

MILING HISTORY  
**QUIZ..**

COACHING

**British Miler**

**MAY**

**1965**

How to achieve your

**SUB - 4 MIN.  
MILES**

*Ideas*

**BMC NEWS**

## EDITORIAL

Since the last issue of THE MILLER the B.M.C. has grown from strength to strength and is now one of the largest specialist clubs in the country. Likewise, the strength and status of British miling has grown rapidly. Who could have envisaged two British runners in the 1,500 metres final in the Tokyo Olympics when not one United Kingdom runner had beaten 4 minutes in 1963? What brave track prophet would have forecast that in 1964 no less than six milers would break the 4-minute barrier or its metric equivalent?

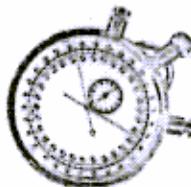
What of the future? The club is staging some paced miles this season in a determined attempt to break the British mile record held by our Vice President, Derek Ibbotson. In achieving this we will be that much more confident in tackling the world record of Peter Snell. Snell is not invincible. He has been beaten in mile races in the U.S.A. The great Herb Elliott was never beaten in a mile race, a record that will seldom be achieved by any other miler.

In the opinion of miling experts it is thought that Alan Simpson, John Whetton, Andy Green and Mike Wiggs could capture the world record for us this year or next. Simpson, much criticised, not without reason, for his back of the field running has shown that leading the field does not affect his performance badly, to wit, his 6,000 metres time indoors in Finland. John Whetton, unbeaten this year indoors with some fast times that surely improve as the season progresses. Andy Green, the giant of the miling fraternity has found the answer to fast miling last year when he altered his rest times in training. Mike Wiggs was robbed of a sub-4 minute mile last year when a freak hailstorm descended upon him. A slow first half also cost him dear. In the right sort of race he could well hit 3 mins. 56 secs. and he has confessed that he thinks he can do it.

Then there are the men knocking at the door of great honours, John Thresher, Neil Duggan, Derek Graham, Mick Gowen, Hugh Barrow and the up and coming Juniors Mike Tagg and Chris Stewart. All these are potential sub-4 material and one at least will break the barrier this season and push the experienced men onto greater efforts.

With the possibility of the metric mile being given olympic status for women, British runners must surely be in with a chance for a medal at Mexico. Gordon Pirie's protege, Aune Smith, has yet to reach her best. The British record of Diana Leather's has stood for too long. Too many coaches are frightened to let their charges run mile races and too many clubs are reticent about staging mile races for women. We are pleased that the London Olympiads and Watford Harriers have shown the way in this matter. Much nonsense is talked about mile training for women. There is only one way to train, and that is PROGRESSIVELY. The writer watched the Australian miler, Joan Bereta, start the season running repetition quarters in 90 seconds with 90 seconds rest. He watched her systematically clip of the lap times until she was doing 70 seconds per quarter. She broke a W.A.A.A. mile record that season. Why allow women runners excessive rest time as many coaches do? Why not lower the time of the quarters and keep the rest time at 90 seconds? It is worth trying.

The regional secretaries are doing tremendous work. Look out for star material from the Midlands and North East areas.



MIDDLE DISTANCE RUNNING QUIZ.

1. What distance is 800 metres?
2. How do you convert 800 metres time to 880 yds. time?
3. What distance is 1,500 metres?
4. How do you convert 1,500 metres time to one mile time?
5. In the past 75 years two world record holders ran the first half of their record runs slower than the second half. Can you name them?
6. What British miler, formerly world record holder, ran his fastest mile when 30 years old?
7. What Olympic 1,500 metre gold medallist was also inter-hospitals(London) bantamweight boxing champion?
8. Who was the first public schoolboy to break 4½ minutes for the mile?
9. Sunder Hagg and Arne Anderson both held the world record for the mile in 1944 and 1945? They claimed that a certain type of training was responsible for their success. What was it?
10. Who coached Jose Barthel to beat surprisingly, Roger Bannister in the 1952 Olympics and gain a gold?
11. A well-known Sunday newspaper sportswriter was once the British mile champion. Who was he?
12. What great American miler was so severely burned as a child that it was thought he would never walk again?
13. A veteran distance runner last year did a 4-minute mile. Can you name him?
14. Can you name the Flying Harrier who beat 4 minutes for the mile?
15. What former minister of the government held the Oxford mile record and what was it?
16. Who was largely responsible for the five lap track at Oxford being altered to four laps?
17. How many miles a week did Roger Bannister train throughout his running career?
18. Can you name the former police champion who ran his fastest race of 4 mins. 30 secs. when 40 years old?
19. Did Gordon Pirie ever break 4 minutes for the mile?
20. What Northern athlete (a) trains three times a day? (b) has an aversion to weight-training (c) is a sports commentator?

— 888 —

Answers on opposite page.

ACCESS TO QUIZ

1. 874.9 yds.
2. Add on seven-tenths of a second.
3. 1,640.14 yds.
4. Add 18 seconds.
5. Peter Snell in his first mile record and Herb Elliott.
6. Sidney Wooderson(4 mins. 4 secs.).
7. Jack Lovelock, N.Z.
8. Sidney Wooderson(Mercers).
9. Partlek(speed play).
10. Waldemar Gerschler.
11. Joe Binks and latterly Doug Wilson, both of the NEWS OF THE WORLD.
12. Glen Cunningham.
13. Bill Baillie, N.Z.
14. Mike Blagrove.
15. Philip Neel Baker(4 mins.43 secs.).
16. Roger Bannister.
17. 25-28.
18. Sgt. Pettit, Metropolitan Police.
19. Yes. He did this in Ireland running against Elliott.
20. Peter Keeling.

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DID YOU KNOW THAT...the 150 members of the British Milers' Club share nearly 200 county, regional, school and national titles in middle distance running?

