Despite the tragic events in Munich, which weighed on my heart, I could not stop thinking about what I had seen during my visit to the East German Olympic training facility in Leipzig. Perhaps it was merely a protective thought process to focus on a positive future rather than the terrible past, but I was determined to find a way to create a system where we could train American athletes and attain higher performance levels for competition against the East Germans and the other Soviet bloc countries. Those countries used a communist system as the foundation and operational protocol to conduct their programs. The administrators, coaches, and athletes operated under a regimen of total discipline directed from the top down to the athletes. The philosophy of complete devotion to the State governed the people and their system.

In the United States of America, the land of freedom and capitalism, people would never tolerate such a system. You could never take children away from their parents and give them to the state to raise and train them. No American parent would allow their young children to be housed and trained in a special “state program”. In addition, Americans athletes are too free in their attitudes and mental perceptions to train in a method with military-type discipline, without flexibility, or in the shadow of “don’t ask, just do it” directions.
In the Western world, our freedoms are jealously guarded. What system, then, would work for us? I knew that better technology would help and, in fact, I had already demonstrated the efficacy of my biomechanical motion analysis technique. Not only was it effective within the American system but, as I had discovered in Leipzig, the East Germans thought the motion analysis technique was good! However, just having the ability to analyze athletes biomechanically was insufficient for producing Olympic quality athletes. They needed an entire support structure of housing, food, training facilities, and coaching, in addition to the scientific contributions such as physiological and biomechanical techniques.

The East Germans and Russians also utilized pharmacological agents to augment performances. The US would not engage in these areas for many reasons, not the least of which was the illegality and safety issues involved. In addition, it would be an anathema to the Olympic idea of healthiness, the optimization of human performance, as well as human and national dignity to be tainted with drug use. Application of technology and technique improvement could achieve the desired performance goals without having to rely on pharmacology.

Another significant disadvantage that Western athletes faced was financial. Every Olympic athlete had to be an “amateur” in order to compete in the Games. State sponsored programs, such as the East Germans provided, were not considered to be violating this restriction since the athletes were not paid to be there. Apparently, free food and lodging, in addition to financial support for their parents were not evaluated by Olympic officials as “payments” and, therefore, they could participate in the Games as amateurs. Many of their athletes were members of their armed services which also provided the illusion of “amateurism”. The Soviet Union's ice hockey team could train year-round since all of them were Army personnel.

Unfortunately, the same situation of state-sponsored athletic “camps” was impossible, at that time, in the United States and other Western countries. The rules governing am-
ateurism dictated that athletes could not be paid to perform their sport. Just as college basketball players are not allowed to receive money to play, student athletes must leave their university and play professionally in order to be compensated. It was the same situation with all Olympic sports: no money for playing. Needless to say, the US athletes were hard pressed to support themselves while pursuing their sport. Many were unable to pay for the mentoring and coaching they needed to excel and often they had to sacrifice their educational goals to find time to work to support themselves while they trained. All too frequently, athletic goals had to be abandoned in order to support their lives or remain in school.

Through my work, I have met many great athletes. Three of the greatest ones were Al Oerter, winner of four consecutive Olympic gold medals in the discus throw; Bill Toomey, the gold medalist in the decathlon in Mexico City; and Russ Hodge, 1964 Olympic competitor and the world record holder in the decathlon in 1966. Interestingly, Russ and his mother, Alice Arden Hodge, are the only mother-son Olympians in American history.

In the early 1970s, Bill Toomey was the head track and field coach at the University of California at Irvine (UCI). He invited me to UCI to demonstrate my methods of athletic evaluation based on the system he had seen me use with the Olympic throwers at Dartmouth College training camp. We became really good friends and Bill visited me a number of times in Amherst. We even had a number of joint business involvements.

Russ Hodge traveled to Amherst to meet me and learn about the biomechanical system I was using. Since CBA had received magazine and television coverage in addition to my presentations around the world at conferences, Russ was curious to see for himself.

It was in one of these meetings with Bill Toomey and Russ Hodge that the idea of an Olympic Training Center was born. I had frequently described my 1972 visit to the East German Olympic training facilities in Leipzig. Usually, I would become animated in the descriptions of how the United States trailed the East Germans and other Soviet bloc countries in training their athletes. I complained that the United States relied strictly on DNA to win events. There was so much talent in the U.S. but no one made any attempt to optimize the athletes’ abilities. On the contrary, they may have been born with superior DNA but the opportunity to maximize their talent was left to them to develop. In a smaller country with far fewer people than the U.S., the East Germans focused their efforts to harness science and nutrition into their training.

