Arthur Lydiard

RUNNING to the TOP

Arthur Lydiard's High-Performance Training Methods

With Garth Glimour

MEYER & MEYER SPORT

The contents of this book were carefully researched. However, readers should always consult a qualified medical specialist for individual advice before adopting any new nutrition or exercise plan. This book should not be used as an alternative to seeking specialist advice.

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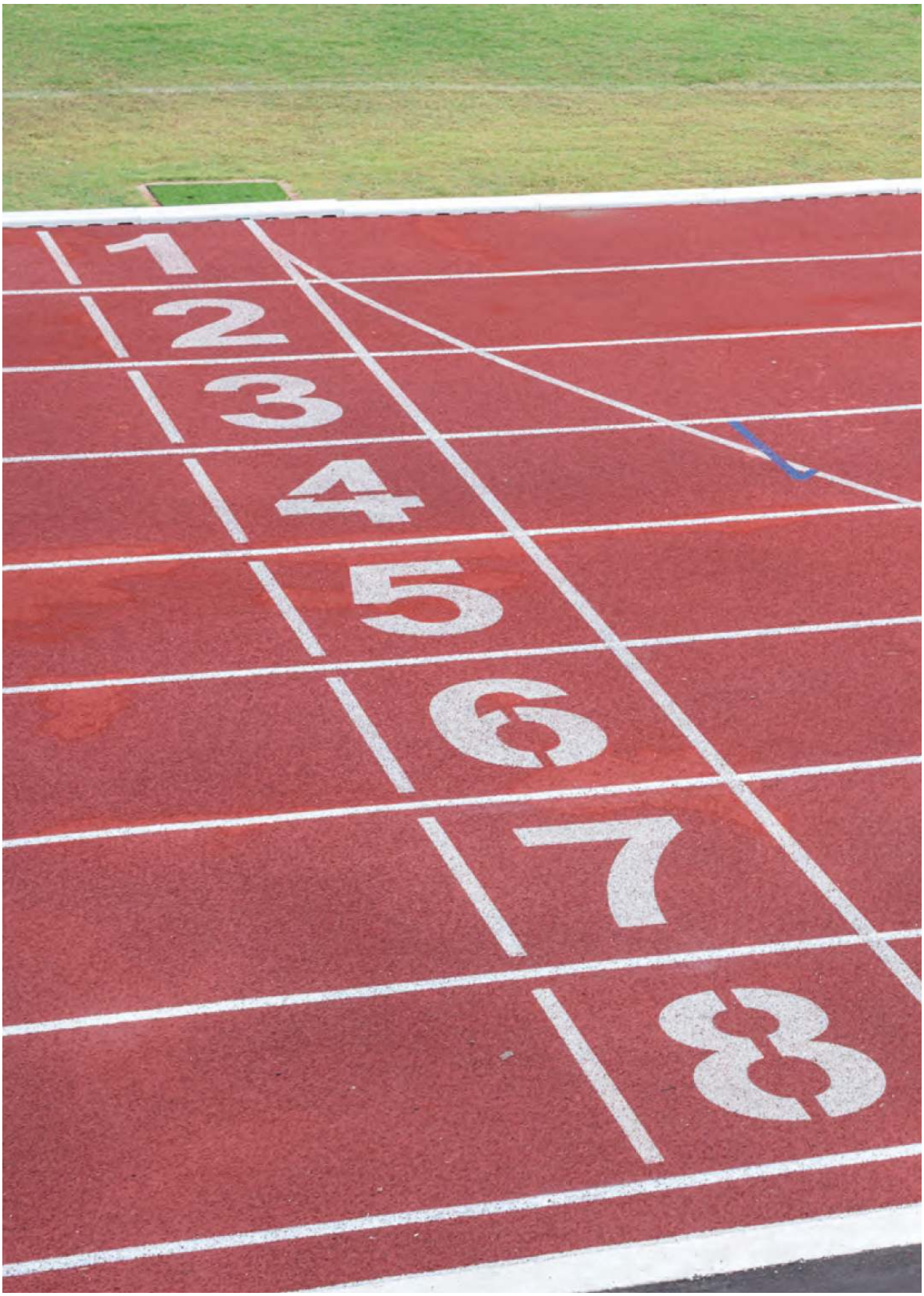
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INTRODUCTION

Running is defined as either the act of progressing by advancing each foot alternately, never having both on the ground at once, or the act of proceeding by lifting one foot before the other is down. Neither definition is particularly complicated and neither places any limitation on the degree of forward momentum attained.