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STARNERS::: Lenardt Strand, a former Swedish international miler whose profession is concert pianist, was so nervous before races that he often arrived at the starting line improperly clad:

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DEAD SHOT..Peter Snell has a pulse rate of 38. Often when milers have their pulse taken by nurses in hospital the nurses run off to get sister because they think the poor fellows are off to join the angels;

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## MIDDLE DISTANCE INJURIES

The average medical practitioner does not have the depth of knowledge required to treat athletic injuries. Each athletic event has its specific type of injury. The runner is subject to march fractures of the toes, dropped metatarsal arch, strained Achilles tendon, synovitis of the knee, palled calf muscles, shin splashes, strained lateral ligament.

Where the onset of the above conditions is sudden and violent the affected part should be immediately immersed in ice cold water and left there for several minutes. This will check internal bleeding.

Some aches and pains in muscles are entirely due to excessive lactic acid accumulating and causing muscle fatigue. This condition should pass off within 48 hours.

The procedure advocated for prompt treatment of athletic injuries is to see your local general practitioner FOR A LETTER OF INTRODUCTION TO AN ATHLETIC CLINIC. Some doctors do not like doing this because they feel they can treat the condition themselves. We have recently been informed of such a clever-stick who was treating a cracked bone with liniment! An X-Ray through another source revealed the fracture. Allow your doctor a week to clear up the condition then ask for a letter if it does not improve. ATHLETIC INJURIES REQUIRE SPECIALIST TREATMENT AND IF YOU ARE A FIRST CLASS ATHLETE YOU SHOULD GET THE BEST.

If you are unable to get to a doctor immediately, here are some first-aid measures which may be of use. In the case of a dropped metatarsal arch (under the foot), place a soft pad under the foot and bandage it on. Strained Achilles tendons respond well to sunlight treatment in hospital, expose your limb to the sun for a short while each day. Synovitis of the knee (water on the knee) should be strapped with an elastic bandage especially for the area. Pulled calf muscles respond well to infra red ray, any electric fire with open filaments gives this. Skin soreness is a tricky thing and when it occurs stop all training on hard surfaces and bathe the limb in a strong solution of Epsom Salts and water (See Black's Medical Dictionary for dosage). Strained lateral ligament alongside the knee responds to friction massage with finger and thumb either side of leg.

A good liniment for general use is : arnica 45%, witchazel 45%, meth. sal. 10%. For internal treatment of athletic injuries that have just occurred, order Homeopathic Arnica 30 X tablets; for longstanding injuries order Arnica 10 X tabs.

Running on the surface where the injury occurred should cease, if on the road, then, train on the track; if on the track, then, train on the grass; if on the grass, then, train on sand.

In the London and Home Counties area, milers are advised to get a letter of introduction from our own Medical Officer, who has to see you, to Dr. Cyriax of St. Thomas's Hospital, Westminster, S.W.1.

Listen carefully to what your coaches say about injuries, often, they have experienced the same injuries you get and are able to offer advice based on experience. Many doctors have never walked on a running track in their lives!

## WHAT YOUR TRAINING TELLS YOU

If you can do  $8 \times 440$  in 70 secs. as a youth with only 90 secs. rest, you are ready to run 4 miles, 43 secs. for the mile.

A junior able to run 8 x 440 in 65 secs. with 90 secs. rest is ready to break 4 miles, 22 secs. for the mile.

A senior able to run 8 x 440 in 60 secs. with 90 secs. rest is on the verge of beating 4 mins. 3 secs. for the mile.

A girl miler able to run 8 x 440 in 75 secs. with 90 secs. rest is ready to run a 5 mins. 2 secs. mile.

A youth able to run 1 mile in 3 mins. 25 secs. is ready to run 4 miles. 33 secs. mile.

A junior able to run  $\frac{3}{4}$  mile in 3 mins. 20 secs. is ready to run a 4 mile, 30 secs. mile.

A senior able to run  $\frac{1}{2}$  mile in 3 mins. 10 secs. is ready to run a  $\frac{1}{4}$  mile in 18 secs. per mile.

An international able to run  $\frac{1}{4}$  mile in 3 mins. is ready to run  $\frac{1}{4}$  mile  $\frac{5}{8}$  miles.

A girl miler able to run  $\frac{1}{4}$  mile in 3 mins. 45 secs. is ready to

A half miler doing the correct training with a time of 2 mins. should be able to do a mile in 4 mins. 22 secs.

An 880 man doing 1.55 secs. for his distance should be able to do

An 800 man diving 1.50 sec. is ready for a 4 min. 2 sec. mile.

A women half miler does 3.15 secs. in ready for a 5 minute mile.

"N O T E S O N T R A I N I N G T E C H N I Q U E S"

by Frank Horwill, Senior Hon. A.A.A. Coach.

After much trial and error I have come to the conclusion that the Lydiard system of winter training has done more harm than good for British milers. It is a medical fact that juniors and youths are subject to march fractures of the toes and in more than half the cases of this nature treated at athletic clinics it is attributed to attempting the ten weeks of a hundred miles a week advocated by Lydiard.

Other injuries reported while attempting these distances are:- synovitis of the knee, shin soreness, pulled calf muscles, dropped metatarsal arch, etc.

Since most winter work has to be done on the roads it seems sheer folly to transfer from the soft going of fartlek and track running to mile after mile of jolting. Even where rubber shock absorbers are placed in the heel and distances are worked up to gradually, many clubs field a depleted cross-country team due to injuries.

What is the answer to this? Wherever possible training should be done on the grass, on the track and some on the road. Where there is a will there is a way. Many commons are partially lit by adjoining street lamps, many tracks have now a form of winter lighting(if your local one hasn't, then, write to the council and kick up a fuss!). Make the most of opportunities at week-ends to train on softer surfaces. Do not allow more than one-third of your running to be done on the road.