For hours, we discussed the future of sports in the United States. Bill and Russ both realized the advantages of the technology that I had to offer. So, Bill asked: “What are we going to do to make a Training Center come about? We need to approach the United States Olympic Committee’s director, Colonel Miller. If we proposed it as a Sports Medicine Center for the U.S. Olympians, perhaps he could be persuaded. It would really be helpful if we can find a physician to join us.”

It happened that I knew a doctor who had been a track athlete. I had met him in Israel in 1957 when I competed in the Maccabiah Games. The Maccabiah Games are held every 4 years as a Jewish Olympics, and Jews from all over the world travel to Israel to compete in this meet. In 1957, I was still in high school at Hadassim, but I competed in the youth class and won the discus throw. The then-famous American, Gary Jay Gubner, who lived in New York, won the shot put event. A medical student, Irving Dardik, won the 400-meter race. Irving and I met during the social events of the Maccabiah Games and engaged in general conversations about sports and Israel.
I was surprised to discover that both Russ and Bill were also acquainted with Irving Dardik. In these early years of the 1970s, Dr. Dardik was a famous cardiovascular surgeon. In fact, he had been nominated, with his brother, Herbert, and Ibrahim Ibrahim, for a Nobel Prize in medicine. As a cardiovascular surgeon, Dr. Dardik had searched for coronary bypass grafts that were sufficiently long, without holes, and compatible with human beings.

Through his medical experiences, Dr. Dardik knew that, following the birth of a baby, the umbilical cord was thrown away. It occurred to him that the umbilical cord would be a perfect solution for his bypass graft. The umbilical cord was long enough to serve as a graft, it had no holes or valves, and it had been “road-tested”, so to speak, for nine months. What Dr. Dardik and his team had to invent was a technique to delete or nullify the human identification so that any recipient could use it as an implant without causing rejection. They had successfully developed such a technique and, hence, the Nobel Prize nomination.

Although Dr. Dardik was a brilliant and successful medical doctor, at heart he was still very much an athlete. He had wanted to compete in the 1956 Olympics in Melbourne in the 400-meter dash. Unfortunately, he failed to qualify for the American team and planned to try for the 1960 Rome Olympic Games. He entered medical school which ended his dream of competing in the Olympics. “In those days, you couldn’t just leave medical school for something like running in the Olympics,” he would explain. Instead of achieving glory as a quarter-miler, he achieved fame as a vascular surgeon. But, as they say, “You can take the boy out of the city but you cannot take the city out of the boy.” Despite his joy and success as a physician, Dr. Dardik never lost his love for running nor his dream about the Olympic Games.

Russ, Bill, and I decided that the best way to convince Dr. Dardik about our idea was to show him the technology that we already used for athletes. We would invite him for a presentation in our Amherst office. Dr. Dardik was sufficiently intrigued about what we wanted to present that he was willing to come for a demonstration.
When Dr. Dardik came in the front door of our office, we saw a tall, handsome man. As the day progressed, all of us discovered that Dr. Dardik possessed an inquisitive and creative mind. I gave him a full presentation of what we were doing, and Al Oerter told him how our scientific methods had helped him to throw much better, even at an older age. Al said:

"When I was 42, sports scientist Gideon Ariel determined that I could throw 75 meters without any problem, if I just maintained the acceleration that I began within the actual throw. In 1984, at the age of 47, I went even further using his technology. I was working with him and it was very hot and I started to get more and more angry because of camera problems that day. I pushed harder and harder for every throw and started landing the discus on the hill and then on the other side. They tried to measure it and found that it was 217 feet to the base of the hill, which was 15 feet high, and finally measured my throw to be around 245 feet long!"

In addition to the description of success from Al, Russ remarked about his improvements. We presented the successes and improved performances that had resulted from the biomechanical analyses of other athletes. Dr. Dardik responded enthusiastically about the idea of better training for the U.S. athletes and he liked the technology which CBA had been using to analyze people, products, and their interactions.

All four of us were committed to the health of athletes in addition to the opportunity to help them improve their athletic skills. Dr. Dardik foresaw medicine as being preventive, before many others did, and so he liked the idea of a center where everyone was working toward optimum health. We shared the ideal that positive-health related ideas developed in the Training Centers would flow to the general public. These goals were in addition to helping the U.S. athletes achieve Olympic victories.

After a long day of sharing ideas and considering many alternatives on how to proceed, the decision was made to approach Colonel Miller with our ideas. Dr. Dardik and I contacted Colonel Miller and, based on the credibility and
successes in our respective fields of expertise, he agreed to meet us in New York City. At that time, the home office of the United States Olympic Committee (U.S.O.C) was in New York.

