"Cells or Soaring?":

Historical Reflections on "Visions" of the Body, Athletics, and Modern Olympism[1]

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The body commands our attention. Crowded newsstands display rows of magazines adorned with static muscular and erotic forms. Television thrusts before eyes and mind images of dynamic powerful bodies engaged in athletic struggles that take on "life or death" proportions.[2] Perhaps nowhere is the athletic body more inspiring than when framed within the ritual, festival, and spectacle of the modern Olympic Games. Anthropologist John MacAloon has aptly said of this compelling quadrennial event: "The 'transcendental ground' of Olympic ritual is the idea of human-kindness." The Games' creator Pierre de Coubertin struggled long and hard to create and protect this celebration of "human being" and "festival of human unity."[3]

In recent decades scholars in several disciplines have evidenced intense interest in the body.[4] Much of the literature that has been produced is concerned with diminished, debilitated, or otherwise impaired bodies (a preoccupation that, itself, merits attention). Scholarly studies of strong, commanding bodies--so omnipresent in modern sport--are comparatively rare.[5] It might be argued, of course, that by their very nature historical and sociocultural studies in which "sport" is the focus are *ipso facto* about the body; however, this literature usually does not make it the central analytical focus. In the latter regard, Bruce Haley's *The Healthy Body and Victorian Culture* (1978) and John Hoberman's *Mortal Engines: The Science of Performance and the Dehumanization of Sport* (1992) merit particular attention.[6]

Representations of athletic bodies are by no means simple and unambiguous. "Cells or Soaring?: Modern Olympism and 'Visions' of the Body,"[7] the theme of this paper, is about such matters--about messages that coalesce and compete in and around presentations of athletic bodies. It suggests that the wider historical, cultural, and intellectual contexts within which modern athletics arose warrant further examina-

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tion--especially those matters that had intersections with the emerging biological sciences.

Life Magazine, the 1996 Olympics, and Presentations of Athletic Bodies

In July 1996 *Life* magazine produced a special issue dedicated to Olympic athletes. To carry out its general theme--"Naked Power/Amazing Grace"--four different covers depicted: a male diver; a female sprinter;[8] four mesomorphic male water polo players; and heptathlete Jackie Joyner-Kersee holding a javelin across her bare muscular shoulders. Taken as a whole, *Life's* 1996 "Olympic" issue is a striking commentary on modern attitudes regarding the body. For one thing, the images contained therein are profoundly different than the weak, disordered (or disorderly), and disarrayed bodies that have been a major focus of "cultural studies." Instead, strong, symmetrical *forms* confront the reader, who is urged to enter into a "Meditation on Athletic Beauty" and partake of its "Celebration." In a short article titled "The Soul of These Beautiful Machines" the reader learns that volleyball player Holly McPeak is 5' 7" tall, weighs 135 lbs, and can execute a 30-inch vertical jump. Her body is described as "another country, its beauty exotic and varied as that of any distant terrain." But *form* is not everything, the reader is told; for "unlike the bulk of a bodybuilder" or the leanness of a model, the musculature of an Olympian has everything to do with, *function.* By means of intense training Olympic athletes have reached the limits of human endurance and attained "the skills and muscles that effect a transformation from mortal to machine."[9]

"Mortal into machine" is quite a different "vision" than the one to which the Baron de Coubertin dedicated his life--or the one that George Wilhelm Friedreich Hegel offered in the early 1800s when reflecting upon the games of ancient Greece. "Sport" (i.e., competitive contests), Hegel wrote, "presents a higher seriousness; for in it Nature is wrought into Spirit. . . [In] this exercise of the physical powers, man. . . has transformed his body into an organ of Spirit."[10]

When Hegel's *Philosophy of History* (1830-31) was published "modern" sports had not yet appeared. In less than five decades a new, immensely powerful form of "athleticism" had become established in English-speaking countries and soon would come to the attention of an impressionable young Pierre de Coubertin. During this same period, the biological sciences underwent dramatic changes as they struggled with "problems of form, function, and transformation."[11] By 1887, when the young Coubertin began his "campaign of twenty-one years," evolutionary biology and experimental physiology were well on the way to be becoming mature disciplines. Evolutionary biology evoked its particular constellation of beliefs and debates about what it was to be human;[12] experimental physiology generated others.

In *The Vital Machine: A Study of Technology and Organic Life* (1991), David Channell has written, "although a culture usually is defined by a single world view" it is not at all impossible for there to be "two different yet coexisting sets of beliefs and attitudes which result in two coexisting world views, each represented by its own cultural symbol or root metaphor."[13] Since the 1600s, the two major paradigms in westem thought had been *vitalism* (life is governed by forces that cannot be reduced to physical laws) and *mechanism* (life can be reduced to physical and chemical forces).

Although neither has been able to resolve all explanatory problems, the mechanistic or reductionist approach--given greater legitimacy by the growing strength of the experimental "life sciences"--has gained ascendancy in the twentieth century.

Channell's assertion concerning "different yet coexisting" views is given concrete expression in *The Olympic Book of Sports Medicine* (1984), a 680-page work produced by the International Olympic Committee (I.O.C.) in collaboration with the Fédération International de Medicine Sportive (F.I.M.S.). On the cover a track athlete soars over a high hurdle. Photographs of graceful ice skaters and intact individuals engaged in feats of skill, strength, and endurance are interspersed throughout. Far more pervasive are schematic representations of myofibrils, axons, motor neurons, and other cellular and subcellular structures. [14] Similar competing presentations of the body appear in scores of late twentieth century publications. As but one example, an article titled "Records Jules Verne Could Not Have Imagined," published in the November 1992 *Olympic Review,* refers to track as: "A school of suffering and constant surpassing of oneself"--one that touches "closely to the very heart of existence, drawing the very best out of a person."[15] Included in the same volume, another article titled "What Is Sports Biomechanics" opens with a photograph of a gymnast soaring above the long horse; its written text focuses on such things as velocities measured by photocells and is accompanied by computer-generated graphs and an outline drawing of a vaulting gymnast upon which forces and vectors have been inscribed. The latter bears striking similarities to illustrations that appeared in Giovanni Borelli's *De Motu Animalalium* (1680), which called for a mechanistic interpretation of physiology.[16]

The most powerful seventeenth century expression of mechanistic physiology was René Descartes' *De l'Homme* (1664) wherein animals and the human body are described as machines. In his study of phenomenological and medical themes regarding the body, Drew Leder points to the extent to which "our culture is still under the sway of the Cartesian paradigm." Acknowledging the value of the specialized scientific view, which certainly does reveal "aspects of corporeality unavailable to ordinary vision," Leder holds that this by no means exhausts the body's meanings. It is through perception and movement, he continues, that the *self* engages the *other.* [17] A similar point was made by physiologist and sports medicine physician Ernst Jokl in 1963 when he and two other sport scientists invoked the last public statement of the eminent nineteenth century neurophysiologist Sir Charles Sherrington--"man's mind can communicate with other minds only through movement." The Olympic Games, Jokl declared, "have demonstrated the profound cultural significance of this remarkable characteristic."[18]

Leder's chapter 5 opens with a quote from F. J. J. Buytendijk's *Prolegomena to an Anthropological Physiology.* Trained in physiology as well as medicine, Buytendijk (the first president of F.I.M.S.)[19] argues that knowledge of the "normative functions of organs and organ systems, regulation and adaptions, tissues and cells," although essential, cannot adequately explain relations between "behavior and physiological functions." He seeks, instead, to establish "anthropological physiology as a *positive* empirical science."[20]

Muscles, Machines, and Mesomorphic Males

During the second half of the nineteenth century, ways of viewing the body that

were grounded in external form (from which various, and often conflicting concepts of function were inferred) were increasingly challenged by mechanistic approaches. When the London chemist Edward Frankland[21] stated "the muscle is only a machine for the transformation of heat into motion," he was reflecting growing tendencies to use machine models in an effort to explain still unresolved physiological questions.[22] By the early 1900s, other analogies such as "the human motor" were being used in attempts to "integrate the disciplines of anatomy, mechanics, physiology, and psychology into a meaningful application for the study of human performance."[23] These analogies, and the complex ideologies that they encapsulated, had implications for the ways in which athletic bodies were "seen"--and sometimes used.