What mileage then in the winter? I do not subscribe to the theory that the winter is a period of ALL slow running. Two sessions a week of long interval training is beneficial, it gives speed over the country and it prevents injury when the greater speed-up follows in the spring. For a miler with a time of 4 mins. 30 secs. I would advocate repetition miles 30 seconds slower than his best time, e.g. 4 x 1 mile in 5 mins. with 880 jog rest, working up to 8 x 1 mile at the end of six months. Another session could consist of half miles 30 secs. slower than best times for the distance, e.g. a 2 minute half miler would do 8 x 880 in 8 mins. 20 secs. with 440 jog rest. It is unwise to go below 660 yds. in the winter time as this tends to raise the athlete to a peak.

Having established two fastish sessions a week which provide both stamina and speed, a look at club races is called for. If you are a youth your races will not exceed three miles, and therefore I see no point in stamina runs exceeding six miles. If you are a junior, you will be racing over 6 miles, likewise I do not see the point in exceeding 12 miles in a training run. If you are a senior you will race up to 9 miles, training runs in excess of 18 miles should be avoided.

So far then, our three runs a week have brought us to a mileage (including limber up) of 17 miles for a youth, 21 miles for a junior and 28 miles for a senior. An intermediate run of the actual distance to be raced and the double stamina run can be the fourth outing, e.g. youths - 4½ miles; juniors 9 miles; seniors 13 miles. Finally a speed run over one-third of the distance to be raced should make up the fifth session. This will bring a total mileage of 28½ miles training runs for a youth, plus 3 miles in the race, a total of 31½ miles; for

juniors a total of 32 miles training plus the race makes up 36 miles a week. For seniors we have 44 miles of training, the race making it 53 miles total. Allowing for progressions on the intervals every six weeks, the mileage in March would be 36 miles for Youths, 46 miles for Juniors and 61 miles for seniors.

It may be argued that Lydiard has produced the world champion and the gold medallists for the Olympics. But I believe that had Snell been coached by Igloi or Gerschler, he would still be the great runner he is; Igloi has produced more sub-4 milers REGULARLY during the past five years than any other coach. My view is that his system of training warrants more respect.

However, if YOU LIKE RUNNING 100 MILES A WEEK FOR TEN WEEKS, THEN, CARRY ON. IF YOU THINK YOU WILL BECOME ANOTHER SNELL LIKE THIS, ONLY YOU CAN PROVE TO YOURSELF OTHERWISE.

A word about hill running. This is a wonderful conditioner, it is also a great cause of injury. Start on a shallow hill and do a short number of runs. Increase the venue of steepness of hill and the number of reps. gradually. Even the great Snell was off for three months because of injuries received by hill running.

Interval training - true interval training is run over distances of 110 and 220 yds. There are physiological reasons why this distance is favoured(see article by Leonard Almond). A miler anxious to break 4-mins. should run his 110s 1½ to 3 secs. slower than his fastest 110; his 220s should be run 3 to 5 secs. slower than his fastest 220. The rest time should be a 55 yds. walk in the first instance(30 secs) and 220 runs are followed by 110 yds. walk(60 secs.) The basis of such training is that the pulse rate is repeatedly sent up to 180 and allowed to fall to 120 within 90 secs. See Tony Ward's comments on this. My experience of this method of training is that a peak is reached very quickly(a month) but it does not last unless endurance repetitions of ½ mile are included in the weekly cycle. A miler of the calibre of Simpson should be able to do 32 x 110 in 13 secs, with 55 yds. walk and 16 x 220 in 27 secs. with 110 yds. walk per week.

I am not in favour of weekly schedules, monotony creeps in when this is adhered to. Sixteen day training cycles have proved very refreshing to middle-distance runners. These are graded so that four days are very severe, four days are light, four days are of medium sessions and four days of rest. A severe session is followed by a day of active rest(weights only, participation in another sport); then a medium session. Track sessions never repeat themselves, the distances range from 110s to ½ mile reps. Track days are followed by fartlek days, no fartlek is ever the same; one day it is long strides another day it is short sprints.

Weight training! How this expression can rouse latent passions! I only give this to athletes if they fail my personal strength test. Could you pass it? Can you go down on one leg to a squat and come up on that leg without help? If not, you need squats of one-third your body weight. Can you do twenty press-ups? If not, you need alternate press work with 25lb dumb-bells. Can you come up from a lying position legs apart and touch your knees with your elbows clasped behind your neck twenty times? If not, you need a 5 lb. weight clasped behind your head in a lying position, get someone to hold your legs, and come up and touch your knees with your elbows, 2 x 15 times.

B E L I E V E  
I T  
O R  
N O T.....

According to the N.U.T.S. the number of athletes under 4 mins. 15 secs. each year from 1959 is as follows:-

1959	97	1962	106
1960	86	1963	117
1961	104	1964	134

There has been a 50% improvement in five years!! The N.U.T.S. expect over 100 under 4 mins. 13.9 this year. Make sure you are among them.

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Generally speaking, the medical profession is not in favour of athletes having periodical detailed medical checks. Two doctors of medicine with a more than average interest in running have spoken against such examinations. However, there is evidence to show that interval training can affect the valves of the heart. Spot checks on the West German team revealed that three members of the running fraternity had T.R. and cancer! In his article in *TRACK COACH*, Tony Ward, Senior Coach, advocated such medicals for runners on the lines that Gerschler gave Pirie. In a recent general medical check-up centre in the North, it was found that 19% of the people had defects about which they knew nothing. Peter Beacham's coach, Frank Horwill, refuses to coach anyone unless they produce a medical certificate with detailed findings on the athlete's health. Peter Beacham was subject to comprehensive medical checks at New End Hospital, these included lung X-rays, blood count and bacteriological tests, etc. As Frank Horwill commented to me: "I don't mind killing a healthy chap, but killing a sick one is not cricket, old man."