The art and technique of running and the processes of talking and writing about running should be equally as simple. Running, after all, is as natural as walking. Once a child has learnt to walk, no one has to teach it how to run.

This book, then, is written to be as uncomplicated as the principle of putting one foot in front of the other without ever having both on the ground at once. Its purpose is simple – to enable you go faster, and get both feet off the ground if you want to, or farther, or both faster and farther, according to your personal aims and aspirations. If you want to be an Olympic or world champion, this book is for you. If you merely want to jog in comfort around your neighbourhood in the interests of your physical well-being, this book is for you, too.

We set out the guidelines, the rationale, the simple principles behind the art and pleasure of running better; we

offer schedules upon which to base your own programmes of training for whatever you aspire to. The rest is up to you.

Arthur Lydiard’s philosophy of running training is like none other, applicable to anyone who pulls on a pair of running shoes. He devised the principles of training now employed by leading coaches and athletes all around the world, in track and field and in many other sporting spheres; he invented the pure and simple exercise of jogging which has infected millions with its benign bug.

First tested and found successful in the 1950s, the Lydiard system has undergone some subtle refinements through the years. But it remains the same elemental theory that first placed a small handful of ordinary runners, from Lydiard’s immediate neighbourhood in an Auckland, New Zealand, suburb, at the forefront of world middle and distance running for more than a decade. Then, as Lydiard advanced from being a coach of runners to an international coach of coaches, it spread around the running tracks and training centres of the entire world.

Arthur Lydiard turned a simple, practical faith in himself into a world-wide nostrum for everyone seeking a method of running better. His name and his methods have won instant recognition in many nations. As gurus go in the modern world, he ranks among the greatest and, almost certainly, the most physically and psychologically effective.

For several years from the mid-seventies, the late great Japanese middle and distance coach Kiyoshi Nakamura brought teams of his top runners to New Zealand to spend months training in the remote vastness of the South Island back country behind Ashburton. These were the famous runners who, in a sudden spasm reminiscent of the explosion of the Arthur Lydiard-trained team into

international running in the sixties, became a dominant world force particularly over the longer distances. The stars were the Soh brothers, then Toshihiko Seko, the legend who won three consecutive Fukuoka marathons, ran world track records for 25,000 and 30,000 metres in New Zealand and took the 1981 Boston marathon in 2:09.26.

Nakamura, one of the most respected figures in Japanese athletics, had an association with New Zealand that stretched back to 1936, when he represented Japan in the historic 1,500 metres which saw Jack Lovelock race away with a spectacular record-making gold medal.

But why, year after year, did he bring his teams of distance runners to New Zealand?

The first reason, he told *New Zealand Runner* magazine's Tim Chamberlain in 1982, on his seventh visit, was that Arthur Lydiard lived in New Zealand.

Nakamura was one of the first Japanese runners to learn Lydiard's methods, the first to invite Lydiard to Japan in 1962. He read all Lydiard's books and came to believe he knew more about Lydiard's methods than Lydiard himself because his studies made a vital link between Lydiard techniques, Christianity and Zen. That might be argued. What could not be argued was that Nakamura used Lydiard as the basis for his coaching methods and philosophy that fired Japan, for a time, into the forefront of international middle and distance running. He took his runners to nearly 20 Japanese records, several world records and a string of international successes. Among the Japanese, Nakamura knew Lydiard best. When he died, the vital spark that lit Japan died with him but he had made the point: The Lydiard system, once understood, was the critical factor between success and failure. Olympic marathoner and leading US

coach Ron Daws was unashamedly a Lydiard fan. Lydiard's name appeared on page one of Daws' *Running Your Best* with the quotation, "It's not the best athlete who wins, but the best prepared."