Shortly after our meeting in Amherst, Dr. Dardik and I met Colonel Miller at the Algonquin Hotel in Manhattan. Colonel Miller was a tall handsome athletic man of military bearing, but warm and upbeat. He listened intently to our vision for success for the American athletes and the plan we proposed to accomplish the task.

I described the scientific focus that the East Germans used for training in their Leipzig Center as well as their other, more secret, locations. Although the United States is a huge country in size and population compared to the East Germans, the East Germans were far superior to the Americans in the support and preparation given to their athletes. The East Germans had decided to make athletic success a national priority and then set the plan into motion.

Americans athletes had to fund themselves, their training, and even pay their own expenses to travel to competitions. Unless they had rich parents or spouses to support their athletic efforts, they were “out in the cold” as far as support. Compared to the East Germans, the U.S. only gave attention to our American athletes when they paraded into the stadium during the Opening Ceremonies. During the intervening four years, the American athlete was left in the wilderness, with no support.

In addition to what I had seen in Leipzig, I explained the wide variety of options that we could and should provide to our own athletes. I presented our vision for a U.S.O.C Training Center that would rival anything that the Eastern bloc countries had. Our ideas were based on quantification of the sport and the athletes in conjunction with proper training, coaching, fitness, and nutrition, but we would excel without the use of any performance-enhancing drugs. These goals could best be achieved in a focused, supported living and training environment, such as the Olympic Training Center idea that we were proposing. It seemed to me that I had spent a lot of time on this Olympic training soapbox, but perhaps this time someone would hear my plea and be able to do something to affect it.

As the meeting progressed, Colonel Miller became increasingly excited about the idea. He was as frustrated as we were about the continuous defeat of American athletes by, seemingly, everyone. He told us that the statistics showed that the United States had dropped from first to third place in the overall medal standings. Colonel Miller wanted the United States to be strong and successful. This desire was more than just part of his job. Success grew and developed from a deep sense of honor and loyalty which he felt for the United States.

Colonel Miller also had to be practical so he posed many of the obvious questions such as, where to establish the first center, and how will it be funded? He pointed out that even a good idea costs money and, in addition, there had to be organizational infrastructure to operate the Center. These were legitimate questions. The first order of business, however, had to be the willingness to recognize the need and to accept the challenge. If and when the decision was made to proceed, the questions and solutions could be addressed with a dedicated organizational will to accomplish them.

Colonel Miller agreed with our ideals and goals. He was as determined as we were to provide more and better opportunities to the American athletes. As the Head of U.S.O.C, he was obviously the best man and in the right place to get things done. He appointed Dr. Dardik as the Chairman of

Squaw Valley Olympic Training Center
http://arielnet.com/ref/go/1159
Sports Medicine Committee and I became the Chairman of Sports Science which included physiology and biomechanics. Colonel Miller’s task was to organize the structure and funding for the U.S.O.C Center, which would be put in place, as soon as an appropriate site was selected.

I immediately contemplated about what should be incorporated in the Sports Science Committee. How should it be organized and who should direct the separate areas? Another critical factor was to coordinate each area and focus on the primary task of helping the athletes. It would need to be emphasized repeatedly that this was not a university study project but rather a joint project for all the disciplines to help the athletes excel in their sports.

For the biomechanics portion of Sports Science, my extensive personal experience as an athlete, a coach, and a biomechanist was immediately applicable. To begin working with athletes immediately, despite the lack of a U.S.O.C Training Center, I thought that we could use the existing CBA facility in Amherst to analyze the athletes. After a permanent site was established, we could move the biomechanical quantification abilities there. It would obviously be more efficient to have all of the Sports Science departments in the same place and at the location where the athletes lived and trained. In the meantime, I would use our own facility for providing biomechanical analyses of athletes.

Initially each athlete would be filmed in his/her event. If possible, the film would be obtained during actual competition since this was the most realistic representation of the performance. The subsequent biomechanical analysis would include a comprehensive report for the athlete with a specifically prescribed training program for performance improvement. Also, corrections could be given, where appropriate, and computerized optimization programs would allow the athlete to estimate the performance potential. Other recommendations could be included such as comments regarding specific fitness routines for that sport or athlete, physiological testing schedules, as well as anything that appeared to be reasonable for improvement.

The biomechanical analysis would include comparisons to world-class athletes in that sport. This would provide both the athlete and the coach with comparative information. Hopefully, the athlete would be inspired to attain the same or a similar technique, as well as having a performance target. After all, what athlete does not want to exceed what the gold medal winner or world record holder had scored.

