

Running Science

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by Owen Anderson

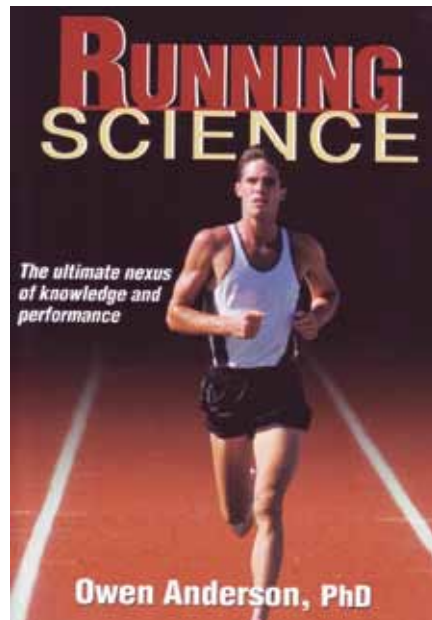
Champaign, Ill.: Human Kinetics, 2013, 596 pp., ISBN: 978-0-7360-7418-6

If asked about the best technical books about running available, an English-speaking reader would perhaps answer Tim Noakes' *Lore of Running* (4th ed., 2002), David E. Martin's and Peter N. Coe's *Better Training for Distance Runners* (2nd ed., 1997), or Jack Daniels' *Daniels' Running Formula* (3rd ed., 2013). It is true that each of these books, all of which have been published by Human Kinetics (Illinois, USA), is an excellent manual for serious runners, but since the publication of Owen Anderson's *Running Science* there has been a serious competitor for their status as best running books ever.

Running Science truly deserves the title "Running Bible" as it covers everything a serious runner should know from a real expert's point of view.

Anderson, who was awarded a National Science Foundation fellowship and completed his PhD at Michigan State University, has written extensively on the topics of running training, strength training for running, sports nutrition, and injury prevention. Until 2012 he was the editor of the periodical *Running Research News*, and among his books is *Lactate Lift-Off* (SSS pub, 1998), arguably the best book available on the subject of lactate threshold (LT) training as it applies to distance running.

On the practical side, Anderson is the developer of the "neural system" for training endurance runners, a programme which de-emphasises training volume, focuses intently on high-quality running and strength workouts, and aims for the expansion of maximal running speed and the optimisation of running-spe-



cific strength and coordination. He is also the founder of Lansing Sports Management, which coaches elite athletes from Kenya and manages their international competitions. He has travelled to Kenya on 15 occasions to study the training techniques of the top Kenyan runners.

The science of running has had a major practical impact on training for improved performance. Thanks to research, runners and coaches now understand how changes in the volume, intensity, and frequency of training impact the key performance variables, including neural drive, $\dot{V}O_2$ max, running economy, lactate-threshold velocity, resistance to fatigue, and maximal running speed. They know which running speeds are best for various types of

training and which forms of strength training have the largest positive effect on performance.

Thanks to the establishment of the anticipatory regulation model of fatigue, they also know what to do when extreme tiredness strikes during races: Turn up neural drive instead of turning down speed in response to a perceived crisis in the muscles. With confidence and understanding, runners and coaches can now – thanks to science – properly answer key questions such as: How fast should my work intervals be run today? How many miles should I cover in my long run? How should I set up my overall training programme? Answers to these questions and others are provided in this book by Owen Anderson.

Running Science contains eleven parts and no less than fifty chapters. Beginning with a look at the genetics of running performance (running's nature-versus-nurture debate; genes that influence performance; genetic differences between elite and nonelite runners) and the biomechanics of running (the body while running; refinement in running form; running surfaces, shoes, and orthotics) in Parts I and II, it then proceeds to describe the physiological factors that are important for performance (Part III: maximal aerobic capacity (VO_2 max); running economy; minimum velocity for maximal aerobic capacity (vVO_2 max); velocity at lactate threshold; maximal running speed; resistance to fatigue). The next unit (Part IV) covers different training methods (general strength training; running-specific strength training; hill training; speed training; cross-training; altitude training), and Part V outlines key variables, such as frequency and volume, intensity, and offers an overview of recovery techniques, periodisation and block systems, as well as integrated strength and endurance training programmes. Part VI explores training for optimizing performance variables (increasing VO_2 max; enhancing economy; gaining vVO_2 max; upgrading lactate threshold; increasing maximal running speed; promoting resistance to fatigue), and Part VII explains the molecular basis of training (training effects at the molecular level; training favoring molecular enrichment). Part VIII discusses how to prepare for popular race distances (training

for 800m, 1,500m and the mile, 5 km, 10 km half marathon, marathon, and ultramarathons). The closing sections of the book address a number of key issues, including the prevention of running injuries and the health benefits of running (Part IX); nutritional supplements, proper eating and drinking for running, weight control, and ergogenic aids for running (Part X); and the brain and the experience of fatigue, psychological strategies linked with top performance and even the addictive aspects of running (Part XI).

In the one-page Epilogue, "The Future of Running", Anderson expresses his belief that further breakthroughs in training and preparation for all races will be achieved by a better understanding of the performance-limiting factor of fatigue. Owen also believes elite runners will spend far less time logging tedious miles at submaximal pace and much more time focusing on high-quality running training plus the kinds of workouts that boost explosiveness, maximal running speed, resistance to fatigue, running-specific strength, and coordination.

Running Science is smart and interesting and packed with everything one needs to know about the sport of running. Anderson has reviewed a large amount (if not all) of the scientific literature on running published in the last 30 years. All data in the book is backed up with scientific research, and Anderson comes up with some surprising results. For example, he dispels some common running beliefs, from the role that lactic acid plays in the muscles (it does not hamper muscle contractility, but is a key fuel for leg muscles and can advance rather than retard endurance) to the benefits of advances in running-shoe technology (next to nothing, as it turns out, which implicates that the purchase of expensive running shoes may represent a symbolic act rather than the actual acquisition of higher-quality shoes) to the effectiveness of the traditional weekly long run (minimal value for increasing endurance according to Anderson).

Readers should not expect to find a series of training plans that they can pick from in this book. There is a weekly plan for the 800m based

on Nixon Kiprotich's training programme, and that is it. However, if you read the book, you will have the knowledge to create your own training plan, and Anderson does provide sample workouts at times in the body of the text. To his credit, he provides fully illustrated guides for all of his weight and form exercises.

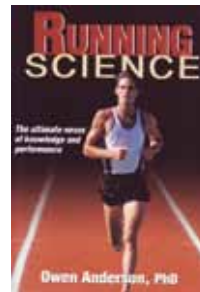
This book makes a compelling case for training programmes built around high quality workouts performed at anaerobic threshold pace (or faster) instead of programmes that emphasize high mileage at slow-to-moderate paces. To that extent, Owen's book is a refreshing contrast to, for example, the books by Jeff Galloway who advocates the use of walking breaks to get faster. Owen, on the other hand, explains why improving maximum sprinting speed and muscular strength are important factors for success in events from 800m on up.

In summary, *Running Science* is exactly what it claims to be: a science textbook on running. Although it is a book primarily written for the serious runner who wants to maximise race times, it is worthwhile reading for all runners interested in the theoretical fundamentals of their sport.

Although there is some repetitive material here and there and there are certain passages in which the science may run a bit deeper than necessary, the book is well organised, allowing readers to focus on those sections of greatest interest and relevance to their training. In spite of the fact that the book is quite technical, the text is fluent and clear and includes a lot of helpful photos, plenty of footnotes and reference reading.

All in all, this book is a must-have resource for any serious distance runner's library!

Reviewed by Jürgen Schiffer



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