Of the Lydiard system, Daws wrote: "A few aspiring kids approach a neighbourhood shoemaker to teach them to run. The shoemaker is a high school drop-out and retired distance runner whose own brand of torturous training methods have so far earned him little more than scorn and ridicule from the coaching community. He agrees to help and, although the runners are not the country's best, not even the city's best – just eager kids from the neighbourhood – the shoemaker promises them world records and Olympic medals if they can endure the workouts. The boy the shoemaker first publicly predicts will set a world record is crippled in one arm; and another runner, who the shoemaker says will be the best middle-distance runner ever, looks muscle-bound and awkward.

"A few years later, the country's entire contingent of distance runners to the 1960 Olympics is coached by the former shoemaker. Thirty minutes apart, the crippled one and the awkward one win gold medals; a day later, another of his runners, seemingly athletically nondescript, takes a bronze. From these and other of the shoemaker's pupils come most of the world records from 800 metres to the one-hour run and two more golds and a bronze in the next Olympics. Wild dreams? A fairy tale? Hardly, I'm just recounting the emergence of New Zealand's Arthur Lydiard, guru of distance runners, father of the jogging craze, prime mover and motivator of Olympians world-wide … Lydiard has either directly coached or influenced more world record-holders and Olympics medalists than anyone. With seemingly endless energy, he has lectured up one country

and down another, pausing periodically to serve as national coach in Finland, Denmark, Mexico and Venezuela. Ironically, he is, like many prophets, largely ignored in official circles in his own country.“

”When Peter Snell and Murray Halberg sprinted off with the gold in the 800 and 5,000 and Barry Magee won the marathon bronze in the 1960 Rome Olympics, the rest of the world was full swing into interval training. So ingrained is the Lydiard philosophy now, we almost have to force ourselves to recall that before him, the coaching of distance runners was aimed 180 degrees in the other direction. Lydiard was the beginning of a magic era; jogging became acceptable if not godlike … Lydiard was the keystone and he never lets us forget that, as an unschooled layman, he did what physiologists, theorists and professional coaches hadn’t been able to do. He was unsophisticated but he was smart and he had the tenacity of a bulldog.“

It was the Lydiard approach that turned my career around and it is the basis for my concept of efficient training. Lydiard’s methods are not geared towards immediate results. He speaks of progressing over several years and sacrificing early success to lay the groundwork for bigger victories later. Even within each season, you would not reach your peak until the last possible moment. Both of these concepts are implied when Lydiard wrote: ”You will come to your peak slower than many others and you will be running last when they are running first. But when it is really important to be running first, you will be passing them.“

The March/April 1992 issue of *Peak Running Performance*, a US publication which presents running-related research information, was entirely devoted to a study of Lydiard’s running philosophy.

”His legacy“, it said, ”can be seen in the training schedules of most of the world’s best middle- and long-distance runners. While Lydiard’s coaching days ended about a quarter-century ago, his breakthrough approach to training remains securely embedded.

”After his great coaching successes at the 1960 and 1964 Olympic Games, sports scientists and exercise physiologists around the world confirmed the scientific soundness of his methods. While Lydiard was not a scientist, his overall training approach was well ahead of the scientific community of his day.“

Lydiard’s programme epitomises one general but very critical concept related to exercise and sports physiology. This broad principle is gradual adaptation. While most athletes would call this “plain old common sense“, experience tells us that common sense is not so common – especially among runners who have a strong desire to improve their running.

The magazine illustrates the concept with the legend of the Greek strongman who lifted a calf when it was first born and continued to lift it each day until it was a full-grown cow. The day-to-day increase in weight was hardly noticeable although the increase over time was significant. With the Lydiard system, it says, this process of gradual adaptation can produce astounding long-term results.

Garth Gilmour

CHAPTER 1

THE 21 FACTORS

Twenty-one factors influence the running athlete. Some are factual, some physical, the rest mental. All of them play a part in how well an athlete performs, how successfully he or she can reach whatever level of achievement he or she aspires to.

They are:

1. The date of the race
2. The challenge the race represents
3. Age
4. Talent
5. Health
6. Nutrition
7. Drugs
8. Hormones
9. Body build
10. Running technique
11. Aerobic capacity
12. Weight
13. Body fat

14. Training methods
15. Coaching
16. Tactics
17. Self-discipline
18. Track conditions
19. State of the weather
20. The opposition
21. The balance between aerobic and anaerobic exercise

Some of them appear under more than one heading. For instance, your weight and body fat at any given time are facts but they are also physical conditions which can be altered. And there are some physical conditions which are susceptible to mental influences or can influence mental attitudes. Each is an integral part of the whole athlete and his or her personal encyclopedia of knowledge.