The athlete’s coach would receive a separate report with special considerations for that individual. Seminars would be held at the training centers to address the athletes and the coaches on the findings in their sport. In addition, seminars for coaches would be provided to facilitate inclusion of the scientific method of analysis into their coaching procedures.

Training on the Universal Gym equipment
http://arielnet.com/ref/go/1160

I sent these proposals to Dr. Dardik and Colonel Miller and continued working on other projects while I waited for their responses. Ironically, during the interim, I was conducting research on ski boots. In order to collect the data on ski boots for the Salomon Corporation, we had to travel to Squaw Valley, California.

Squaw Valley is located west of Lake Tahoe in the Sierra Nevada Mountains of California. Squaw Valley and its place in history are due primarily to the efforts of Alexander Cushing. In 1946, after returning to a Wall Street law office following service in the Navy during World War II, Alexander Cushing took a ski vacation at Sugar Bowl where he met Wayne Poulsen, a former skier and developer of Mt Rose. At Poulsen’s invitation, Cushing toured Squaw Valley and agreed to invest in a project to develop a ski resort there. By 1948 Poulsen and Cushing had formed a partnership and in 1949 the resort opened with a double chair, a rope-tow and a 50-room lodge. The partnership didn’t survive the first
winter, and Poulsen left to develop the real estate he owned in the valley, while Cushing stayed on as chairman of the ski lift company.

Cushing envisioned a vast and varied resort on the European model and was determined to build it quickly. He installed ski lifts up every peak within reach which meant that Squaw opened super-steep terrain that would have been considered prohibitively dangerous anywhere else. Top skiers loved Squaw's cliffs and its immensely varied and occasionally challenging snow conditions. The steep terrain drew the attention of photographers and film-makers like Warren Miller who spent a couple of winters there in the early days and helped to popularize the resort.

As Squaw Valley's chairman, Cushing's spirit was tested more than once. The resort's first chairlift, Squaw One, was destroyed by avalanche each year for its first three years. The fourth year of operations there was a devastating flood, and during the fifth year, the lodge burned down. For many, these setbacks would have signaled the time to sell out. Instead, Mr. Cushing surprised many by securing Squaw Valley as the site for the 1960 VIII Olympic Winter Games, beating internationally regarded resorts competitors such as Innsbruck, Austria, St. Moritz, Switzerland and Garmisch-Partenkirchen, Germany. Cushing's campaign succeeded through the power of an idea—conjuring the Olympic ideals of simplicity with a focus on athleticism and diversity. His
bid, written in French, English, and Spanish, declared that “the Olympics belong to the world. Not just one continent.”

In February of 1960, over 800 athletes and 30 national teams competed in the VIII Olympic Winter Games at Squaw Valley. The first televised Olympics, the 1960 games brought international publicity to the Lake Tahoe region and sparked interest in winter sports and California skiing.

Cushing modeled the resort after European ski destinations. He re-engineered the model of traditional U.S. ski resort by locating a swimming pool, ice rink, roller disco, and restaurants on the mountain instead of at the base. His designs also brought the most advanced lift technology to the U.S. for the first time. When Squaw Valley opened, its Squaw One lift was deemed the longest double chairlift in the world.

Thus, in the mid-1970s, when I traveled to Squaw Valley to film skiers for our Solomon ski boot project, I was thrilled at the opportunity to visit the site of the 1960 Winter Olympics. Squaw Valley is a breathtakingly beautiful area with a wide valley surrounded by mountains. In the summer, the meadows and slopes were covered with green and abundant wild flowers making the valley into a wonderland of nature at its best. During the winter, the valley became a sparkling white winter wonderland with brightly colorful skiers everywhere.

During some of the ski boot tests, I had the chance to meet the owner of Squaw Valley, Alexander Cushing. His manager, Mr. Black, who was from Australia, had been quite helpful to us with filming the skiers in Squaw Valley. While we were having lunch one day, I suddenly had the inspiration to ask him about the potential of Squaw Valley becoming the location for our Olympic Training Center. He listened to my ideas and surprised me by responding that he would discuss the matter with Mr. Cushing.

I called Dr. Dardik and told him about my conversation with Mr. Black. We were both very excited about this promising lead. I gave the phone number to Dr. Dardik and he immediately called Mr. Cushing. A meeting was arranged and then things progressed rapidly.
After a few meetings in New York with Colonel Miller and a visit to Amherst to my laboratory, the dream materialized. An official Olympic Training Center in Squaw Valley was established to coach, train, and provide living quarters for athletes on a permanent, year-round basis.