In 1860, *Cornhill Magazine* began a series of articles titled "Physiological Riddies" in which new developments in the biological sciences were described. In the second, "How We Act," the author used the model of the steam-engine as an analogy for the mechanism of "muscular motion."[24] Other *Cornhill* articles discussed exercise in relation to health, the ancient Olympics, the Oxford-Cambridge Boat Race, and systems of "training."[25] In "Training in Relation to Health," published in 1864, the author observed that the English lacked an understanding of the values of different foodstuffs (e.g. protein, carbohydrates) and that training "rules and traditions" in use relied heavily on John Sinclair's *Code of Health and Longevity* (1807) and were based upon "no intelligible principles."[26] Although there would be changes over the ensuing decades, scientifically-determined training regimens are of comparatively recent origin.

It would be incorrect to maintain that athletes always are approached with mechanistic models in mind. Quite the contrary! It is corporeal form that first engages our attention; and dynamic corporeal form is central to athletics. The icon of the mesomorphic male striving for success in a demanding contest could and can be inspiring; the vision could--and apparently did--transport ordinary mortals, at least temporarily, to new heights. Late nineteenth century literature is replete with such messages. In 1870, while proclaiming a "new era" in sporting practices, *Bailey's Magazine of Sports and Pastimes* enthusiastically described Mr. Mitchell, hero of the recent Oxford-Cambridge athletics meeting, as "a grand man of thews [power and bodily strength] and muscle." Shortly thereafter, Hippolyte Taine commented upon the physically superior men he had seen in England, especially athletes whose training had resulted in "a powerful frame of bones and muscle," heart, courage, and character.[27]

Victorians often associated such men with their own interpretations of the "Homeric Ideal." In *The Greek Heritage in Victorian Britain* Frank Turner has observed: "Greek sculpture had in their opinion embodied ethical rules of beauty. . . . The Greek lived, in all things, a healthy, and in a certain degree, a perfect life."[28] *Eric, or Little By Little* and *Tom Brown's Schooldays,* David Jenkyns points out, "are both full of Homer."[29] *Modern Athletics* (1868), which discusses such things as techniques, training, and the management of athletic meetings--and includes records of the best performances in several sports--opens with a chapter dedicated to "Ancient Athletics" that is liberally supplied with phrases in Classical Greek.[30]

This fascination was noted by foreign visitors like Taine, who declared that in England there were gentlemen "whose ambition and regimen are those of the Greek athlete."[31] The ideology had many adherents. In an 1893 lecture titled "The Athletic

Games and Their Effect on Greek Art," Yale University's History of Art professor J. M. Hoppin asserted that "the most perfect specimens of the human body, developed by training" were represented in ancient sculpture. Their analogue, Hoppin held, could be found in modern types of "athleticism, especially at the university."[32] Sir Richard Livingstone "was confident that an ancient Athenian would feel quite at home in Oxford or Cambridge" among the athletic youth who were "well developed in body and mind."[33] Representations of Myron's Discobolus appeared in publications like *Punch;* that of the Apollo Belvedere appeared prominently in works like Richard Proctor's *Strength: How to Get Strong and Keep Strong* (1889). The frontispiece of John Boyle O'Reilly's *Athletics and Manly Sports* (1890), "the boxer," is a composite of the body of the Greek god and a head and face that resemble those of John L. Sullivan.[34]

The constellation of ideas and ideals attached to the rapidly growing fervour for athletics on both sides of the Atlantic was eloquently summed up by the respected American physician J. William White in 1887, the year that Coubertin began his "voyage de vingt et un ans." Ranging from the ancient Olympic Games and the "Greek aesthetic for beauty, harmony, and well-being"; to the Chivalric displays of Medieval knights; to Dr. John Morgan's 1873 study of the health of men who had rowed in the Oxford-Cambridge Boat Race; to athletics at his own University of Pennsylvania, White declared: "Let us by all means foster. . . the manly games and sports in which for centuries it has been the pride of the Anglo-Saxon race to excel."[35] Almost identical words were forming in the mind of the young Coubertin.

What is especially significant about White's lengthy article is that it intermixed these lofty sentiments with observations about the emerging physiological sciences. In a telling sentence, White called upon the words of American physician Edward T. Hartwell (who would subsequently become a president of the American Association for the Advancement of Physical Education) to declare that the modern ideal of exercise and athletics is not the descendent of Greek or Medieval ideals, but is the child of the scientific spirit embodied in the new physiology and psychology engendered through the labours of Harvey and Haller, Du Bois-Reymond, Müller, and Helmholtz.[36] In addition to being a leading contributor to nineteenth century neurophysiology, Du Bois-Reymond along with Rudolph Virchow (founder of cellular pathology), [37] had been called upon in the 1860s to resolve the debate over which was the better, German or Swedish gymnastics. (Nationalistic sentiments more than science are evident in the report that ensued.)[38]

The same year that White's article appeared--and four years after Coubertin's first visit to Rugby School--the German physician and sportsman George Kolb[39] published *Beitrage zur Physiologie Maximaler Muskelarbeit Besonders des Modernen Sports.* Compared to anything available at the time, Kolb's monograph (an amplified English translation of which appeared in 1893 as *Physiology of Sport)* seems remarkably modern. It contained sphygmographic tracings of pulse rates: measures of energy consumption and fatigue: and other graphic data. In a short chapter entitled "Alkaloids," Kolb commented upon his experiments with digitalis, morphine, cocaine, and other drugs, and concluded that these all impaired performance.[40] It would be another three decades before F. A. Bainbridge's *Physiology of Muscular Activity* (1919), wherein athletics are briefly discussed, offered anything comparable in the English language. How may we account for such a modern-appearing physiol-

ogy of exercise monograph as early as 1887/1893?

Part of the reason may be found in the lead that German scientists had taken during the nineteenth century in advancing the physiological sciences.[41] In an excellent comparative study, Thomas Bonner has analyzed the considerable differences in medical training that existed in Great Britain, France, Germany, and the United States during the second half of the nineteenth century. By mid-century, Germany (not yet a unified nation) was the only country where medical education was "almost exclusively in the hands of university professors rather than medical practitioners."[42] Most physicians in Britain were trained outside the sphere of the universities; and in the United States, by the 1870s, those individuals who desired a medical education better than anything available in their own country were going to Germany and to Vienna rather than to Paris and Edinburgh for their training.[43]

Although gymnastics continued to be the preferred form of physical exercise in Germany, as Heiner Gillmeister has pointed out, before 1900 sports like football (i.e., soccer) and tennis had begun to attract adherents in cities like Berlin and Hamburg;[44] Kolb's monograph reflects this. By the early 1900s, as John Hoberman has pointed out, German physicians and physiologists were among that small group of individuals who were becoming interested in "the science of performance."[45]

The Athlete Becomes a "Physiological Model"

Today, athletes serve as research subjects for physiologists and other scientists, many of whom are specifically interested in improving performance. The latter is a twentieth century innovation. Improvement of performance was not what motivated those few early investigators who, a century ago, had begun to turn to athletes to examine a particular scientific question. Étienne-Jules Marey, Director of the Paris Physiological Station, was dedicated to establishing *"la méthode graphique* in physiology and medicine;"[46] and he devised many ingenious instruments (including an improved version of the sphygmograph). Among his wide-ranging research initiatives, Marey undertook chronophotographic studies of hurdlers, runners, pole vaulters, and gymnasts using the high bar.[47] Nathan Zuntz's interest in studying "the marching soldier, the aplinist, the high-altitude ballonist and the (sportive) cyclist," as Hoberman has pointed out, was prompted by a desire to learn more about "energy efficiency of the mammalian organism."[48]