We have not given them any order of priority because none exists but, perhaps, the single most important factor of them all is the first listed – the date of the competition.

Think about it. You do not have to be an Einstein to see how significant that race date is. Whether the race is a club championship, a national title event or an Olympic Games final, everything that happens in the lead-up to it – and we're talking from weeks to years depending on the individual athlete's level of experience and ambition – is aimed at that single event. Anything else along the way is merely a stepping stone to the ultimate goal.

So, everything the athlete does in that lead-up has to be timed correctly and precisely to produce the peak performance when the starting gun sounds on the big day. If you doubt that, listen to any group of athletes talking after a championship.

They are noted for their excuses after events. A lot of Olympic titles were won in times that very many competitors had comfortably bettered. Yet, on the day, they cannot perform anywhere near their best.

This demonstrates that the race date is indeed the key to correct training. I often tell young people, “Look, last year, you ran the best race of your career. Everything went right and you performed at your very best. Now, if you know why that happened and you put your training plan together properly to reproduce that peak performance again on the day of the first race you want to win this season, then I would say you know something about training.

“Until you can do that, you don’t know a damn thing about it. You are just a good athlete who, one day, without realising why it is happening, will run a good race.“

I often refer back to Lasse Viren, who, after his first Olympic triumphs, was injured and out of running for a couple of seasons but then came back as great as before. The American accused him of blood-doping, which was ridiculous. The reason was simply that I had taught the Finns how to construct a programme and follow it to achieve peaks when they wanted them – and the Finns had listened and learned. Viren knew the programme that got him his first Olympic medal; all he had to do to win some more was repeat it.

Many of the medal winners in the Olympics are not the best athletes but they are the best-prepared athletes on the day of competition. I cannot emphasise this strongly enough: A world of difference lies between the two.

So that, fairly succinctly, is what this book is all about: Guiding you to get all those 21 elements together in the

right place at the right time for you to attain your selected goals in athletics.

Let’s begin by considering why running is for everyone – from potential Olympic champion to the woman or man, girl or boy who merely wants to get that extra enjoyment and satisfaction out of life that spring from simple physical and mental fitness.

CHAPTER 2

WHY IS RUNNING VALUABLE?

The key that opens the first door to your goal is oxygen. We can be healthy without being fit. Or we can be fit without being healthy. What we need to aim for is both fit-ness and health. The first fundamental we have to recognise, in trying to reach this happy combination of both, is that nearly every metabolic reaction in the human body depends, directly or indirectly, on oxygen. The key, therefore, is to achieve the best oxygen uptake level possible to feed the metabolic processes.

The second fundamental is that the only way we are going to get that higher oxygen uptake level is by steadily exercising over long periods – and the only way we can do that, day after day, is by maintaining the exercise at an aerobic level, not an anaerobic level.

What's the difference? Aerobic exercise requires the presence of oxygen; anaerobic exercise does not. A muscle can contract for a while under the anaerobic conditions of inadequate oxygen supply but, sooner or later, the

restoration of an adequate oxygen supply is essential for the recovery of that muscle or it ceases to function efficiently.

Drs Laurence Morehouse and Augustus Miller in their *Physiology of Exercise* say quite simply that aerobic metabolism is far more efficient than anaerobic metabolism because more energy is derived from a given amount of foodstuff when the reactions occur under aerobic rather than anaerobic conditions. So it follows that aerobic activity can be sustained by drawing energy from the oxygen we supply to the operating muscles and, the more efficient the supply, the more efficient and enduring will be the activity.

This brings us to the heart, the large pumping muscle which transports oxygenated blood from the lungs through the bloodstream to supply those muscles. We have to teach that pump to work progressively harder to take more blood with more oxygen to where it's wanted. Only one set of the body's multitude of muscles can work long enough and hard enough to maintain a reasonably high aerobic pressure on the blood vascular and cardio-respiratory systems to achieve that desired result. They are the quadriceps, the large muscles at the front of the thigh.