There were dormitories for more than 300 athletes and the spacious dining room facilities were open 24 hours per day. Billiard and ping-pong tables, as well as a small outdoor swimming pool, were in almost constant use. A soft drink machine dispensed free beverages such as water and electrolyte drinks.

The strategy was for athletes to come to Squaw Valley for two-to-three week sessions periodically during the year. This would allow them time to maintain their ordinary lives and, hopefully, work schedule. For those athletes who needed a permanent base for living and training, they could live full-time at the Squaw Valley Camp. The flexibility of schedules was achievable with a permanent base of operation which the Squaw Valley facility afforded. Athletes could be analyzed during their residency using the biomechanical technology provided through CBA along with the exercise physiology tests. Additional tests could be conducted in the physiology department which was under the direction of Dr. Fritz Hagerman.

The Squaw Valley Center had previously focused primarily on ski related events. The nature of skiing as a recreational sport meant that the sport itself provided sufficient exercise for the participants. Therefore, the center had only minimal weight training equipment available for the incoming Olympic athletes. For these world-caliber athletes, the training facility needed a major overhaul in size and environment. It also needed many new and varied exercise equipment.

I contacted Harold Zinkin, my old friend at Universal Gym. I described the situation as it currently existed and told him that this was an opportunity for Universal to contribute to American athletes. In addition, it would be a feather in their advertising cap to be able to claim that their equipment was being used at the official United States Olympic Training Center where top athletes trained on Universal Gym exercise equipment. Harold immediately said, "Agreed". Under the supervision of Ed Burke, who was both an employee of Universal and also the former American record holder in the hammer throw, the Squaw Valley Olympic Training Center possessed one of the most sophisticated exercise training rooms in the world.

Colonel Miller, Dr. Dardik, and I eagerly contacted everyone that we could to find funding, equipment donations or any type of corporate sponsorships. We talked with people that we knew personally, and followed every lead in an effort to create the best training facility for the American athletes. Fortunately, there was more patriotic fervor in the population at large after some of the recent drubbings that the U.S. teams had experienced. This attitude was something
that many corporations could use to their advantage in advertising so we were successful in getting almost any necessary equipment. Companies like Universal, Yager, Cybex, and others donated their best equipment to the Center. It was a wonderful confluence of interests with athletes benefiting from the equipment and the companies being able to advertise that the best American athletes at the U.S.O.C Training Center were using their products.

Dr. Dardik, with his gold medal in medical achievement, gave tremendous credibility and confidence to our concept. With my contributions in biomechanics and Colonel Miller as Head of the U.S.O.C., the three of us were in constant demand for interviews. We tried to use every forum available to spread the word. Our goals were to attract the athletes to train at the center, and to garner support from individuals and corporations. We wanted the entire world to know what our vision was and how we hoped to achieve it.

As we had planned, one of the Olympic Sports Medicine Committee’s major roles was to analyze and study the body as it related to the sporting event performances which were contested in the Olympic Games. One of the purposes of the training center was to bring together various experts from all over the country with different areas of expertise and pool their resources. The idea was to gather, process, and use as much information from many different areas. The synthesized information would be provided to the athletes, coaches, and trainers to maximize training and performance. Also, the center would be used as an educational institute with medical and scientific people continually rotated through Squaw Valley. They would bring knowledge into the center and, in turn, return to their home institutions with the new knowledge they had acquired. I was specifically assigned to the area of biomechanics and Dr. Fritz Hagerman was assigned to the area of physiology.

After a few successful months of operation with several teams that came to the training center and with staff hired to run the camp, Dr. Dardik was assigned to assemble his Sports Medicine Committee. At the first meeting of the Sports Sciences Committee under the chairmanship of Dr. Dardik, I was appointed to be in charge of biomechanics. The other six-committee members included: Tenley Albright, Allan Ryan, Tony Daly, Dave Costill, Alan Singer, Leroy Walker, and Don Hanley. Each of the individuals represented different athletic organizations related to sports and athletes.

