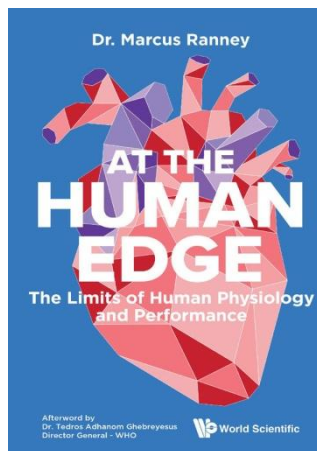


Book Review: “At The Human Edge – The Limits of Human Physiology and Performance”



At The Human Edge: The Limits of Human Physiology and Performance Paperback – 2 December 2020
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Dr. Tedros Adhanom Ghebreyesus Director General World Health Organization who says that ‘many of the world’s health most pressing health problems are not scientific challenges at all; they are challenges of politics, economics, agriculture, energy, commerce and trade. How far can human beings push their physical capabilities? To what extent can the human body adapt and transform itself to cope with the harshness of an extreme environment? What are the cellular changes happening inside a human body as it pursues life to the fullest, whether it be scuba diving in the Indian Ocean or skiing in the French Alps? Dr. Marcus Ranney explores these issues in his path-breaking book At The Human Edge – The Limits of Human Physiology and Performance.

Dr. Ranney, an extra-ordinary human being and a medical doctor, is ideally positioned to write this book. While doing his medical degree at the University College London Medical School, Dr. Ranney joined the University of London Air Squadron and enlisted in the Royal Air Force. Winter training took him to various ski slopes across the European Alps. He worked alongside jet pilots and got to study the effects of extreme g-forces on their physiologies. A few years later Dr. Ranney found himself leading a hundred-strong team to Mt. Everest. The following year, in his final year of medical school, after a brief stint with the helicopter ambulance emergency services in London, Dr. Ranney was introduced to an organisation that supported the International Space Station’s transportation system, which led to a month long internship in Florida with the medical team at Kennedy Space Centre, NASA. Towards the end of the internship, Dr. Ranney watched Atlantis return to earth and come to a shuddering halt a few hundred metres away from him. Later, while working as a doctor in North London, Dr. Ranney took time out from his job to led a team from Great Britain to participate in an outdoors, winter games festival, held in the northernmost region of Siberia, deep in the arctic circle, during which time he studied the effect of cold weather and extreme physical stress on human bodies.

As a mountaineer climbs up a treacherous mountain, oxygen, the most vital of all life-giving elements, becomes scarcer, resulting in shortness of breath. What happens subsequently as the mountaineer presses on? Replace Mount Everest with the South Pole. Hypothermia is the condition in which the body's core temperature drops below 35 degrees Celsius, the temperature needed for the many thousands of normal protein interactions and metabolic processes of our cells. Below 28 degrees Celsius, severe hypothermia ensues and the normal physiological responses of the body no longer function. The heart rate and blood pressure begin to decrease and most cellular processes begin to shut down. An average human being is usually unable to perform any meaningful motor activity and experiences a very drowsy and near comatose mental state. This triggers two very primordial reflexes, one to enter a small, enclosed space and burrow in, and the other, to shed one's clothes. Dr. Ranney has a detailed explanation for this effect and dear reader, I shall leave it to you to read this exciting book and find out for yourself.

If humans were to undertake a 13-year journey to the ends of the solar system, would it be possible to keep the crew in a state of cryohibernation? This is not as far-fetched as one might imagine and Dr. Ranney tells us about medical student Anna Bagenholm, who, while skiing off-piste, crashed through a frozen river where she was trapped under more than 6 inches of ice for over an hour, and survived to tell the tale. How does the human body react if, when walking across an ice sheet on a frozen lake, one falls through? How stressful is running a marathon to the human body? Could running extreme distances like the marathon be actually dangerous to the human body? What happens when the glycogen stores in the liver and muscles are depleted during a marathon? Do please read this book to find out for yourself.

Just as humans have evolved over the generations to the conditions of Earth's temperature, pressure and atmosphere, we have also evolved under the influence of its gravity. This constant force acting upon our body has crafted our physiological systems much more than we initially appreciate. Conversely, when we send humans into space where the gravitational component is removed (which we call microgravity instead of zero gravity, as zero gravity is technically impossible) or when we land humans on a terrestrial object like the Moon or Mars where their smaller masses exert a smaller gravitational force relative to Earth's, changes to the physiological systems of our bodies can be observed, all of which are symptomatic and can have debilitating long-term consequences. Studying these effects and developing ways to combat them are paramount if we are to successfully land man on far away objects involving long sojourns through space and microgravity.

How do human bodies react to the extreme heat and aridity of a desert? Dr. Ranney examines the case of an athlete, one Mauro Prosperi who participated in the Marathon des Sables, a six-day, 251 km ultramarathon and having been thrown completely off course by a fierce sandstorm on his fourth day of the race, went for ten straight days without food and water, and survived. Understanding how our bodies react to extreme heat

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and desert conditions is very important since global warming is a reality and we need to gear up to meet this threat.

When a human being dives into water, the urge to breathe is not because of the need for oxygen. No, it is the body's need to rid itself of carbon dioxide that's the cause of this drive to breathe. I'd rather not explain more here. Dear reader, please read this wonderful book for yourself and find out.

Dr. Ranney devotes the penultimate chapter of his book to mitochondria. Despite warning us that the chapter on mitochondria is likely to make heavy reading for those who are not science buffs, Dr. Ranney manages to retain the tension and excitement that is characteristic of the entire book. At the end, one is left with no doubt regarding the importance of understanding mitochondria. Damaged and dysfunctional mitochondria have been implicated in a range of human pathologies and the list is steadily growing. Last but not the least, Dr. Ranney examines how much of a role science played when Eliud Kipchoge ran a full marathon in under two hours.

Understanding how our bodies react when pushed to the edge will help us combat pain, increase tolerance and endurance, as human beings strive to achieve more and more for reasons ranging from glory to greed. Dr. Ranney writes exceedingly well, in simple, but limpid prose, as he effortlessly switches from scientific analysis and descriptions to the narration of extreme human adventures that pushes human endurance to its limits.

The forward to this book has been written by eighty-five year old Sir Chris Bonnington CVO, CBE, DL, British Explorer, who has inter alia completed 19 Himalayan expeditions and for a brief period of time held the record of being the oldest person to have summited Everest, at the age of fifty. Jonty Rhodes, former international cricketer who is currently a cricket coach and commentator has a few paragraphs of comments.