An evaluation of various sports has proved that the activity that best produces this consistent aerobic pressure is cross-country skiing. It works all muscles but it works the quadriceps best. Not everyone is in a position to go cross-country skiing all the year round but, fortunately, next comes an activity which is available to virtually everyone – running. Running lifts the body weight against gravity, largely using the upper leg and thigh muscles hard enough and long enough to get a better result even than cycling, which ranks next, rowing or walking.

Swimming, for instance, is well down the list because the body weight is buoyant in water. Once swimmers reach a level of endurance and technical skill, they can go through the water fairly well without too much strain and without exerting that required level of pressure on the heart that running achieves. Compare swimmers at the end of a 1,500-metre race with runners who have just competed over the same distance.

To use running as the cornerstone of fitness depends on the development of a programme that enables us to maintain that aerobic pressure at its upper limits – just short of tipping into anaerobic effort – for long periods.

You cannot build a house without a solid foundation; you cannot build good physical condition without a sound aerobic foundation. We can use a variety of exercises to develop muscular efficiency and strengh but we also need muscular endurance to acquire real fitness.

One of my favourite photos is of two large German shotputters standing on either side of a girl marathon runner. Her weight is half that of the shotputters but tests determined that she had twice their cardiac output. These huge men, briefly, could move heavy weights a considerable distance but both had poor blood vascular and cardiorespiratory efficiency. The small girl’s, developed by long aerobic running, was 100 per cent better.

Particularly as we get older, we need not only good muscular strength to keep our muscles toned, we also need to improve our cardiovascular system. We breathe in a lot of oxygen but, unless we have that efficiency, we also waste a lot. If we can improve the blood flow per minute from heart to lungs and back, we create the opportunity to assimilate more of that oxygen.

And, of course, once we get the extra oxygen into the body, we can improve the circulatory system. We know from testing older walkers, distance runners, cyclists and other athletes that their circulatory systems are very well defined and efficient; many times more developed than those of sedentary people.

To improve our ability to transport more oxygen and then use it and our blood sugars through muscular endurance, we need good capillary beds. These can be developed quite substantially by continuous aerobic use of muscle groups over long periods.

All living cells, plant and animal alike, contain mitochondria, aptly called the powerhouses of the cell system. Mitochondria metabolise carbohydrates and fatty acids to carbon dioxide and water and release energy-rich phosphate compounds in the process. All the activities of life – growth, movement, irritability, reproduction and others – require the expenditure of energy by the cells but the number of mitochondria per cell may range from a few to more than a thousand. Mitochondria move, change size and shape and fuse with each other to form bigger structures or split apart to form shorter ones and are usually concentrated in the region of the cell with the highest rate of metabolism.

Living cells are not heat engines and cannot use heat energy to drive these reactions. Instead, they must use chemical energy, chiefly in the form of energy-rich phosphate bonds.

Adenosine triphosphate (ATP) is the chemical which is the source of our energy. The ATP stored in the working muscles is sufficient to work for only a few seconds but the muscles also contain creatine phosphate, which is there for

rebuilding ATP. It, too, is limited to about 15 to 20 seconds of strenuous exercise.

This is where the delicate balance between aerobic and anerobic exercise plays its part. A marathon runner, employing a moderate work-rate, can get enough oxygen to economically burn fat and glycogen. This enables ATP to be rebuilt as fast as it is being used and the trained runner, working aerobically, can continue for several hours – in the case of the elite ultrarunner, for day after day of steady aerobic output.

What happens when the runner sprints or shifts his work-rate into the anaerobic phase is that oxygen is no longer absorbed fast enough for the fat and glycogen breakdown. The body will then cheat and break down glycogen without oxygen.

The difference is that aerobic metabolism produces innocent wastes, water and carbon dioxide; anaerobic metabolism produces lactic acid, which, as it accumulates, progressively prevents the muscles from contracting.

The anaerobic system will function temporarily even during a long run at a basically aerobic work-rate – when you tackle a tough hill or kick in a burst of speed, for instance – and certainly will when aerobic metabolism can no longer supply the energy you need to sustain your pace. In fact, even when you begin a run slowly, you are likely to be running anaerobically until your aerobic mechanism reacts and takes charge. This should be borne in mind to guard against going out too fast at the start of a race or training session or failing to warm up adequately to prepare the aerobic mechanism.