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As you enter Alf Wilkins' gymnasium in Henriquez Street, East London, you will see a large notice on the door: WELCOME TO ALF'S TORTURE CHAMBER. His athletes are sent off for a fast run over Tower Bridge, a feat in itself for you'll have to dodge thousands of commuters going in the opposite direction. As you come in dripping with sweat and steaming like an old B.R. engine you are given a barbell with 60 lbs. and told to do squats at a lively pace, so you reach for your track top. Alf, with fire from his nostrils, will have you chinning the bar as though you are sitting on tictacks. As you shake your head regretfully and plead for mercy, Alf, by now purple with two horns sprouting, will show you how to do squat thrusts, step-ups, press-ups, dips and abdominals. By now, devoid of all feeling and leaving a river of sweat behind you, Alf will tell you: "That's the first time round, ONLY TWO MORE TO GO." As you are helped into the showers afterwards a voice will say: "See you next week."

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The heart recovers 60% within one minute's rest of a condition of exhaustion. Logically, it can be assumed that a rest time of not more than two minutes puts the athlete in a fit state for more running. Although lactic acid present in the muscles may alter this rest time,

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TONY WARD ADDRESSES WELSH INTER-NATIONAL COACHING CLINIC AT CARDIFF

A Condensed Report. MODERN CONCEPTS OF MIDDLE DISTANCE TRAINING.

Coaches owe much of their success to trial and error and not on the findings of physiologists. The latter descend on the former's activities and examine them scientifically. Professor Necker has said that the 35 to 40 kilometres run gave more stable results than interval training. Lydiard said it first purely from trial and error.

Training today differs from the past only in the INTENSITY of its performance. As Elliott said: "a body built on pain."

The main aim of training is to build up an indifference to fatigue. There is little difference physiologically between the great athlete and the club one, it is mainly psychological.

Physiologists advocate interval-training because they say it is the most efficient way of doing quality work in a short time. It is more easily measurable than other forms of training. Most of the world's great athletes employ a form of interval training.

Professor Gerschler has fixed distances for the miler precisely. He should run 100 metres in 16 to 18 secs.; 200 metres in 34-36 secs.; 400 metres in 74-86 secs. The cardiac rhythm must not exceed 180 beats per minute at the end of the effort and must not take longer than 90 seconds to return to 120 beats. Runs longer than 200 metres are not nearly so effective because the athlete has partly paid off the oxygen debt during the run.

IT SEEMS ILLOGICAL TO ME THAT THE ATHLETE WILL HAVE A PULSE OF 180 BEATS PER MINUTE AT THE END OF HIS FIRST REPETITION RUN AND ALSO THAT HIS PULSE WILL TAKE THE SAME TIME TO RECOVER AFTER THE FIRST RUN THAN, SAY, AFTER THE FOURTEENTH. THERE SEEMS A NEED, THEREFORE, TO COMMENCE ALL INTERVAL TRAINING TRACK SESSIONS WITH A FASTISH RUN OVER 200 OR 400 METRES - POSSIBLY AT THE END OF THE WARM-UP AND THEN WHEN THE PULSE REACHES 120 BEATS PER MINUTE (OR 12 BEATS IN 6 SECONDS) THE PROGRAMME OF INTERVAL WORK SHOULD BEGIN.

Dr. Hollmann of Germany has stated that the speed of the interval should be fixed according to the athletes' best performance for the distance of the run. Thus an athlete who has a best of 800 metres of 24 seconds should run at a training rate of 30 secs. The session ceases when the pulse-rate fails to reach 120 within 90 secs. I endorse his findings.

Sprinting the intervals flat out DOES NOT ACHIEVE AN INCREASED ALKALINE RESERVE AND DOES NOTHING FOR ENDURANCE. (See notes on alkaline).

The world of athletics, however, is swinging away from interval training, this was evident at the World Congress of Coaches. Professor Reindell said that heart malfunction COULD occur through interval training. That is why I am against written schedules. I CANNOT STRESS TOO HIGHLY THAT A CONSTANT CHECK ON AN ATHLETE'S HEALTH IS VITAL AS WE PUSH HIS LIMITS TO THE BRINK.

THE BIGGEST FAULT THAT I FIND WITH LYDIARD'S SYSTEM OF TRAINING IS THAT THE 12 WEEK TRACK TRAINING PERIOD IS SOMEWHAT NAIVE. BUT THIS MAN HAS PRODUCED A WHOLE CROP OF WORLD GREATS NOT FROM THE WHOLE OF NEW ZEALAND BUT FROM HIS OWN CLUB AND NEIGHBOURHOOD. WE

## MUST ASSESS HIS METHODS AND TAKE THE BEST FROM THEM.

Gerutty's methods in themselves have a place in the schedules of today. Gerutty's strength lay in his mesmerising powers over such runners as Dave Power, Alby Thomas and Herb Elliott who all did well in 1958 and Elliott moreover in 1960. His resistance running, hill running and heavy weight training programmes certainly suit the athlete who cannot run 150 to 200 kilometres a week and the strain of interval running.

It is important that the system be adapted to the athlete and not vice versa. Certain principles can be laid down. The winter conditioning period from October to December is of the utmost importance. During October to December I advocate a vast amount of running at steady pace - not a jog-trail or plod - on varying surfaces. This mixed with Fartlek, so that speed is not completely lost. The odd session on the track should make up the remainder of the running.

In January, the athlete maintains these long runs and Fartlek reduces the sessions on them and intensifies his work with more interval training on the track. I believe that the psychological advantages of running over intervals of 200, 400, 600 and 1,000 metres far outweighs the physiological advantages of running mainly up to 200 metres.

By March, on his long runs every top class athlete, no matter what his event should be able to run 20 miles in under 2 hours in training and the top class woman, 10 miles in 75 minutes.

Often a runner would do better at track racing if he did less racing over cross-country. Bruce Tullish had his best ever track season in 1962 which followed a restricted cross-country season. (Editor's note:- Numerous members have reported the same.)

