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Breaking Olympic records

Improved understanding of psychology and nutrition will mean no end to record breaking

Reading the records of the 19th century may be a pleasant pastime for today's athletes; if a hundred years ago you could have run, for example, 10 000 metres in 30 minutes, you would have been a world champion. Will athletes in another 100 years look back to present day records with the same envy? Plotting the running speeds of the record holders for 200 m, 1500 m, and the marathon (42.2 km) shows a linear increase with time from the early 1900s to today, with no evidence of an approach to a plateau.¹ Indeed, Whipp and Ward have shown that women are currently improving at a faster rate than men.² If this rate of improvement is maintained, there will come a time when the best women will beat the best men. The authors predict that this could occur around the year 2035 for most events, and much sooner in the marathon. However, the faster rate of improvement for women may be explained by the fact that they entered competitive athletics later, so that the benefits of interval training, peak training, psychological preparation, and sensible nutrition have been crammed into a shorter period. The improvement may therefore not be maintained. Such factors may also explain the linear improvement with time in the records for men. Thus relatively recently, on 16 May 1954, Roger Bannister became the first man to run the mile in under four minutes (3 minutes 59.4 seconds). His training consisted mainly of 400 m intervals performed each day during his lunch break. Now many athletes train two or three times a day with carefully planned seven, 10, or 14 day cycles of various activities, including long runs, long intervals, short intervals, hill training, bounding, running in the swimming pool, and training for periods each day in hypobaric facilities. Similarly, nutrition has changed greatly. A R Downer, the Scottish 100, 220, and 440 yard champion in 1883, 1884, and 1885, ate only an animal diet: "beef and mutton are preferred ... the legs of the fowl are highly esteemed ... biscuits and stale bread are the only preparations of vegetable matter which are permitted." This would now be considered a disastrous diet for athletes.

Sadly, drugs may also have contributed to some of the progressive improvement. Anabolic steroids increase muscle bulk³ as well as the ability to train longer and harder. The sharp change in the slope of the line for the percentage improvement in performance in throwing events in the 1950s, compared with the steady increase in that of the 1500 m distance, is consistent with the timing of the availability of anabolic steroids to athletes. "Blood doping" or erythropoietin injections may have contributed to some of the improvement in the times of distance events.¹

So does this mean that, with more stringent control of drug misuse, records will begin to plateau? The answer is an

emphatic "No." Physiological science has made a big contribution to improvements in the past, but in the future biochemical and nutritional science will enable even greater improvements to be made, without the use of banned substances.

I will give three examples. Firstly, only a few years ago Eric Hultman and his group in Stockholm discovered that two fuels must be used simultaneously for maximum power in the explosive sports—glycogen and phosphocreatine.⁴ Phosphocreatine is synthesised in the muscle from creatine so that dietary supplementation with creatine leads to an increase in phosphocreatine in the muscle of some athletes and hence an increase in their explosive power output. Secondly, in 1956 Roger Bannister wrote: "Though physiology may indicate respiratory and circulatory limits to muscular effort, psychological and other factors beyond the ken of physiology set the razor's edge of defeat or victory and determine how close an athlete approaches the absolute limits of performance."⁵ It has taken some time for the role of psychology in athletic performance to be taken seriously. However, it is now possible to put forward hypotheses to account for some effects of stress and anxiety in terms of biochemistry. This leads to consideration of specific nutritional supplements to expand the more usual armoury of the sports psychologist—for example, to suppress stress and to decrease the risk of infection from prolonged stress of training.^{1 6} Finally, the molecular basis of central fatigue, which originates in the brain, is yielding to physiological biochemistry, with exciting possibilities of delaying such fatigue by nutritional supplements.⁷ Such work is only in its infancy; as it matures it will make important contributions to performance so that records will still be broken and running speeds will still increase linearly with time.

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