No matter how hard or deeply you breathe, the oxygen your muscles can use is limited to your maximal aerobic capacity, or maximum oxygen consumption, known as VO2. It is calculated by the amount of oxygen you can consume each minute divided by your fat- free weight. All other things being equal, therefore, the large person can use more oxygen than the small one.

VO2, naturally, varies widely. A normally active mid-twenties male can use between 44 and 47 ml of oxygen for each kilogram of fat-free weight each minute. Top endurance runners can lift their capacity to more than 70 ml/kg/min. Women score, on average, lower than men because, pound for pound, their muscle mass is less. But the gap between male and female VO2 capabilities is reducing rapidly as more and more women work to training schedules as tough as men's.

How widely the VO2 can vary can be seen in any marathon race. The top runners will be cruising aerobically on their high VO2 at around five-minute miles; at the back of the field are runners who couldn't cover one mile at that pace because they would be completely anaerobic. Their lower aerobic capacity means they can run their consecutive miles only at a much slower pace.

In aerobic exercise, one molecule of glycogen forms 38 molecules of ATP. Anaerobic exercise yields only two. And Morehouse and Miller, in *Physiology of Exercise*, consider that severe anaerobic work is only 40 per cent as efficient as aerobic work.

The elite runner covers distances at high speeds aerobically because his or her muscles are able to break down and release fat from the fat cells and oxidise the fat as fuel. During sub-maximal exercise, fat is the main fuel. When

your muscles are metabolising mainly fat, the oxygen demand is greater than when burning glycogen, which means you either have to take in more air or slow down. Fat, therefore, is not the preferred fuel for fast running.

In shorter races, say, under 10 km, runners burn glycogen almost exclusively. When the marathon runner burns fat efficiently, the glycogen is conserved and is available for that fast finish over the last ten miles that wipes out the opposition. Once you have established the base of muscular endurance, maintaining muscular strength and tone is attainable by developing the muscle fibre through the application of resistance – by lifting weights or running up stairs or hills.

Again, since the muscles contain both red and white fibres (otherwise known as slow-twitch and fast-twitch), you have to define exercises which work on both. No amount of exercise will change the balance of red and white fibres you were born with but you can improve their efficiency. The slow-twitch fibres are the best for aerobic metabolism, the powerful fast-twitch fibres for anaerobic metabolism.

The diaphragm and extensor muscles that maintain posture are red or slow-twitch muscles; muscles in which the white fibres predominate, including most of the flexor muscles, are specialised for speed and tire more easily.

Essentially, we have to develop oxygen uptake to make our body machinery function better. The net results will be, hopefully, a delaying of the aging process and, certainly, an improvement in both muscular and mental endurance. We will find that, when we don’t tire physically, we don’t tire mentally either.

I have proved this in training high school boys and girls. Not only did they improve as athletes, they also became better students. They were able to study longer and more effectively without suffering from mental fatigue. Quite a few who became national athletic champions were also duxes or top academic pupils at their schools.

In Finland, one newspaper took me to task, declaring that the training programme I was laying out for high school boys was too severe and would affect their studies. Three of those boys won Finnish high school championship events and one of them became dux of his school.

There is no necessary distinction between the sporting jock and the academic swot; the one attribute goes hand in glove with the other. They can be the same person. The high oxygen uptake levels of properly trained athletes feed a better oxygen supply to all parts of their bodies, including their brains.

CHAPTER 3

THE BASICS OF YOUTH

The great Swedish coach Gosta Holmer, head Olympic coach in 1948, said that if you can get an athlete in his teens to train but not race until he is mature, you will have laid the foundation for an Olympic champion. It's an ideal I've always agreed with, the reason why I've always insisted on taking the long view with athletes who want to become champions in a hurry. There are no safe shortcuts.

When I was in Kenya, I was reminded once more of the lesson the African athletes have given us since they began dominating middle and distance running around the world. Part of their way of life has been doing exactly what Holmer preached.