In 1865 Adolf Fick and Johannes Wislicenus had undertaken an ascent of the Faulhorn, a mountain of approximately 2,000 meters in the Swiss alps. Their analyses of food consumed and urine expelled, published as "On the Origin of Muscular Power" (1866),[49] led them to conclude that chemist Justus von Liebig's assertion that it was muscle substance that provided the needed energy was incorrect; it probably was fats and carbohydrates that provided the staple fuels for the muscles. They offered the steam engine as "a useful analogy" since iron machinery did not consume itself; and a separate fuel (e.g., coal) provided the energy for work indirectly through steam.[50] Shortly thereafter, Dr. E. A. Parkes (drawing upon this research) undertook studies of the effects of high-nitrogen and low-nitrogen diets consumed by two British soldiers involved in "severe walking exercise."[51] (For a nation engaged in constant military actions the value of such information seems evident.) In 1871, the *New York Medical Journal* published American physician Austin Flint, Jr.'s analyses of

food eaten and urine expelled by the professional pedestrian Edward Payson Weston during a five-day 400-mile walk. When Payson engaged in a similar event in England in 1876, F. W. Pavy, physician to Guy's Hospital, undertook similar studies--and came to opposite conclusions than had Flint regarding the fates of foodstuffs in the body.[52]

Wilbur Atwater, professor of chemistry at Wesleyan University, had studied nitrogen balance in Carl Voit's laboratory in Munich. In the 1880s, Atwater returned to Germany--this time to study with Max Rubner, who was applying the first law of thermodynamics to the animal body.[53] There he learned the value of the calorimeter and the importance of determining the exact equivalent per gram of each item of food consumed. Upon his return home Atwater built the first calorimeter in the United States and used it in nutrition experiments he conducted on Harvard and Yale rowers. In *University Boat Crews* (1900),[54] published under the auspices of the United States Department of Agriculture, Atwater concluded that the average daily intake of 4,085 calories and 155 grams of protein that the men had consumed "must indicate a real demand."[55] However, this interpretation did not take into account the fact that training practices still in vogue were influenced by beliefs set down nearly a century earlier that called for large quantities of rare meat;[56] it soon would be challenged by Yale physiologist Russell Chittenden (who also had studied in Germany). Chittenden included soldiers and Yale athletes among the subjects for his early 1900s studies of strength, physical performance, and nitrogen balance. The "average man" weighing 150 lbs., he concluded, needed far less protein than had been indicated in the standards set by either Voit or Atwater.[57] It is interesting to note that few such studies before World War I were conducted in Britain, "the nation that had taught the world to play."

Why So Few Experimental Studies of Athletes in "The Nation That Had Taught the World to Play"?:

In 1862, physician J. M. DaCosta had identified a functional disorder among Union Army soldiers that was characterized by chest pain, palpitations, and breathlessness. Identified as "irritable heart," this was thought to be caused by the exhaustion of long military campaigns.[58] The issue became intimately associated with athletics following the 1867 Oxford-Cambridge Boat Race when the London *Times* published physician F. C. Skey's denunciation of such contests.[59] John Edward Morgan (physician to the Manchester Royal Infirmary and a former oarsman at Oxford) contacted men who had rowed in the race between 1829 and 1869 and inquired about their present condition. The vast majority of the more than two hundred respondents believed that their health had been improved, not harmed, by their youthful activity.[60] In 1873, the Clinical Society discussed "severe injury to the heart from overstrain" and hypertrophy among professional pedestrians and mountain climbers (alpine climbing had begun attracting the attention of English gentlemen in the 1860s). The British Medical Association did likewise.[61] For the next half century no topic related to athletics occupied more attention in the *Lancet* and the *British Medical Journal* than did concerns about the heart.[62]

In America, Dr. E. H. Bradford's 1877 study of the health of men who had rowed in Harvard crews relied, as had Morgan, on self-report data supplied by former

athletes. George Meylan, M.D. obtained more extensive information from men who had rowed at Harvard from 1852 to 1892.[63] In the hope of shedding light on the much-debated question of "overtraining," Dr. Eugene Darling undertook metabolic and cardiovascular tests on Harvard oarsmen and football players, noting how difficult it was to obtain accurate data while not interfering with "the men's training regimens."[64]

At the 1899 Boston marathon doctors Harold Williams and Horace Arnold gathered information concerning pulse rates, heart sound, and heart size before and after the race, and concluded that "murmurs" exhibited following the race were only temporary signs of cardiac fatigue. Drs. J. B. Blake and R. C. Larabee, who evaluated men who ran in the 1900, 1901, and 1902 marathons, also found no evidence of permanent injury.[65] Nonetheless, debate over "athlete's heart" continued with considerable force. American interest in distance running increased when Johnnie Hayes was declared the winner of the 1908 Olympic marathon.[66] Under the direction of Dr. Watson Savage, the Pittsburgh Athletic Association's Department of Physical Research collected X-ray, cardiovascular, and renal function data from participants at its 1909 marathon.[67]

The *British Medical Journal* in August 1908 published one of its few clinical or scientific reports on athletes that did not have as its focus cardiac function. This was an investigation by physiologist Leonard Hill, who used as his subjects two men who had competed in the London Olympics (T.H. Just and H.E. Holding). On the basis of their performances in the experimental tests, Hill concluded that by inhaling oxygen before a race athletes could "break the worlds records and relieve themselves of distress which follows their greatest efforts."[68] The December 1908 meeting of the Medical Society of London gave considerable attention to such matters as violent exercise and albuminuria, "physiological emphysema" ("second wind"), and "overstrain" and cardiac weakness.[69]

At the 1909 annual meeting of the British Medical Association, the topic "Medical Aspects of Athleticism" evoked contrasting views. Whereas physicians like Sir Lauder Brunton maintained that races over one mile were "wholly unsuitable for boys under the age of nineteen," Sir James Mackenzie was less alarmed, noting that "the cardiac area in perfectly normal young people often appear[ed] enlarged."[70] Citing the work of American investigators, Dr. William Collier asserted:

> Time and again the public has been invited to believe that the youth of the nation is being physically ruined on those very fields on which, according to Wellington, the battle of Waterloo was won. It is illuminating, therefore, to find that, dispassionately examined, this charge proves to be nothing more than a hasty generalization based on a not always correct interpretation of certain rare incidents.[71]

Why was it the case that the nation that had "taught the world to play" made so few contributions to the experimental study of the athletic body? The continuing influence of a comparative, as opposed to an experimental, orientation in British physiology was a factor. In his study of Michael Foster and the emergence of the Cambridge School of Physiology in the 1870s, Gerald Geison has compared developments in Germany to the "stagnant backwater" that English physiology had become.[72]

"We English physiologists," John Burden Sanderson declared in 1872, "must admit with regret that we have had very little to do with the unprecedented development of our science during the last two decades."[73]

Could the dominance of the vaunted "gentleman amateur" *ethos* also have been an influence? Comments made by British physiologists, physicians, and sportsmen well into the twentieth century suggest that it might. In 1926, while a visiting professor at Cornell University (where he conducted experiments on acceleration during running) physiologist A.V. Hill (1922 Nobel Prize in Physiology and Medicine and a track athlete during his youth) observed: "In America. . . people are more inclined to treat the subject of athletics scientifically. . . there are, I fear, many sportsmen in England who would be shocked by such an idea."[74]

These sentiments were echoed in 1953 by Sir Stanley Rous (recipient of an Olympic Diploma of Merit in 1974) when he wrote in the foreword to *Fitness and Injury in Sport:* "For a people to whom sport is a serious matter, the British, compared with many other nations, usually go about their games in a surprisingly unserious way. . . . who cares what effect [running] has on the chemical structure of a certain muscle, or what it does to the para-sympathetic nervous system."[75] A decade later, Sir Arthur Porritt (New Zealand Olympic captain in 1924 and 1928, and manager of the 1936 British Olympic team) observed that although an international organization of sports physicians had existed since 1928, it was only in 1953 that such a group was organized in Britain.[76]