Once April and the track season arrives the tempo changes. I do not believe that basic speed of a distance runner can be improved by all that much and that his interval work should be near to or a little faster only than racing speed. I do not agree with very fast intervals with short rests, week in week out. Too much of an athlete's best running is left on the track. Time trials are a double-edged weapon. Introduced correctly they can be a great boost to the athlete's morale. Olympic history is full of examples where time trials have shown the potential gold medal winner that he can outrun the "field". Zatopek, Abebe, and Elliott all did this. It is better to have time trials under the actual racing distance.

I believe in weight training wholeheartedly for distance runners. we are on the brink of first laps in 50 seconds in the 880, for such running POWER IS VITAL. Weight training for the runner is for strength, high poundages and a low number of reps. Isometric training takes less time and is a first-class ancillary to the athlete with a busy life.

Many of our coaches are too pedantic in their approach, studying the method rather than the athlete. Above all, I believe that training in these running events is an art more than a science. Some international athletes stay with coaches who, with limited knowledge gained years ago and with little access to modern ideas, have little more, to offer them and, in fact, can take them no further along the road to the top. Only in Britain could this happen and our ideas here want a radical overhaul.

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A PHYSIOLOGICAL BASIS FOR INTERVAL TRAINING

by Leonard Almond, Senior Hon. A.A.A. Coach,  
Northern Region Secretary B.M.C.

The aim of training is to make the organism better adapted to exercise. If an athlete can develop a large cardiac output and with it the aid of a high maximum oxygen uptake, his cardiovascular system must be regarded as being trained. In practice, interval training appears to meet this demand, as most international middle-distance runners employ this system. In order to give a satisfactory explanation for its use, it is necessary to study the athletes' response to exercise and apply this to research conducted into intermittent work.

The cardiovascular system is designed to meet the widely varying metabolic requirements of the body, so during exercise the parameters responsible for oxygen transport and utilization are increased. The heart rate rises from its resting state to a maximum of 195 plus or minus 10, depending upon the intensity of the work. The stroke volume (the volume of blood expelled by the heart per unit time) will increase, but according to Asmussen and Muischhoff when the heart rate rises above 120 beats/minute the stroke volume in most individuals reaches its maximum value and will remain constant with any further rise in heart rate. More oxygen will be extracted by the active tissues, therefore the arteriovenous oxygen difference will rise progressively, but it is unlikely that it will increase more than four fold.

The maximum rate of work that can be performed depends not only on the maximal capacity of the cardiovascular system to deliver oxygen to the tissues, but also the ability of the athlete to utilize anaerobic metabolites. During severe exercise, the work time will be limited by the accumulation of anaerobic metabolites, notably, lactic acid, in the blood. High concentrations of lactic acid would make further exercise intolerable and the athlete would be forced to stop.

When exercise ceases the recovery phase begins almost immediately. The heart rate recovery shows two characteristics, a fast phase and a relatively slow phase. The fast phase is associated with a rapid fall of the heart rate to about 110-120 beats/minute, this phase covers the first two minutes of recovery. During this period 60-80% of the recovery takes place according to the intensity of the previous work. This is followed by the slower phase, when the heart returns slowly to its resting state. The intensity and duration of the work period will influence the time taken to return to a resting level. During the faster phase, the stroke volume of the heart will remain fairly constant, then it will return to normal during the slower phase of recovery.

Christensen investigated intermittent and continuous running on a treadmill with two subjects. Running continuously for 20km/hour (12.4 miles/hour) his subjects reached maximal values for oxygen uptake, blood lactic acid, and pulse rate, in 3 and 4 minutes respectively and were completely exhausted. By employing short spells of work and rest and running at the same speed, his subjects were able to run for 15 and 20 minutes respectively with only a slight increase in blood lactic acid, despite a marked decrease in oxygen uptake. A relatively constant heart rate of 140-150 beats/minute was maintained during the working periods. Similar investigations by Karrash and Hollman support Christensen's

findings. Hollman recommends short work spells of not more than 30 seconds and rest periods not longer than 90 seconds. According to Lehmann many short rest pauses should imply a more favourable recovery than longer, but thereby fewer, pauses.

In the light of what we know about the cardiovascular responses to exercise and research on intermittent running, what are the stimuli to training? It is not possible to provide a conclusive answer, but an effective system does seem to exist.

Short work periods enable the athlete to work with a heart rate close to his maximum, thereby exceeding the threshold suggested by Karvonen, who believes that the stimulus to cardiac training is associated with heart rates of 140/minute, or more, achieved during exercise. By employing short periods of work the production of lactic acid is kept to a minimum and a new work period can be started within 1½ minutes, 60-80% of the recovery will have been completed. Due to this short rest interval the stroke volume of the heart will remain elevated and fairly constant throughout the workout. The heart, therefore, is induced to transport its full volume of blood through the still open peripheral arteries, still retaining the stimulus on the heart while the skeletal musculature is recovering. Reindell and Hollman believe that in this way the cardiac muscle receives more training than in the continuous form of endurance work.

For the required training effect, however, the total amount of work done plays an important role. The number of short work periods will depend on the athlete's condition, but the most numerous he can do the higher the adaption and stronger development of the heart will occur.

A physiological explanation for interval training has been attempted and a training procedure recommended. It is suggested that short work periods of not more than 30 seconds, during which the heart rate should be sustained above 140 beats/minute, followed by a recovery of not longer than 90 seconds, should produce maximal training effect.