In Kenya, as in other African nations, many youth run to and from school every day of the school year. No cars, no buses, just their own legs. One youth called Biwott, for instance, ran ten miles to school and ten miles home again five days a week – one hundred miles a week. He became an Olympic champion at the 1968 Games in Mexico, which illustrates how long the message of this great potential for success has

been around. These kids run because it’s the only way for them to go. They run with no pressure on them, no racing except in fun, and all the time they are laying a wonderful foundation of high oxygen uptake and endurance so that, when they finally turn out in a race somewhere, many of them produce fantastic times. We saw this in the 1988 world cross-country championships when the junior Kenyans proved far superior to anyone else. Now the Moroccans, Tunisians, Algerians and others who are moving into the international scene are also running fast times because they, too, have done so much aerobic running as young kids that they have a huge natural base on which to build speed and proper technique.

In the US, when young kids show any form at high school, the tendency is to put them on the track and pile the anaerobic work into them. Consequently, they don’t develop.

We know that young people, before they reach puberty and go through that fast growth spurt, have the ability to use oxygen more efficiently for their body weight than adults. They also have highly sensitive nervous systems so they are protected by nature to be able to continue activity for a long time at the aerobic level. But they cannot stand heavy doses of anaerobic training and pressure from coaching regimens to race a lot. This occurs in many of the affluent countries, usually because sporting success is as good for an educational institute as academic success, and success means better funding. These youngsters, therefore, don’t develop their aerobic capacity sufficiently so when, as adults – if they’re still interested in running – they come up against the Africans, and their relatively low oxygen uptake level is no match for their opponents’ high level. When the pressure goes on in a race, they lose knee lift, they

experience neuromuscular breakdown, they can’t sprint at the end – and the Africans can.

It’s an anthropomorphic fact, of course, that the Africans have the advantage over Caucasians of larger gluteal muscles. They can do things to get more power that white people can’t. They can actually lean forward and still get their knees up; the Caucasian has to stay much more upright.

But the American publication, Running Research News cast new light on Kenyan supremacy by reporting the results of a study by Swedish exercise physiologist Bengt Saltin, of the famed Karolinska Institute in Stockholm. He compared seven elite Swedish runners with students from Kenya’s St. Parick’s high school, which, with a roll of about 500 students, has produced six world cross-country champions, four sub-2.10 marathoners and more than a dozen Olympians.

Saltin, reported RRN’s Owen Anderson, PhD, reckoned that thousands of Kenyan runners were just as good as the top seven Swedes but discovered that St. Patrick’s athletes followed incredibly simple training plans, which included a considerable mileage run as fast as possible on six days of the week. Running to and from school added some 10- to 30-km slower running to the plan.

Saltin found the Kenyans had a small advantage over the Swedes in total anaerobic capacity (about three per cent). The Swedes’ VO2 max ranged from 76 to 81 ml/kg/m; the Kenyans’ from 79 to 87. Each group had equal slow-twitch to fast-twitch fibre ratios but then Saltin found a significant difference in what lay inside and around the Kenyans’ muscles.

They tended to have more mitochondria per muscle cell and more capillaries draped round their fibres. The Swedish runners had four to five capillaries per muscle cell in their quadriceps but the Kenyans had seven to eight, quite similar, Saltin found, to the world's best cross-country skiers, giving them a greater capacity to use oxygen and a greater resistance to fatigue.

Inside their muscle cells, the Kenyans had a higher concentration of the enzymes which break down fat and greater quantities of citrate synthase, a critical enzyme needed to provide muscles with energy aerobically. Reverting to Biwott for a moment, *Sports Illustrated* magazine ran a big article on him when he won his Olympic medal, showing him in his home village, which was largely mud and straw huts. Here, the magazine said, was an athlete who had never had a coach, wasn't trained properly and didn't even have the right food but won an Olympic gold medal.

If we look at the situation sensibly, Biwott didn't need a coach. He was better without one. He laid the basis for his success with all that running between home and school with no more pressure on him than the weight of his schoolbag. He trotted along at his own pace, playing as he went, as kids will do when left to their own devices – and there was the best training he could get. None of the American way: The guy with 'Coach' on his back, a clipboard and a stopwatch in his hands, shoving kids through repetitions until they are falling down with fatigue, blacking out and vomiting because the oxygen debts they are incurring are so great their central nervous systems are being attacked. Many of them, who got their college education only because they won sporting scholarships, have told me since that they dropped running as soon as they graduated although