International Expositions, International Congresses (Olympic and Otherwise), and Competing "Visions" of the Body

These were not the only "visions" of the body that held sway during the late 1800s and early 1900s. Equally, if not more pervasive, was the "hygienic." Its discourse took several forms. Appropriate exercise was deemed an essential aspect of health; and this brought a variety of hygienic/health considerations into close association with the emerging field of "physical education." In several countries a considerable number of physicians became involved in some manner. All but one of the first ten presidents (1885-1919) of the American Association for the Advancement of Physical Education, for example, were medical doctors.[77] And the number of meetings and conferences at which hygiene and physical education were discussed in the half century following the 1876 Philadelphia Centennial Exposition was quite remarkable.[78]

In *The Anthropology of World's Fairs* Burton Benedict has traced the evolution of "international expositions," the first of which took place at London in 1851. Between 1851 and 1908 (the year both the Franco-British Exposition and the Games of the IVth Olympiad were held in London) fourteen major international expositions were held in Europe and the United States. Beginning with the second (Paris 1855), these often included a section dealing with "education, health, and social life"--and frequently an international congress dedicated to physical education.[79] When the word "physiology" was invoked, as it often was at such conferences, this was the physiology of the hygienist and medical clinician not the laboratory researcher. This "physiological model," as Bruce Haley has accurately pointed out, partook of "a common means of conceptualizing psychological health as well as health of the whole person,

mind and body together."[80] It encompassed a bewildering and frequently contradictory assemblage of: earlier millenarian sentiments; concerns and aspirations brought forward by social interpretations of evolutionary biology; anxieties about industrialism and urbanization, gender, class--and more. It intersected with the emerging sanitary sciences (i.e., public health) and anxieties about "national degeneration" following a military defeat.[81] Several authors have pointed to the influence of the Franco-Prussian War on the young Coubertin; and following the Boer War the British medical press repeatedly discussed "national degeneration." Many, but by no means all, physicians preferred physical training to athletics. Gymnastics (thought to develop each part of the body appropriately and harmoniously) formed the core of physical training. However, there was far from unanimity regarding which form of gymnastics was the best; and nationalistic and personal sentiments rather than objective reason fueled most disputes. While he shared many of the concerns and aspirations of his contemporaries, Coubertin certainly did not believe that his Olympic Idea could be achieved through any of the pedantic "rational" gymnastic systems so dear to most of the hygienists and pedagogues, and the preponderance of physicians.

Coubertin seized upon every opportunity to advance his particular vision. In an address before the French Association for the Advancement of Sciences on January 26, 1889, he stressed the physical, intellectual, and moral superiority of English public school sport--a position to which he remain firmly commmitted.[82] With the support of powerful men like Jules Simon, Coubertin prevailed over the efforts of Paschal Grousset and the Ligue Nationale de l'Éducation Physique that Grousset headed;[83] and as Secretary General of the organizing committee of the Congress International pour la Propagation des Exercises Physiques dans l' Éducation that was held during the 1889 Paris International Exposition, Coubertin ensured that competitions in running, riding, fencing, and swimming, as well as gymnastics, were included.[84]

The Baron was not so fortunate a decade later when he witnessed his new Olympic Games submerged within the larger contexts of the 1900 Paris International Exposition. The Congress Internationale de l'Éducation Physique (of which Coubertin was nominally one of three vice presidents) was dominated by physicians and pedagogues. In his opening remarks, Georges Demeny (a former associate of Marey at the Paris Physiological Station and now Professeur de Cours Supérieur d'Éducation Physique for the City of Paris) denounced athletics as an excess and called for establishing physical education on a "scientific" (i.e., rational) basis--a theme that ran throughout the 1900 international congress.[85]

Although interested in pedagogical matters, and certainly not adverse to the health-giving potential of exercise, Coubertin repeatedly took issue with the advocates of Swedish and other gymnastic "systems." These might be appropriate for invalids or, mingled with simple games, for children and women; but, as he stated in his *Memoirs Olympiques:* "the eternal *Mens sana in corpore sano,*" with its "'eminently hygienic' ideal remained a little too medical to be proposed to the ambitions of the young."[86]

Coubertin occasionally referred to the "machine-like" precision of skilled rowers and other athletes. (Can any of us escape entirely the ideological contexts in which we live?) However, his vision of Olympism was something quite different--one that was based upon what has been described a "state of equilibrium between the body and the soul," spirit and matter.[87] In the preface to the I.O.C. Congress held at Brussels in 1905, Coubertin explicitly criticized what he called those "tenacious and noisy young doctors. . . worshipers of theoretical science and perfectly disdainful of practical knowledge."[88] As Norbert Müller has pointed out, the Baron was "strictly against modern tendencies which attempted to define a sportsman purely in terms of physiological and biomechanical parameters."[89]

Although Coubertin would maintain several times that he had been "urging specialists without success to look" into various "scientific" questions, this statement must be considered within the context of his expressed desire to foster interest in his own vision of the psychology of sport. Referring with approbation to physician Fernand Lagrange's *Physiology des Exercises du Corps* (one of those many turn-of-the-century works in which the term "physiology" equated with hygiene not experimental science), Coubertin wrote: "I wanted to see medicine, which to my mind was fast becoming too predominantly physiological, take a greater interest in psychology." It is within this context that Roger Dépagniat's statement crediting Coubertin and Olympism with establishing a truly new and truly French science--"la psychophysiologie sportive"[90] (the theme of the 1913 Lausanne I.O.C. Congress)--must be understood. The Baron reiterated his position at the Prague Congress in 1925, his last year as president of the I.O.C., noting that "scientific control" was becoming ever more a part of athletics. "Through its insistence on being merely physiological and forgetting to be psychological," he asserted, science provided only "imperfect data."[91]

Indeed, during the 1920s a revolution of sorts in the "sport sciences" was occurring.

The "Sports Sciences" and Sports Medicine Begin to Come of Age

Several authors have pointed to the significance of the 1911 Dresden International Hygiene Exhibition in helping to launch "the sport sciences." The exhibition included a Sports Division and a special laboratory (headed by physician Arthur Mallwitz, a participant at the 1906 and 1908 Olympics) where various experimental studies of the effects of exercise were undertaken. German-born United States Naval Surgeon Henry Beyer praised the exhibition and lamented the fact that America lagged considerably behind what Germany had achieved in the scientific study of such matters.[92] An extensive bibliography of articles and books dealing with exercise and sport, edited by Berlin doctor Siegfried Weissbein, was prepared in connection with the exhibition.[93]

Weissbein also edited *Hygiene des Sports* (1910) as part of the Biblithek für Sport und Spiel series; the two volumes included chapters on sport and the muscles, skeleton, joints, heart, nervous, and other systems. The chapter on metabolism and energy drew from Nathan Zuntz's experiments with soldiers and high altitude studies that investigators had been conducting at Monte Rosa. A photograph of Atwater and Benedict's bicycle ergometer, displayed in 1911 at Dresden, also was included.[94] In 1912, physicians meeting at the Golf Hotel at Oberhof, Thuringia established the Deutsche Reichskommitee für die Wissenschaftliche Erforschung des Sports und der Leibesubüngen (German Imperial Committee for Scientific Research of Sports and Physical Education).[95] In the years preceding the scheduled 1916 Olympic Games, several important efforts were made in Germany to advance the scientific study of sport and "look into the laws and the limits of increasing athletic performance." A research laboratory was established in Charlottenburg district in 1912; shortly thereafter, the German Imperial Committee for the Olympic Games decided to create a research facility at the Berlin Stadium.[96] Interrupted by the war, these efforts led to the establishment of "an institute of higher education devoted to physical training" (Die Deutschehochschule für Leibesübungen) in 1920.[97] The German Medical Society for the Advancement of Physical Training (Deutscher Ärztebund zur förderung der Leibesübungen), founded in 1924 with F. A. Schmidt as chairman and Arthur Mallwitz as vice-chairman, limited its membership to registered physicians.[98] Three decades would elapse before the American College of Sports Medicine was established by a small group of physical educators, physiologists, and physicians.[99]