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YOUR OXYGEN DEBT...The oxidation of fuel which releases energy takes place both with oxygen(aerobic reaction) and without it (anaerobic). Slight exercise causes oxygen to be supplied at the same rate the fuel of muscular contraction is oxidized. If an athlete runs at a rate which requires 4 liters of oxygen per min. but is only able to take in 3 liters for each min., he incurs an "oxygen debt" of 1 liter for each min. of exercise. During recovery his oxygen intake will remain above the resting level until the "debt" is repaid. Even though the athlete was using oxygen faster than he could supply it he can incur a "debt" of 15 liters. Training can improve the "debt" capacity. In a 10 mile run only one oxygen debt is experienced. Whereas in 10 x 100 yds. full out ten high "debts" are experienced, and each time he runs into the "debt" he slightly increases the power to undergo a greater debt. Theoretically, then, 10 x 100 yds. full out is more beneficial than a 10 mile run. This is not the whole story but it is to be recommended in "get fit quick" schedules.

#### THE STARS OF TOMORROW STATE HOW BRITISH MILLING CAN BE IMPROVED

Martyn Rouse - Windsor and Eton A.C. "By faster and harder training.

Chris Lindsay - Epsom College A.C. "There should be more paced races, and runners should somehow be stopped from disregarding "the bare" and running their usual 4 mins. 2 secs. miles."

Terrence Gould - Ipswich. "Government grants to help sponsor and coach promising athletes."

William Steek - Rochester A.C. "By the aims of the British Milers' Club, particularly coaching and training sessions. Also, top milers do far too little in winter. Snell's example shows this, it is futile to expect these to do 3.55 when they have not done the work and are not strong enough."

David Patterson - T.V.H. "By training as a group when possible, and by running hard in every race and by running as a group and not individually."

Philip Tucker - T.V.H. "Milling could be improved by having more track races and more coaching for younger members."

Leonard Wheeler - Farnham A.C. "By paced races against the watch and special races for all ages."

David Cox - T.V.H. "By keeping all good milers together. Having coaches who know something about the mile."

Rodney Simnett - Ponders End. "Strengthen our milers with weights and cross-country."

Stephen Walker - Thurrock Harriers. "To study 'RUN TO THE TOP' by Arthur Lydiard."

Hendrik Spaan - Cambridge and Coleridge. "More coaching schemes - paced competitions - clubs like this one, which can promote competitions and give expert advice to athletes about training, tactics, etc."

Richard Fisher - Essex. "More meetings for good class milers."

Christopher Latta - Reading. "More races with 'hares' included to hot up the pace. More foreign 'stars' in invitation races at venues all over the country."

David Dilnot - Windsor and Eton. "We have the talent but we don't have the determination. Our athletes don't have the 'killer' instinct which is needed to win at all costs or the ability to suffer."

Peter Tim Chapman - Q.P.H. "By instituting a system of A.A.A. coaches to develop schoolboys interested in middle distance running by touring schools in rotation and giving demonstrations."

Michael Wood - Waterloo Harriers. "More centres where young milers can be coached properly."

James Blaikie - Dumfries Academy A.C. "British miling can be improved by entering sub 1.30 half milers in the more important mile races of the year, such as the Paisley Carr Mile, the A.A.A. Champs, mile, etc. Judging by the English Schools results there is plenty of up-and-coming talent. These boys must be encouraged and here, I think the B.M.C. can play its part."

James Edwards - Notts. A.C. "More competition between milers of a similar standard, e.g. inter-county competitions with planned attacks on time standards."

Alan Bone - South Shields Harriers. "With the help of more coaches and better training facilities."

Martin Daykin - Great Yarmouth A.C. and Cheltenham. - "Those who show talent while at schools should be given further encouragement, incentive and advice on leaving afterwards."

Frederick Campbell - Edinburgh. "Strict training schedules, improved facilities and coaching, will, in my opinion improve British miling."

John Trainor - Gateshead Harriers. "As Lydiard has produced the best miler in the world we should use his system of training."

John Bednarski - Swindon A.C. "Races run faster in the beginning of race - paced if need be."

RACES FOR YOUR DIARY

One of the main requirements of British miling is for graded and paced races. Where clubs and commercial concerns have been good enough to stage such races at their expense PLEASE SUPPORT THEM WHOLEHEARTEDLY. If you state that you will run do not contract out of this pledge unless the circumstances are quite exceptional.

May 1. B.M.C. and Cambridge Harriers' graded race for youths and juniors, 3.30 p.m. Satcliffe Park, Eltham, S.E.9. Nearest station Kidbrooke S.R. Southern youths informed.

\_\_\_\_ 600 \_\_\_\_

May 1. Ladies one mile at Watford, organised by Watford Harriers. Apply Val Toullinson, 26 Ascasia Road, Guildford, Surrey.

\_\_\_\_ 600 \_\_\_\_

May 16 B.M.C. and London Olympiads graded mile for men 4.20 to 4.10. Ladies under 5.30 mins. Fee payable on day 2/6d. Hayes Stadium 3 p.m.

\_\_\_\_ 600 \_\_\_\_

June 12th Coal Industry Gala Day, Barnsley, attempt on British mile record. Four runners from South, four from Midlands, four from North, one from Northern Ireland and one from Wales. All expenses including accommodation will be paid. Volunteers for pace-making required. Only runners who have beaten 4 mins. 4 secs. can be considered for this race, unless they are prepared to set pace, e.g. a 4.10 miler will be considered if he will run a sub. 3 mins. first half.

\_\_\_\_ 600 \_\_\_\_

August 7th Q.P.H. and B.M.C. mile at Paddington, further attempt on British record, only two top milers on ranking list at time will have all expenses paid. All runners considered.

\_\_\_\_ 600 \_\_\_\_

July 12th(Monday evening) Billingham Games, North v South v Midlands B.M.C. relay 4 x 1 mile. All expenses paid to teams selected. Two more runners required for South team.

\_\_\_\_ 600 \_\_\_\_

June 8th Whit Tuesday The Sheffield Sports. Entry forms available for large selection of all grade mile races.

\_\_\_\_ 600 \_\_\_\_

STOP PRESS 15th May Saturday Hendon Copthall Stadium Shaftesbury Harriers Meeting. Men's open mile for all who have beaten 4 mins. 15 secs. Apply direct to Mr. Smith, 81 Holmer Gardens, Edgware, Middx or ring 270 7486 or HLV 2000 Ext. 157 Mark letters B.M.C. Exhibition mile.