One of the first decisions made by the new U.S. Sports Medicine Committee was for the U.S.O.C to open three regional training centers by the end of 1977. Squaw Valley, California was the first center. Other sites in the East and Midwest were being evaluated. The regional training centers would be self-sufficient units that would be able to accommodate a number of sports simultaneously. Training facilities, room and board, staffing and the necessary services would be under the control of the U.S.O.C. Consideration would include seasonal weather since the goal was for both winter and summer sports to be supported. Several specific targets for development and training were established at this initial meeting. They included:

1. Athletes would be selected from all levels of ability (elite, junior, novice, and introductory level) and they would be screened at the pilot project level for participation in a training center.
2. Activities that would be included in the training center concept were: short-term intensive training of athletes who were members of teams readying for competition, clinics with practical experience opportunities for athletes, coaches, judges, and officials, and specialized development camps for ath-

Hal Connolly
letes, competition (both domestic and foreign) for athletes training at the site.

3. The regional training centers would be the hub of gathering and disseminating information related to the newly introduced U.S.O.C Sports Medicine Program. The Sports Medicine concept would include studies, research, and programs in exercise physiology, biomechanics and kinesiology, nutrition, sports psychology, and medical services (orthopedic and internal medicine). Studies and research at the regional centers would provide factual information concerning the use of bee pollen, anabolic steroids, blood doping, and other elements that had been purported to have beneficial effects on performance. The Sports Medicine Program would also have the responsibility to correlate the information gathered from various research programs and determine its effects on preventing athletic injuries as well as its effect on preventing diseases common to the American public. The medical staff would inform the athletic and medical community about their findings concerning training, diet, methods of preventing athletic injuries, and effects of training on preventing diseases. It would be clearly stated that any and all pharmacological elements were never permitted.

In general, the U.S. Olympic Committee’s Sport Performance Division delivers focused, applied and performance-impacting sport science, technology and medical services to America’s top coaches and athletes. Headed by Alan Ashley, the team was comprised of experts in nutrition, biomechanics, medicine, physiology, strength and conditioning, psychology and performance technology. Using cutting-edge technology and revolutionary training techniques, the division was second to none in providing resources to further athlete development. The unique, collaborative structure allowed experts to share insights and knowledge across sports and throughout disciplines. In turn, this made the U.S.O.C. more targeted and effective in developing game-changing programs that enhance athletes’ ability to reach their true potential and excel in international competition.

In its first year, the U.S.O.C. Training Center in Squaw Valley operated with impressive success. As the official Chairman of Biomechanics for the United States Sports Medicine Committee, my assignment was enormous. I was responsible for biomechanically analyzing every sport and every athlete who came to the training center. I conducted hundreds of studies for many teams athletes. Since there

Analysis of the hammer throw
Chapter 12: The Olympic Connection

were no computers at Squaw Valley, I used the equipment in our CBA facility in Amherst to analyze the athletes. High-speed film was taken at the training center, and then flown to Amherst for analysis. In Amherst, we expedited the work so that the analyses were rapidly processed and the reports were taken back to Squaw Valley for the coaches to present to their athletes.

One important requirement regarding the biomechanical analyses was for the athletes and coaches to receive the reports before leaving the center. Following a presentation of the biomechanical results, a seminar was conducted with each team to discuss the results and to design the training program based on the quantified results. This process of evaluation, analysis, and planning was to be repeated every few months.

One of the first studies was to analyze the women's basketball team. My team and I then went to work analyzing various team sports such as volleyball, baseball, soccer and others. We also analyzed individual sports in track and field, including events such as the shot put, hammer throwing, and javelin. Several studies were performed for the cyclists. Some of the water sports were included such as canoe, scull, and kayak rowers.

Before the remarkable successes by the East German and other Soviet bloc countries, the U.S. had dominated most of the track and field events. America was a huge country with an enormous wealth of raw, natural talent. The sheer number of gifted athletes had sufficed to win gold at the Olympic Games. However, with the advent of focused training, nutritional and pharmacological enhancements by the Eastern countries, the U.S. fell behind. As I had told Dr. Dardik and Colonel Miller, unless we help to develop our athletes with skills, technique improvements, and nutritional guidance, we would continue to lose to other countries. With the U.S.O.C Training Centers finally a reality, America had the chance to recover its athletic greatness, and once again win Olympic medals.

One of the events that the U.S. had enjoyed success in previously included the hammer throw. For many years, the United States held the world records in the hammer throw because of Hal Connolly. As the last American to win the Olympic gold, in the 1956 Melbourne Australia Games, Hal Connolly had dedicated his life to the hammer throw. It was his goal to see America once again among the world's best in this event. Hal Connolly's athletic career was amazing. He transformed himself from a young handicapped child outside of Boston to a household name around the world. He devoted his career to helping young athletes in track and field events, including his two sons, who were also successful hammer throwers.