When Sir Arthur Kieth (Fellow of the Royal College of Surgeons and former Fullerian Professor of Physiology) prepared a second edition of *The Engines of the Body* (1926), he included a lengthy appendix titled "Muscles as Combustion Engines and How They Serve the Needs of Athletes." In this he commented at length on "the oxygen debt" and the recent work of physiologists Walter Morley Fletcher, A. V. Hill, and Otto Meyerhoff.[100] The substantial advances in the sports sciences during the 1920s were reflected in the second edition (1931) of F. A. Bainbridge's *Physiology of Muscular Exercise,* edited by Arlie Bock and David B. Dill. With the arrival of Dill and Bock, the Harvard Fatigue Laboratory (established in 1927) had quickly became involved in a variety of high performance studies. [101] Research on athletics also grew at colleges and universities; however, it was the extensive and well-organized inter-

collegiate programs (with their many coaches, trainers, and other personnel) that enabled the United States to continue its Olympic successes at a time when champion athletes from other countries rapidly were coming to the fore.[102]

In 1928, the universities of Hamburg and Leipzig created full-time sports medicine positions. That same year the journal *Arbeitsphysiologie,* which would become a major--albeit it by no means not the only--vehicle for disseminating scientific reports of exercise and athletics, was founded. For his 1928 Arris and Gale Lecture before the Royal College of Surgeons, Dr. Adolphe Abrahams (who would become physician to the 1936 British Olympic team) selected as his topic "Physiology of Violent Exercise in Relation to Possible Strain." Having commented briefly about recent work on oxygen consumption, efficiency of the heart, metabolism, and the "effort syndrome," Abrahams stressed the value of the "thoroughness of Teutonic discipline" and the many opportunities that Americans had for "research upon the athlete in their numerous colleges and universities."[103]

Thirty-three physicians attending teams participating at the Winter Games of the IX Olympiad at St. Moritz in 1928 organized a committee charged with planning the an International Congress of Sports to take place during the forthcoming Amsterdam Games. It was during this congress that the first constitution of the Association Internationale Medico-Sportive[104] was adopted.

The Games also provided an opportunity for groups of physicians, physiologists, and other specialists from several countries to undertake cardiovascular, electrocardiograph, neuromuscular, blood chemistry, reaction time, and other experiments on male and female competitors. (The reports of these investigations were published as *Ergebnisse der Sportärzlichen Untersuchungen bei den lX Olympische Spielen in Amsterdam 1928.)*[105]

The original intention of the Dutch Society for Physical Education had been to develop an inclusive (e.g. biology, psychology, pedagogy, etc.) International Congress of Physical Education that would "allow everybody interested in physical education to co-operate."[106] When it became apparent that it would not be possible to carry out "such a great congress with many sub-divisions," the organizers reduced the focus to three topics: (1) standardization of formulae in the medical inspection of sportsmen; (2) rhythm of the heart in connection with sport: (3) the part physical education should have in the programs of elementary and secondary schools and universities.[107] (These papers were published in *Compte Rendu du Congress International d'Éducation Physique et de Sport Amsterdam, 1-4 Août 1928.*) Conferees were welcomed by congress president F. J. J. Buytendijk, who declared that sport and physical education, properly conceived and carried out, must contribute to "la santé d l'âme" as well as "du corps." And in words that might have gladdened the heart of Coubertin, he stated: "the body of the athlete demonstrates the perfection of both, made concrete in symbolic form."[108]

The drive toward a reductionist view of athletic bodies, so clearly evident by the time of the Amsterdam Olympics, has accelerated over the last three-quarters of a century. It is especially, but by no means exclusively, evident within the present orientations of the biomechanical, physiological, and biochemical sciences. Whereas a hundred years ago a few physiologists had involved athletes in their research in the hope of elucidating various scientific questions, today hundreds--if not thousands--seek to use science to *improve* athletic performance. Such efforts are infused with

mechanistic perspectives. Yet, within athletic contests--and especially within those of the densely symbol-laden Olympic games--other messages are often proclaimed as athletics *soar* (or seem to soar) beyond (not just because of) their *cells.*

Epilogue

In the inaugural volume of *Olympika: The Intertnational Journal of Olympic Studies* (1992), John MacAloon pointed to the establishment of I.O.C. medical congresses in 1989 as tantamount to an official bifurcation of the biomedical and the social/humanistic sciences within the Olympic context. The consequences of this, as MacAloon has insightfully observed, may prove to be far more detrimental than positive.[109] Serious questions must be asked about this trend, for ethical questions that modern biology has evoked--and provoked--are no less daunting in the realm of sport than in any other aspect of our collective lives. *Quo vadis* 2001?

Endnotes

1. This paper is based upon my 1999 J. Howard Crocker Olympic Studies Lecture at the International Centre for Olympic Studies at The University of Western Ontario. My sincere thanks to the many faculty, students, and staff who made my stay so pleasant, informative, and memorable. Thanks also to reviewers for their cogent comments, which helped to better formulate certain points that appear herein.

2. Three papers published in Fernand Landry, Marc Landry, and Magdeleine Yerlès (eds.), *Sport...The Third Millennium* (Sainte-Foy: Les Presses de l'Université Laval, 1991) offer remarkable commentaries on the "manner in which culture is presented, interpreted and translated through globally televised multicultural performances" (p. 46). These are: Kang Shin-pyo, "The Seoul Olympic Games and Dae-Dae Cultural Grammar" (pp. 49-63); Miguel de Moragas Spà, "Spanish Television (TVE) and the Coverage of the Opening Ceremony of the 1988 Seoul Olympic Games" (pp. 65-71); and James E. Larson, "Commercial Imperatives: NBC's Construction of the Seoul Olympic Games Opening Ceremony" (pp. 73-93).

3. John J. MacAloon, "Olympic Games and the Theory of Spectacle in Modern Societies," in John J. MacAloon (ed.), *Rite, Drama, Festival, Spectacle: Rehearsals Toward a Theory of Cultural Performance* (Philadelphia: Institute for the Study of Human Issues, 1984), pp. 241-280. See also the detailed historical analyses in John J. MacAloon, *This Great Symbol: Pierre de Coubertin and the Origins of the Modern Olympic Games* (Chicago: University of Chicago Press, 1981).

4. An article in the July 12, 1991 *Chronicle of Higher Education* carried the headline "The Human Body and Cultural Conceptions of it Draw Attention of Humanities and Social-Science Scholars." This literature is now vast. Many sources credit the writings of Michel Foucault with advancing such studies. For example, *Discipline and Punish: The Birth of the Prison,* A. M. Sheridan Smith,

trans. (New York: Pantheon Books, 1973) and *Birth of the Clinic: An Anthropology of Medical Inspection,* A. M. Sheridan Smith, trans. (New York: Pantheon, 1977).

5. Among those works that discuss physically dynamic, athletically capable females, Susan K. Cahn's *Coming on Strong: Gender and Sexuality in Twentieth-Century Women's Sport* (Cambridge: Harvard University Press, 1994) merits particular attention. Likewise, the women discussed in works like Allen Guttmann's *Women's Sports: A History* (New York: Columbia University Press, 1991) are whole, capable, achieving individuals. It could be argued that the now numerous books that discuss male athletes do likewise.

6. Bruce Haley, *The Healthy Body and Victorian Culture* (Cambridge, MA: Harvard University Press, 1978); and John Hoberman, *Mortal Engines: The Science of Performance and the Dehumanization of Sport* (New York: Free Press, 1992).