\_\_\_\_ 600 \_\_\_\_

<u>THE</u>	<u>G R E A T</u>
<u>ANNUAL</u>	<u>R U S S E L L</u>
<u>GENERAL</u>	<u>S T R E E T</u>
<u>MEETING</u>	<u>L O N D O N</u>
<u>O P</u>	<u>M A R K E T</u>
<u>THE</u>	<u>T U B E</u>
<u>BRITISH</u>	<u>I S</u>
<u>M I L E R S</u>	<u>T O T T E N H A M</u>
<u>C L U B</u>	<u>C O U R T</u>
<u>W I L L</u>	<u>R O A D</u>
<u>B E</u>	<u>P L E A S E</u>
<u>H O L D</u>	<u>S U P P O R T</u>
<u>O N</u>	<u>T H I S</u>
<u>S A T U R D A Y</u>	<u>I M P O R T A N T</u>
<u>1 2 T H</u>	<u>M E E T I N G</u>
<u>J U N E</u>	<u>A N D</u>
<u>A T</u>	<u>A S S I S T</u>
<u>7.30 P. M.</u>	<u>O T H E R</u>
<u>A T</u>	<u>M E M B E R S</u>
<u>T H E</u>	<u>W I T H</u>
<u>Y. M. C. A.</u>	<u>T R A N S P O R T</u>

S P O T L I G H T O N M E M B E R S - Training - Racing.

Peter Beacham - Poly. 1st in Midland Counties A.A.A. Indoor 1,000 yds. Champs. at Gosford. 1st in National A.A.A. Indoor Champs. at Gosford. Set up All Comer's record in 880 of 1.52.5. Broke Frank Salvat's Wigmore Harriers' Boxing Day relay record for 8 miles. Selected for U.K. against U.S. indoor match Wembley, also for U.K. team to Finland. Recently did 3 miles in training in 14 mins. 7 secs;  $\frac{1}{4}$  mile in 3 mins. 2.2. secs. personal bests.

\_\_\_\_oo\_\_\_\_

Milner twins, Tony and Peter - Walton A.C. report that in a time trial in April they both recorded 4 mins. 12 secs.

\_\_\_\_oo\_\_\_\_

Mike Wiggs - T.V.H. Awarded major trophy by T.V.H. for his 13 min. 16 secs. 3 mile in Southern Championships. Also awarded special merit medal for making England C.C. team by his 9th placing in National C.C. Mike is not going to do much racing during next six weeks.

\_\_\_\_oo\_\_\_\_

Mel Edwards - Cambridge Univ. Has consistently been doing 90 miles training a week during winter, but has had knee and achilles trouble of late. He won the University College "5" at Parliament Hill Fields on January 30th. He won the T.V.H. Club 10 mile cross-country championship in February 1965. Injury permitting, he looks a cert. for the Cambridge v Oxford match at the White City.

\_\_\_\_oo\_\_\_\_

Ray Roseman - S.L.H. In the London to Brighton Relay Ray ran the fastest time on stage 12.

\_\_\_\_oo\_\_\_\_

David Lem - Leic. C.A.T. Appeared in the U.K. "Top 50" list with a 3 mile time of 13:55. Ranked 10th in C.C. Junior 1965 U.K.

\_\_\_\_oo\_\_\_\_

Derek Graham - 9th Old Boys. Ranked 2nd in U.K. Cross-Country Rankings, 1965. 8th Lille; 1st Northern Ireland; 1st All-Ireland; 5th International (2nd U.K. finisher); 2nd "Martini". Derek did not improve on his 1963 mile time in 1964, but his recent indoor run in Finland showed that he was in great form for the start of the track season. Should not be too difficult for him to shed those two seconds this year and break 4 mins.

\_\_\_\_oo\_\_\_\_

Gabrielle Carpenter - Gov. Godiva. Gabrielle was 2nd in the Warwickshire Championships in January. Her regional secretary Tony Saunders says that she is developing well(athletically) and we are anxious to see her run in the graded mile for women at Hayes Stadium on Sunday 16th May at 3 p.m.

\_\_\_\_oo\_\_\_\_

Jim Malligan - Wolverhampton Harriers. Another one of Tony Saunders' protégés, he did 4.35 for mile against the A.A.F. in the Midlands' team in December at Coalford, to take 2nd place.

oOo

Hugh Parfitt - Victoria Park Harriers. Hugh did a 4 miles, 12 secs, 1000 m. racing day at the Glazebrook Rangers football match. Hugh has been injured and has only just started light training. What will this brilliant youngster do when he gets over the injury bogey that has dominated the start of the last two seasons? He did 4 miles, 7.1 secs, in the Sward Trophy meeting after only a month's training last year!

oOo

David Gayland - Wolverhampton Harriers. Another Saunders inspired runner who did well at the A.A.F. Indoor Champs, knocking off 28 secs. from his previous Junior 1 mile best time to gain a bronze medal..

oOo

Martin Laykin - Cheltenham. Here is a great prospect for the future, now being advised by Tony Saunders. He ran brilliantly in the National Youths to take 15th place, then he placed 13th in the Youths' Inter-Counties and 8th in the National Schools. He has run a measured 21 miles in 1 hour 59 mins.!!

oOo

Mike Lester and Mike Dunphy - Hercules. The former gained a Desiratus Medal for his run in the Middlesex. He and Dunphy finished 3rd in the Belgrave Harriers 30 minute gearlauf. The latter has been running consistently well and may bring about a surprise in the graded mile race on Sunday May 16th at Hayes Stadium.

oOo

Graham Peel - Blackburn A.C. As a 1st year junior Graham has improved his mile and half mile times during 1964. In the early season county championships (Lancs) he was 3rd in the 880 yds with 2 mins. dead. He went on to improve to 1.67 before the end of the season. He improved his mile time ten seconds in the Lancs County Champs. to record 4.19.2 and was placed 2nd. In the Northern Counties he improved again to record 4.17 and placed 4th. A good season by any standards.

oOo

Gerald King - Windsor and Eton. Won the Southern Youths C.C. at Brighton in great style. Has had a great cross-country season but was sadly off form in the National Youths C.C. His time of 4 mins.20 secs. qualifies him for Senior membership while still a youth!

oOo

Feilidh Durnan - Sparkhill recorded some fast two mile races at Coalford this year with 7.05.2 and 8.50. He ran a good 2,000 yds. at Wembley indoors, working his way through the field lap by lap, urged on by the R.M.C. secretary!

oOo

John Offord - Leicester C.A.T. placed 4th in the National Youths C.C.

