66

New Guinea: aerobic power, 57; cholesterol levels, 86; energy expenditure, 54-5; haemoglobin levels, 85; lung volumes, 96; sample size, 13; skinfold thickness, 57, 65, 66, 204-5; weightfor-height, 197-8; weight (children), 197

New Zealand: athlete data, 144, 157; (Maori) cholesterol level, 86

Nigeria: energy expenditure, 55; maximum heart rates, 45; sample size, 13; skinfold thickness, 66-7; weight excess, 68

Nilo-Hamitic, aerobic power, 247

Norway: aerobic power, 211, 214; athlete data, 170-1; heart rate, 119; skinfold thickness, 202-3

nutrition, 81–98; body weight and, 83–5; growth and, 63; on rate of maturation, 193; overnutrition, 82 (see also obesity); skinfold thickness and, 82–3; tropical, 67

obesity: activity patterns in children and, 226; socioeconomic class and, 82; traditional life-style and, 108

Pascuans, aerobic power, 247

Pedi people (Bantu), rural areas and urban areas compared, working capacity in, 100

Peru, lung volume, 97

Peruvian Indians, 74

physical performance, tests on, 6-7

physical working capacity: disabilities and, 94-5; disease and, 92-3; effect of leisure on, 106; nutrition and, 81-98; social class and, 92; survey in children of, 215-19

Poland: athlete data, 163; rural regions, aerobic power, 106

puberty: comparative age of, 189; physical working capacity and, 218

Pygmoid people, Bantu negroes, aerobic power compared with, 132

Quechua Indian: aerobic power, 57; skinfold thickness, 57

quadriceps muscle, 34, 111

racial differences: athletes, 148, 150; in performance, 223-4; sweat, 62

regions: circadian rhythm and, 80; equatorial, 80; polar, 80

right hand-grip strength, 69 right knee extension strength, 69

302 Index

rural areas compared with urban areas: indices of fitness in children, 103; $\dot{V}_{\rm O_i}$ max, 105; working capacity, 99–106

Rumania, athlete data, 162

St Kitts-Nevis: weight-for-height (children), 197-8, 200; weight (children), 197

sampling: bias (civilized), 9-10, (primitive), 10-14; forced expiratory volume, 17; in growth and development, 184; size, 9, 13; socioeconomic spectrum, 111; vital capacity, 17; volunteers, 109-12

Sardinia, aerobic power, 247

seasons of the year: aerobic power and, 107; on hunt type, 20; variations in energy expenditure and working capacity with, 50, 51, 52, 53

seasonal variation: adolescent athlete and, 229; performance in children and, 225

secular trend, 190-2

semi-longitudinal studies, on growth and development, 180-1, 188-9

serum lipids, nutrition and, 85-6

sexual differences, skinfold thickness and, 201

Siberia, environmental temperature of, 79

siblings, comparison of, 129-130

Σ40K+ determinations, 88

Singapore Chinese, lung volumes, 96

sitting height: athletes, 149, 151

skinfold thickness: ageing effect, 250; altitude and, 56-7; athletes, 149, 151; nutrition on, 81, 82-3; seasonal effect on, 107; survey on, 200-6; tropical, 65; tuberculosis on, 98; water sports, 157; see also subscapular skinfold, suprailiac skinfold, triceps skinfold, and under individual races, etc.

South Africa, 28; aerobic power, 31, 66, 211; athlete data, 144-5, 157; efficiency, 42; maximum heart rate, 45; sample size, 13; skinfold thickness, 65; weight excess, 68

South America, athlete data, 144

sport: physical characteristics, 170-1; physiological characteristics, 174-7

standardization, growth data, 185, 187-8

standing height: disabled children, 95; growth curves, 193; secular trend, 191

submaximum testing, 44, 182

subscapular skinfold, 200

suprailiac skinfold, 200

Sweden: aerobic power, 28, 31, 108, 109; athlete data, 144-5, 149, 150-1, 170, 172-3; children aerobic power, 211; weight-for-height (children), 194, 198; weight (children), 194; working capacity in urban and rural children, 101

swimmers: physical characteristics, 150-2; working capacity, 153-5

Switzerland: aerobic power (children), 211; energy expenditures, 54; physical working capacity in children, 216