7. The term "cells" should be interpreted in the modern biological sense. The author prefers to leave to the reader's discretion the interpretation of the term "soaring" as it appears in this paper.

8. Views regarding women in the first half of the twentieth century were likely to focus on the reproductive function and most often were shaped by assumptions--stated or unstated--of female incapacity. The entry of the former U.S.S.R. into Olympic competition accelerated research on female athletes in several former "eastern bloc" countries. Jacqueline L. Puhl, C. Harmon Brown, and Robert O. Voy (eds.), *Sport Science Perspectives for Women* (Champaign, IL: Human Kinetics Books, 1988) point to the limited English-language literature that existed prior to the 1972 Women and Sport: A National Research Conference, which called for physiological, biomechanical, and other research studies of the female athlete. The *Sport Science Perspective for Women* book evolved from a conference sponsored by the United States Olympic Committee Sports Medicine Council in 1985.

9. "Naked Power/Amazing Grace," *Life,* July 1996.

10. Quoted in John Hoberman, *Sport and Political Ideology* (Austin, University of Texas Press, 1984), p. 12.

11. See William Coleman, *Biology in the Nineteenth Century: Problems of Form, Function, and Transformation* (Cambridge: Cambridge University Press, 1971).

12. These are reflected, for example, in debates over works such as John Hoberman's *Darwin's Athletes: How Sport Has Damaged Black America and Preserved the Myth of Race* (Boston: Houghton Mifflin Co., 1997).

13. David F. Channell, *The Vital Machine: A Study of Technology and Organic Life* (New York: Oxford University Press, 1991), p. 8.

14. A. Drix, H. G. Knuttgen, and K. Tittel (eds.), *The Olympic Book of Sports Medi-*

cine (Oxford: Blackwell Scientific Publications, 1988), passim.

15. Carlos R. Galindo, "Records Jules Verne Could Not Have Imagined," *Olympic Review,* 301 (November 1992), pp. 632-634.

16. Hong Youlian, "What is Sports Biomechanics?" *Olympic Review,* 301 (November 1992), pp. 620-626.

17. Drew Leder, *The Absent Body* (Chicago: University of Chicago Press, 1990), pp. 5-6, 11.

18. E. Jokl, M. Karvonen, and E. Simon, "Sports Medicine in the World: The International Council for Sport and Physical Education," *Journal of Sport Medicine and Physical Fitness,* 3 (1963), pp. 261-264.

19. The Association Internationale Médico-Sportive, established in 1928, was renamed Fédération Internationale Médico-Sportive et Scientifique in 1933. See, Allan J. Ryan, "Medicine," in David Levinson and Karen Christiansen (eds.), vol. 2, *Encylopedia of World Sport: From Ancient Times to the Present* (Santa Barbara, CA: ABC-CLIO, 1996), p. 628; pp. 631-632. See also: Albert Govaerts' (President of F.I.M.S.) "editorial" in the initial (June 1961) issue of *The Journal of Sport Medicine and Physical Fitness,* the "Official Journal of the Fédération Internationale de Médicine Sportive."

20. F. J. J. Buytendijk, *Prolegomena to an Anthropological Physiology* (Pittsburgh, PA: Duquesne University Press, 1974), p. 11, 47.

21. Frankland had studied with the German chemist Justis von Liebig, an early contributor to studies of metabolism. A very useful analysis of nineteenth century nutritional and metabolic research is Kenneth J. Carpenter, *Protein and Energy: A Study of Changing Ideas in Nutrition* (Cambridge: Cambridge University Press, 1994).

22. Quoted in Coleman, *Form, Function, and Transformation,* p. 134. See also: F. W. Pavey, *A Treatise on Food and Dietetics Physiologically and Therupeutically Considered,* 2nd. ed. (New York: William Wood Co., 1881), p. 64.

23. Anson Rabinbach, *The Human Motor: Energy, Fatigue, and the Origins of Modernity* (Berkeley: University of California Press, 1990), p. 52.

24. "Physiological Riddles: How We Act," *Cornhill Magazine,* 2 (1860), pp. 21-32.

25. On emerging theories of "training" see: Roberta J. Park, "Athletes and Their Training in Britain and America, 1800-1914," in Jack W. Berryman and Roberta J. Park (eds.), *Sport and Exercise Science: Essays in the History of Sports Medicine* (Urbana: University of Illinois Press, 1992), pp. 57-107.

26. "Training in Relation to Health," *Cornhill Magazine,* 9 (1864), pp. 219-231.

27. "Sports, Past and to Come," *Bailey's Magazine of Sports and Pastimes,* 18 (1870), pp. 191- 197; Hippolyte Taine, *Notes on England* (New York: Henry Holt and Co., 1876), pp. 48-49.

28. Frank M. Turner, *The Greek Heritage in Victorian Britain* (New Haven: Yale University Press, 1981), p. 37.

29. David Jenkyns, *The Victorians and Ancient Greece* (Cambridge, MA: Harvard University Press, 1980).

30. H. F. Wilkinson, *Modern Athletics* (London: Frederick Waene and Co., 1868).

31. Quoted in Jenkyns, *Victorians and Ancient Greece,* p. 215.

32. J. M. Hoppin, *The Athletic Games and Their Effect on Greek Art: A Lecture Delivered in the Shefield Scientific School. . .* February 17, 1893 (New Haven, CT: Press of Tuttle, Morehouse and Taylor, n.d.).

33. Cited in Jenkyns, *Victorians and Ancient Greece,* p. 221.

34. Richard A. Proctor, *Strength: How to Get Strong and Keep Strong, With Chapters on Rowing and Swimming, Fat and Age* (London: Longmans, Green, and Co., 1889); and John Boyle O'Reilly, *Athletics and Manly Sports* (Boston: Pilot Publishing Co., 1890).

35. J. William White, "A Physician's View of Exercise and Athletics," *Lippincott's Magazine,* 39 (1887), pp. 1007-1033.

36. Ibid., p. 1011. Johannes Müller and Herman von Helmholtz were important contributors to several of the physiological sciences; among Emil Du Bois-Reymond's contributions was the demonstration that electrical changes accompany muscular action.

37. For an insightful and very readable account of nineteenth century cellular physiology see, Henry Harris, *The Birth of the Cell* (New Haven: Yale University Press, 1999).

38. Emil du-Bois Reymond, "Swedish Gymnastics and German Gymnastics from a Physiological Point of View," A. B. C. Biewind, trans., in *Essays Concerning the German System of Gymnastics* (Milwaukee: Freueker Publishing Co, n. d.). This was included with other essays and published by the executive committee of the North American Turnerbund.

39. Hans Langenfeld, "Auf dem Weg zur Sportwissenschaft: Mediziner und Leibusubungen in 19. Jahrhundert," *Stadion,* 14 (1988), pp. 125-148.

40. George Kolb, *Physiology of Sport: Contributions Towards the Physiology of Maximum Muscular Exertion, Especially in Modern Sport, As Rowing, Athletics, Gymnastics, Cycling, Swimming, etc.* (London: Krohne and Sessemann, 1893).

Between 1886 and 1890 Kolb had experimented on crews in training at different German rowing clubs. Blood pressures were taken using the sphygmomanometer of Professor von Basch of Vienna and Dr. Richardson's sphygmograph; vital capacity by using Waldenberg's apparatus. Cocaine, Kolb determined, had no benefits during the race, but could be useful afterwards.

41. The significance of the early contributions of German physicians to the eventual establishment of a science of human performance have been discussed in John Hoberman's *Mortal Engines* and in papers that emerged for the conference celebrating the Eightieth Anniversary of the founding of the German Society of Sports Physicians; see, K. Tittel, K. H. Arndt, and W. Hollmann, *Sportmedizin: Gestern-Heute-Morgan. Bericht von Jubiläum-symposium des Deutschen Sportärztebundes,* Oberhof, 25. bis 27. September 1992 (Leipzig/Berlin/Heidelberg, 1993).