I H A T  
T H E Y  
S A I D . . .

Harry Wilson, Senior Hon. A.A.A. Coach, writer on middle distance running:- "As an experiment I gave a schoolboy athlete who had done 8 miles, for the 880 a crash programme. He was totally unfit but wanted to put up a good time in six weeks in a school championship! I gave him very severe training every other day. On the day between sessions he jogged three miles only. He did 1 mile, 56 secs. in the championships."

oOo

Arthur Lydiard, New Zealand coach of present world record holder, Peter Snell:- "I have arrived at my formula of 100 miles a week for ten weeks for runners from half milers to marathon men by trial and error. I tried 60 miles, I tried 100 and even 200 miles a week, I found the former too little, and the latter too much."

oOo

Percy Cerutty, coach to Herb Elliott:- "When a miler is the champion of his country he should run like one against his own countrymen. I have no time for a national champion who 'sits' on the leader, lets him do all the pace-making and then jumps him in the straight. A champion should have the courage to lead the field."

oOo

Igloj, Hungarian coach to numerous sub 4-minute milers:- "I do not think tactics play or should play much in mile races. A miler should run against the clock. If he sets out to run each race faster than the previous one he will win. It is when he starts thinking about what so-and-so's doing he fails."

oOo

Frank Horwill, T.V.H. coach:- "I was a Lydiard fan. I trained Thames Valley youths' team in 1963 on these lines. Although we won the Middlesex Cross Country Championship after several years' lapses, much to the surprise of the favourites, mile results in the track season were below average. Boys who had regularly done 15-20 mile runs a week, and were clocking up 75 miles a week during the winter made very poor showing during the summer. I abandoned his methods and so far my charges have done much better. Coaches should strive all the time to find what suits their runners. I have no time for a coach who is not prepared to go on learning all his life."

oOo

Don Taylor, 10,000 metres U.K. record holder:- "I have rarely exceeded 40 miles a week for the past two years. I think that the intensity of running is more important than excessive mileage. I must admit though, that the 100 miles a week men can race more often than the 50 mile a week types. Mel Batty has raced three times in a week and got away with it. I am hardly able to move next day after a big race."

oOo



LADIES

Maureen Smith - nee Bonnard (Retired Founder Member) 4 mins. 53.6  
 Penelope Gardner - 4 mins. 56.9 Southern Region.  
 Elizabeth Joyce - 4 mins. 58.5 Midlands Region.  
 Valerie Touinson - 5 mins. 4.4. Southern Region.  
 Muriel Rees - 5 mins. 9.7 Southern Region.  
 Sheila Taylor - 5 mins. 10. Midlands Region.  
 Gabrielle Carpenter - 5 mins. 14.8 Midlands Region.  
 June Hale - 5 mins. 15 secs. Southern Region.

BOY

Philip Tucker - 4 mins. 36.8 (14 years of age!!!!)

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 M I S C E L L A N E O U S  
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Every regional secretary of the B.M.C. is a senior A.A.A. coach and is fully qualified to coach any middle-distance runner up to world class. If you have not already got a coach and need advice PLEASE CONTACT YOUR REGIONAL SECRETARY who may undertake to coach you personally or will put you in touch with a qualified coach who can. Being there is half the battle of coaching, and where possible coaches should be sought who can see you at least once every month. The addresses of regional secretaries are:-

<u>NORTH</u>	<u>NORTH EAST</u>	<u>MIDLANDS</u>
Leonard Almond, 109 Towngate, Leyland, Lancs.	Gordon Surtees, 8 Greenwood Road, Cowpen Estate, Billingham, Co. Durham	Tony Saunders, 145 Sweetman Street, Wolverhampton, Staffs.

<u>SOUTH</u>	<u>SOUTH WEST</u>	<u>WALES</u>
Frank Horwill, 41 Ravenstone Road, N.W.9. Hendon 0649	Roy Profitt, 32 Dale Gardens, Matley, Plymouth, Devon.	Secretary required

MEDICAL ADVICE Dr. David Ryde, 56 Anerley Park, S.E.20. Sydenham 8027 is always available to members who phone him first for an appointment. Dr. Ryde is a specialist in sports medicine.

ATHLETIC BOOKS If you require the latest athletic books send us a P.O. for the amount less 20%. Minimum postal charge of 1/- should be included. We will order these for you and send them on. Note that THE GOLDEN MILE by Herb Elliott is out of print.

SUBSCRIPTIONS Have you paid your subs.? If not, please do. The B.M.C. is a non profit making organisation which has used all its finances to better the cause of British miling. Note the prizes awarded for outstanding achievements last year.

DONATIONS The B.M.C. welcome donations of any kind, be they cash, sports equipment for prizes to members, cups for Club championships, etc.

GRADED MILE RACES Can your club stage a graded mile race for youths, Juniors and seniors throughout the summer? One a month, a youths' mile in May, a junior mile in June, a senior one in July, not forgetting one for ladies in July.

ANNUAL GENERAL MEETING Saturday 12th June at 7.30 p.m. at the Y.M.C.A. Great Russell Street, London.