Taiwan, hand-grip strength, 220

Tamiars, skinfold thickness, 66

Tanzania: aerobic power, 66, 67; cholesterol levels, 85; skinfold thickness, 65, 204; weight-for-height

(children), 197; weight (children), 197; weight excess, 68

Tarahumara Indians: aerobic power, 57, 99, 247; energy expenditure, 54; skinfold thickness, 57

team sports, 166-71; aerobic power in, 164-5, 167-9; anaerobic power in, 164-5; anaerobic work in, 167; body characteristics between, 166-71; muscle strength, 167-9, 171; physical characteristics, 162-3; working capacity in, 164-5 temperature, body, 79

Thailand, hand-grip strength, 220

topography, local, 54; variation of energy expenditure and working capacity with, 54-9

track competitors, 140-1

triceps skinfold, 200

Trinidad: aerobic power, 66; energy expenditure, 114; lean body mass, 69; lung volumes, 97; maximum heart rate, 45; sample size, 13; skinfold thickness, 65; weight excess, 68

tropical, nutrition, 67

tuberculosis, 93; on growth and development, 98; vital capacity and, 94

Tunisia: aerobic power, 214, 247; body fat, 208; skinfold thickness, 205; weight-for-height (children), 197; weight (children), 197

Turkey, lung volumes, 97

Twa: aerobic power, 67, 126; lung volumes, 97; weight excess, 68

twin studies, 127-9

twins: environmental factors and, 129; trained and untrained, aerobic power differences in, 154; trained, 128-9; untrained, 128-9; vital capacity variance, 129

United Kingdom: aerobic power, 30; athlete data, 145, 162-3, 165; energy expenditure, 55, 118; lean body mass, 69; skinfold thickness, 202-3; weightfor-height (children), 195; weight (children), 195

United States: aerobic power, 31, 109, 211; athlete data, 144-5, 151, 157, 162-5, 170-1; body fat (children), 207; hand-grip strength, 220; heart rate, 120; lung volume data, 97; physical working capacity (children), 216-17; skinfold thickness, 72, 203; time running (soldiers), 112; voluntary activity, 118; weight-for-height (children), 195; weight (children), 195

USSR, athlete data, 162, 171

Venezuela: aerobic power, 67; muscle strength, 69; skinfold thickness, 65

Vietnam, hand-grip strength, 220

vital capacity, 5; ageing upon, 242-4, 251-2; athletes, 148, 170-1; circumpolar region, 73; low, 94-5; sampling bias, 17; in swimmers, 151-2; team sports, 162-3; twins, 129; water sports, 156-7, 161

Vo, max measurement, 26-32; see also aerobic power

Warao Indians: aerobic power, 67; muscle strength, 69; skinfold thickness, 65 water sports, 156-61



Index 303

- weight: change in, with age and nutrition, 105, 189, 248-9
- weight (adults), 105; Bantu, 83; different races compared, 194-7; Ethiopia, 83
- weight (children): different races compared, 194-6; disabled, 95; rural and urban, 101
- weight (excess): skinfold thickness in, 82; tropical data, 68
- weight-for-height, 192–200; athletes, 149, 151; different races compared, 194–7; North American Indian, 196, 200; socio-economic class and, 198; sport, 170–1; World War II and, 179 work tolerance, cold and, 72–6
- working capacity: ageing and, 233-52; measurement of, 23-46, 181-4; secular trend in, 190-2; sport, 144-5, 153-5, 172-3
- Yemenite: energy expenditure, 114, 116-17; skinfold thickness, 66-7; weight (excess), 68
- Yoruba: skinfold thickness, 66-7; weight (excess), 68
- Yugoslavia: athlete data, 157, 163; lung volumes, 97
- Zaire: aerobic power, 67, 101; acculturation, 101; athlete data, 163, 165; lung volumes, 97; sample size, 13; weight (excess), 68; see also Hoto and Twa