42. Bonner, *Becoming a Physician,* pp. 35, 235. These developments were enhanced when governments of Prussia and Bavaria began to support well equipped physiological and chemical research institutes that were allied to universities.

43. See for example, Thomas N. Bonner, *American Doctors and German Universities: A Chapter in International Intellectual Relations, 1870-1914* (Lincoln: University of Nebraska Press, 1987); Edward M. Hartwell (Ph.D. in biology from Johns Hopkins University and M. D. from the Cincinnati Medical College, and soon to become president of the American Association for the Advancement of Physical Education) spent considerable time in 1889 investigating medical practice and physical education in Germany and Austria. See Roberta J. Park, "Edward M. Hartwell and Physical Training at The Johns Hopkins University, 1879- 1890," *Journal of Sport History,* 14 (1987), pp. 108-119.

44. Heiner Gillmeister, "English Editors of German Sporting Journals at the Turn of the Century," *Sports Historian,* 13 (1995), pp. 38-65.

45. Hoberman, *Mortal Engines,* pp. 69-99.

46. Robert G. Frank, "The Telltale Heart: Physiological Instruments, Graphic Methods, and Clinical Hopes, 1854-1914," in William Coleman and Frederic L. Holmes (eds.), *The Investigative Enterprise: Experimental Physiology in Nineteenth Century Medicine* (Berkeley: University of California Press, 1988), p. 218.

47. Etienne Jules Marey, *La Machine Animale: Locomotion Terrestre at Aerienne* (Paris: Libraire Germer Bailliere, 1878); Jean Zoro, *Images de 150 Ans d'E.P.S.: Éducation Physique et Sportive à l'École, en France* (Clichy: Verdiers S.A., 1986), p. 36, pp. 234-235.

48. John Hoberman, "The Early Development of Sports Medicine in Germany," in Berryman and Park, *Sport and Exercise Science,* pp. 233-238.

49. Adolph Fick and Johannes Wislicenus, "On the Origin of Muscular Power,"

Philosophical Magazine of London (4th series), 31 (1866), pp. 485-503.

50. Carpenter, *Protein and Energy,* pp. 64-69.

51. E. A. Parkes, "Further Experiments on the Effect of Diet and Exercise on the Elimination of Nitrogen," *Proceedings of the Royal Society of London,* 19 (1871), pp. 349-361.

52. Austin Flint, Jr., *On the Physiological Effects of Severe and Protracted Muscular Exercise* (New York: D. Appleton and Co., 1871); and F. W. Pavy, "Report of Analysis of Urine During Severe Exercise in the Case of Mr. Weston," *British Medical Journal,* 2 (1876), pp. 298-299; 315-316.

53. Rubner's insistence "that the animal body behaved according to principles that also explained the working of the steam engine" offered yet another challenge to vitalist beliefs that there was a qualitative difference between living and nonliving forms. See, Hamilton Cravens, "The German-American Science of Racial Nutrition, 1870-1920," in Hamilton Cravens, Alan I. Marcus, and David M. Katzman (eds.), *Technical Knowledge in American Culture: Science, Technology, and Medicine Since the Early 1800s* (Tuscaloosa: The University of Alabama Press, 1996), pp. 131-132.

54. Wilbur O. Atwater and A. P. Bryant, *Dietary Studies of University Boat Crews.* Bulletin No. 75, U.S. Department of Agriculture, Office of Experiment Stations (Washington, DC: Government Printing Office, 1900).

55. Carpenter, *Protein and Energy,* pp. 106-107.

56. See Park, "Athletes and Their Training."

57. Carpenter, *Protein and Energy,* pp. 107-114; Russell H. Chittenden, *The Nutrition of Man* (New York: Frederick A. Stokes Co., 1907).

58. The best account of these matters is James C. Whorton, "'Athlete's Heart': The Medical Debate Over Athleticism, 1870- 1920," in Berryman and Park, *Sport and Exercise Science,* pp. 109-135.

59. "The University Boat Races," *Lancet* (1867), pp. 454-455; *London Times,* October 10, 1867, p. 9.

60. John Edward Morgan, *University Oars, Being a Critical Enquiry Into the After Health of the Men Who Rowed in the Oxford and Cambridge Boat-Race from the Year 1829 to 1869, Based on the Personal Experiences of the Rowers Themselves* (London: Macmillan, 1873).

61. "Review and Notices," *British Medical Journal,* May 24, 1873, p. 589.

62. Before the invention of the X-ray and the electrocardiograph, the methods available to judge the heart's condition were auscultation, percussion, and pulse rate.

Many physicians agreed with the eminent cardiologist Sir James Mackenzie, who held that "the trained finger"--taking pulse rates--provided more accurate information than did such instruments, which could not enable the examiner to distinguish hypertrophy from dilatation.

63. E. H. Bradford, "Health of Rowing Men," *Sanitarian,* 5 (1877), pp. 529-536; George Meylan, "Harvard University Oarsmen," *American Physical Education Review;* 9 (1904), pp. 362-376; 543-552.

64. Eugene Darling, "The Effects of Training: A Study of the Harvard University Crew," *Boston Medical and Surgical Journal,* 141 (1899), pp. 229-233; idem., "The Effects of Training: Second Paper," *Boston Medical and Surgical Journal,* 144 (1901), pp. 550-559.

65. Harold Williams and Horace D. Arnold, "The Effects of Violent and Prolonged Muscular Exercise Upon the Heart," *Philadelphia Medical Journal* (June 3, 1899), pp. 1233-1239; J. B. Blake and R. C. Larabee, "Observations on Long Distance Running," *Boston Medical and Surgical Journal,* 147 (1902), pp. 318-323.

66. Hayes was awarded the victory after Italy's exhausted and disoriented Pietro Dorando was disqualified for having received assistance at the conclusion of the race.

67. Watson L. Savage et al., "Physiological and Pathological Effects of Severe Exertion (The Marathon Race)," *American Physical Education Review,* 15 (1910), pp. 651-661.

68. Leonard Hill, M. Flack, and T.H. Just, "The Influence of Oxygen Inhalations on Athletes," *British Medical Journal,* (August 22, 1908), pp. 499-500.

69. "Reports of Societies: Medical Society of London," *British Medical Journal,* December 25, 1908.

70. "Discussion on the Medical Aspects of Athleticism," *British Medical Journal,* September 25, 1909, pp. 829-838.

71. "School Sports," *British Medical Journal,* September 25, 1909, p. 898.

72. Gerald L. Geison, *Michael Foster and the Cambridge School of Physiology: The Scientific Enterprise in Late Victorian Society* (Princeton: Princeton University Press, 1978), pp. 3, 13.

73. Quoted in Geison, *Cambridge School of Physiology,* 13.

74. A. V. Hill, *Musculur Movement in Man: The Factors Governing Speed and Recovery from Fatigue* (New York: McGraw-Hill Book Co., 1927), p. 2.

75. Stanley Rous, "Foreword," S. S. Knight, *Fitness and Injury in Sport: Care, Diag-*

nosis and Treatment by Physical Means (New York: Van Nostrand, 1953), p. ix.

76. Sir Arthur Porritt, "Medical Science and the Future," in H. A. Meyer (ed.), *Modern Athletics by the Achilles Club* (London: Oxford University Press, 1964), pp. 160-173. As late as the mid-1990s, editorials in the *British Journal of Sports Medicine* were lamenting the failure of sports medicine to achieve recognition from either the medical profession or the populace. Peter Sperryn, "BSMA and the Recognition of 'Sports Medicine,"' *British Journal of Sports Medicine,* 28:3 (1994).

77. See, Roberta J. Park, "Physiologists, Physicians, and Physical Educators: Nineteenth Century Biology and Exercise, Hygienic and Educative," *Journal of Sport History,* 14 (1987), pp. 28-60; Roberta J. Park, "Edward M. Hartwell and Physical Training at Johns Hopkins University, 1879-1890," Ibid., 108-119.