In the years following Connolly's 1956 Olympic victory, however, the American hammer throwers had failed to throw distances comparable to those of their Soviet and Eastern bloc counterparts. At the 1976 Montreal Olympic Games, no American exceeded the qualifying standard of 226 feet, while the Soviet Union had more than twenty-five athletes capable of heaving the hammer that distance. One reason for this discrepancy was the use of scientific analysis by the U.S.S.R. and the application of Newtonian physics. As I had repeatedly told everyone who would listen, and perhaps many who instantly became deaf, these approaches were the cornerstones of modern Eastern and Soviet bloc sports groups. Now, with the Training Centers and the renewed attitude of the U.S.O.C. hierarchy starting at the top with Colonel Miller, we were going to apply the same approach.

One of the methods the U.S.O.C. Training Center system could employ was to work with athletes and coaches by conducting educational and analytical sessions. These training
sessions, as well as arranging a competitive setting for many of the track and field events, were techniques that would give support to the athletes in both technical skills and make them aware of the newly developed, positive attitude of the Olympic Committee.

In August 1978, the U.S. Olympic Committee organized a hammer-throwing clinic in Houston, Texas and invited a group of national class American hammer throwers to participate. Attending the clinic were some of the best American throwers currently competing in the hammer throwing event: Ed Arcaro, Emmitt Berry, Andy Bessette, John McArdle, Dave McKenzie, Midles, Perkins, Satchwell, and Silvario. Comparison of the throws of these athletes was made with those of the top six finishers in the preceding 1976 Montreal Olympics. The Olympic athletes analyzed in order of finish, beginning with the gold medalist, were: Yuriy Syedikh (Russia), Aleksey Spiridonov (Russia), Anatoliy Bondarchuk (Russia), Karl-Hans Riehm (West Germany), Walter Schmidt (West Germany), and Jochen Sachse (East Germany). For the purpose of comparison, the lone American thrower, Larry Hart, finished fifteenth among the twenty finalists. Clearly, the U.S. had a challenging task to try to regain its competitive credentials.

At the Houston clinic, CBA’s equipment was used to film the athletes and the film was sent to the Amherst office. The biomechanical portion of the study focused on comparing the single support phase of the third turn and release between the Olympic competitors with those of the athletes at the U.S.O.C. Houston clinic. Another important question considered in this study was the hip-shoulder relationship during the turns. The cinematographic approach to this problem involved consideration of segment length. A third focus was to perform separate digitization of the implement itself (the hammer head). This process allowed for the determination of the instantaneous linear velocity, acceleration, and angle of release.

The results were predictable, as well as unfortunate for the American athletes. Compared with the Olympians, the American throwers were slower in completing each turn in every rotation. However, several clinic throwers achieved as
much acceleration in the transition from the second to the third turn as did the world-class throwers.

All of the Olympic athletes spent more time in the double support phase of the first and second turns than in the single support phase. The gold medalist, Syedikh, demonstrated a double support phase longer than his single support phase in the last turn and during release. He was able to achieve this extended double support phase by placing his right foot in a toe-to-heel relationship with his left foot, while the other throwers placed their feet adjacent to each other as shown in the diagram on page 258.

The foot placement and the deeply flexed knees also allowed the gold medalist to establish and maintain a positive center of gravity in the direction of the throw. This positioning improved his balance and his throwing technique which contributed to his increased velocity of the hammer at release. Continued movement of the athlete's center of gravity in the direction of the throw, as evidenced by the Olympic competitors, is an extremely important component of throwing technique. If the body-hammer system moves forward early in the throwing sequence, it can ultimately reach a higher horizontal velocity.

The shorter throws of the American athletes reflected the relatively low velocities during the turns and low linear velocities of the hammer during the delivery phase. An unexpected result, however, was their frequently high turning accelerations and consistently high linear accelerations of the hammer during delivery.

However, the extended double support phase exhibited by the Olympic athletes, most notably by Syedikh, probably contributed to the acceleration of the hammer. The longer both feet are on the ground, the more that force can be applied to accelerate the turning body.

The tangential velocity of the hammerhead is a product of its angular velocity and the effective radius of its path. Thus, it is important that the radius be as large as possible. Syedikh's lean toward the hammerhead, counterbalanced by deep flexion of the left leg and toe-to-heel placement of the right foot, maximizes the effective radius of the hammer's path. Most of the other throwers lean away from both the hammer and the direction of the throw.

These are merely short descriptive comments which were included in the longer report to the athletes, coaches, and the Olympic committee. The CBA staff collected the data and processed the information before sending the detailed analysis of every athlete attending the Houston Clinic. The athletes and the coaches were able to ask questions and confirm the details about their individual performances in addition to comparing their throws with the Olympic finalists.