78. Physical education was a discussion topic at various pre-World War I International Hygiene Expositions and at events such as I. Threesome Congress International de l'Éducation Physique de la Jeunesse (Brussels, 1910) and La Conferencia Teórico-Practica sobre Educación Física (Mexico, 1911).

79. Burton Benedict, *The Anthropology of World's Fairs: San Francisco's Panama Pacjfic International Exposition of 1915* (Berkeley and London: The Lowie Museum of Anthropology/Scholar Press, 1983); Dietrich Quanz, "The World Fairs of the Nineteenth Century and the Olympic Games as Manifestations of Western Industrial Culture," in Kang-Shin-pyo, John MacAloon, and Roberto DaMatta (eds.), *The Olympics and Cultural Exchange: East/West and South/North* (Seoul: Hanyang University, The Institute for Ethnological Studies, 1987), pp. 483-486.

80. Haley, *Healthy Body,* pp. 3-22.

81. See for example, Robert A. Nye, *Crime, Madness, and Politics in Modern France* (Princeton, NJ: Princeton University Press, 1984), chapter 9.

82. Pierre de Coubertin, *L'Éducation Athlétique* (Paris: Imprimerie Chaix, 1889).

83. In the 1880s and early 1890s, four "schools of thought" vied for favor in France. Although there was considerable overlap in their orientations, the *hygienists* were more committed to health than to any particular form of exercise. The Swedish and German forms of gymnastics had their adherents: some individuals favoured exercises directed to military needs. Coubertin's group favoured athletics based upon the English model, with their purported emphasis on "manly" virtues. See in particular, MacAloon, *This Great Symbol,* pp. 136-138 and Pierre Arnaud (ed.), *Les Athlètes de la République: Gymnastique, Sport, et Idéologie Républicaine, 1870-1914* (Toulouse: Bibliothèque Historique Privat, 1987).

84. Pierre de Coubertin, *Une Campagne de Vingt-et-Un Ans, 1887-1908* (Paris: Libraire de l'Éducation Physique, 1908), pp. 33-44: *Procès-Verbaux, Congress*

International pour la Propogation des Exercises Physiques dans l'Éducation (Paris: Imprimerie de l'Exposition, 1889).

85. "The Second Olympiad," in Pierre de Coubertin, *Olympic Memoirs* (Comité International Olympique, 1979), pp. 31-37; Georges Demeny, *Procès-Verbeaux Sommaires, Congress International de l'Education Physique: Exposition Universelle Internationale de 1900* (Paris: Imprimerie Nationale, 1900).

86. Coubertin, *Olympic Memoirs,* p. 74.

87. Juan Antonio Samaranch, "Message for the Pierre de Coubertin International Committee," *Comité International Pierre de Coubertin* (Lausanne: Secrétariat Général, n.d.), p. 29.

88. Comité International Olympique, *Congress International de Sport et d'Éducation physique sous l haut patronage de S. M. Léopold II Roi des Belges* (Auxerre: Editions de la Revue Olympique, 1905), pp. 5-6.

89. Norbert Müller, "Après un Siècle d'Olympism: Regards sur le Congress du Havre," in Norbert Müller (ed.), *Coubertin et l'Olympism: Questions Pour l'Avenir, Report du Congress du 17 au 20 Septembre 1997 à Université du Havre* (Niedernhaussen: Shors, 19), pp. 44-53.

90. Coubertin, *Olympic Memoirs,* 82; Roger Dépagniat, "Introduction," Pierre de Coubertin, *Essais de Psychologie Sportive* (Lausanne et Paris: Librairie Payot et Cie., 1913), pp. 5-19.

91. *The Olympic Idea: Discourses and Essays,* pp. 96-97.

92. Henry G. Beyer, "The International Hygiene Exhibition at Dresden," *Popular Science Monthly,* 80 (1912), pp. 105-128. The following year the *Lancet* reported that "a committee had been appointed to collect information and to inquire into the question of athletics with a view to putting games on a scientific basis"; however, it would several decades before any such concerted effort occurred in Britain.

93. Siegfried Weissbein and E. Roth, *Bibliographie des Gesamten Sports* (Leipzig: 1911).

94. Siegfried Weissbein, *Hygiene des Sports* (Leipzig: Grethlein and Co., 1910), 2 vols.

95. This is credited as being the world's first sports medicine organization. See for example, Wildor Hollmann, "Entwicklung der Sportmedizin in Deutschland," in K. Tittel, K. H. Arndt, and W. Hollmann (eds.) *Sportmedizin: Gestern-Heute-Morgan. Bericht von Jubilaum-symposium des Deutschen Sportarrztebundes, Oberhof, 25. bis 27. September 1991* (Leipzig/Berlin/Heidelberg, 1992), pp. 22-31; Hoberman, "Sports Medicine in Germany," p. 240.

96. Gertrud Pfister, "Sports Medicine in Germany and Its Struggle for Professional Status in the Weimar Republic," paper presented at the Pre-Olympic Congress, Dallas, TX, 1996. See also, Hoberman, "Sports Medicine in Germany," pp. 240-242.

97. Carl Diem, *Die Deutschehochschule für Leibesübungen* (Hannover: Der D. H. F. L. Gestiftet von der Continental - Caoutchouc - und Gutta Percha - Co., n. d.).

98. Pfister, "Sports Medicine in Germany."

99. See, Jack W. Berryman, *Out of Many, One: A History of the American College of Sports Medicine* (Champaign, IL: Human Kinetics, 1995).

100. Arthur Kieth, *The Engines of the Body* (London: Williams and Norgate, Ltd., 1926).

101. Steven M. Horvath and Elizabeth C. Horvath, *The Harvard Fatigue Laboratory: Its History and Contributions* (Englewood Cliffs, NJ: Prentice-Hall, 1973).

102. Interested in learning the reasons for American successes in early Olympic games, in 1913 Carl Diem (with three of his countrymen) had visited the United States to observe first hand the reasons for America's domination in Olympic track and field events. Diem subsequently brought Alvin Kraenzlein (gold medal winner in 1900) to Berlin to give short-term training courses to aspirants for the 1916 Games. See, Dietrich Quanz, "The Impact of North American Sport on European Sport and the Olympic Movement," paper presented at the International Symposium -- Sport. . . The Third Millennium, May 21-25, 1990, Quebec City, Canada.

103. Adolphe Abrahams, "On the Physiology of Violent Exercise in Relation to the Possibility of Strain," *Lancet,* 214 (1928), pp. 429-435.

104. The original name of F.I.M.S. See, Ryan, "Medicine," p. 628. The constitution set forth three major purposes: (1) "to inaugurate scientific research in biology, psychology, and sociology n relation to sport; (2) to promote the study of medical problems encountered in physical exercises and sports in collaboration with various international sports federations; and (3) to organize international congresses on sports medicine to be held during and at the site of the quadrennial Olympic Games."

105. F. J. J. Buytendijk (ed), *Ergehnisse der Sportärztlichen Untersuchungen bei den IX. Olympischen Spielen in Amsterdam 1928* (Berlin: Verlag von Julius Springer, 1929).

106. J. Van Breemen, "Short Review of the Origin of the International Congress on Physical Education and Sport," *Compte Rendu, Congress International d'Éducation Physique et de Sport, Amsterdam, 1-4 Août 1928* (Amsterdam: D'Oliveira, 1928), pp. 54-55.

107. Ibid., pp. 10-11; 55.

108. F. J. J. Buytendijk, "Conférence d'Ouvrture," *Compte Rendu, Congress International. . . Amsterdam,* 25-36.

109. John MacAloon, "Sport, Science, and Intercultural Relations: Reflections on Recent Trends in Olympic Scientific Meetings," *Olympika: The International Journal of Olympic Studies,* I (1992), pp. 1-28.