Another group of athletes who attended the Houston, Texas Clinic, in addition to the hammer throwers, were the shot putters. Beginning in 1948 and continuing through 1968, the American shot putters had dominated the world stage. They had swept the medals for nearly 20 years, until 1972, when the results placed Poland on the top pedestal. In 1972 and 1976, American shot putters had failed to perform as well as their Eastern European counterparts. In fact, in the 1976 Olympic Games, no American was present on the winners' stand for any medal.

Attending the clinic were currently some of the best American throwers in the event, including Al Feuerbach, who had finished in 4th place in the Montreal Games. Other throwers participating in the clinic were Peter Shmock, Dave Laut, and ten other athletes. Comparison of the throws of these athletes was made with those of the top six finishers in the 1976 Montreal Olympics in the same manner as the biomechanical analyses performed on the hammer throwers.

The biomechanical analysis revealed that the most important factor in shot putting is the velocity of the shot at re-

See "Table of Contents" or "Index"
lease. This factor was found to be more important than either the height or the angle of release.

The biomechanical study also incorporated the use of a force platform. This equipment was particularly useful in determining the forces applied to each leg during the shot put action. The most striking result of the force platform analysis was the discovery of the roles of the rear push-off leg and the front breaking leg. In the push-off phase, there was only a small horizontal force on the rear leg while the vertical force reached approximately 560 pounds. This indicated that the rear leg provided a lifting force but minimal pushing force in the direction of the throw.

Another characteristic which differentiated the U.S. athletes from the Olympic competitors, was the vertical pattern of the center of gravity. In most cases the clinic throwers raised the body prematurely during the gliding and transitional phases.

The acceleration curves showed that the clinic throwers had less dynamic strength relative to their Olympic counterparts. We recommended specific exercises which would more efficiently contribute to their throwing techniques. The athletes and coaches were excited to receive the information they gleaned at the clinic and all enthusiastically requested future training sessions.

The figures on page 259 represent the best European shot putters at the time. These computer-generated stick figures were made with the computer technology available in 1976. It is ironic that biomechanical analysis and subsequent graphic representations executed on a million-dollar mainframe in 1976 can now be processed on a $100 computer, an iPad, or any modern smart-phone. However, it should be remembered that what can be shown or analyzed with biomechanical processes are based on actual human performances. Computerization can assist the person to be better, but only the athlete can perform.

One last example of the Biomechanical Committee’s work with Olympic athletes was with the javelin throwers. Long ago, during the era between the Mycenaean Times and the Roman Empire, the javelin was a commonly used offensive weapon. Being lighter than the spear, the javelin was thrown rather than thrust and thus allowed long distance attacks against one's enemy. Today’s athletes, however, used javelins that were much lighter than military ones because the idea of the event was to demonstrate distance rather than penetration.

The javelin throw has a particularly strong tradition in the Nordic nations of Europe. Of the 69 Olympic medals that have been awarded in the men’s javelin, 32 have gone to competitors from Norway, Sweden, or Finland. Finland is the only nation to have ever swept the medals at a currently recognized official Olympics and has done so twice: in 1920 and 1932.

One of the world records of the past was thrown by the American Al Cantello (1959). Not since 1971 had any American javelin competitor exceeded 91 meters and only a handful have even thrown as far as 85 meters. America is a nation of throwers, but of baseball pitchers and football quarterbacks. The small European countries, such as Finland and Hungary have excelled in some of the other areas of throwing, such as the javelin, and have dominated the Olympic winners stand.

In addition to these differences in sport participation, American javelin throwers did not conform to the typical physique pattern found in their European counterparts. As a whole, Americans were larger and stronger. Regardless of the physical differences between the American and European javelin throwers, skill, technique, and strength in the plane of motion affect the final ballistic motions of hand and javelin. One of our biomechanical tasks was to discover the best technique for the athletes we had and how could they compete successfully against their European competitors.
Unlike other throwing events, the javelin competition allows the athlete to build speed over a considerable distance. In addition to the core and upper body strength necessary to deliver the implement, javelin throwers benefit from the agility and athleticism typically associated with running and jumping events. Thus, these athletes share more physical characteristics with sprinters than with other, larger athletes such as those throwing the hammer and shot.

Traditional free-weight training was standard fare for javelin throwers. Metal-rod exercises and resistance band exercises have been employed to train a motion similar to the action of the javelin throw in order to increase power and intensity. The extensive training focused on flexibility and loading the arm-shoulder areas to develop strength. Without proper strength and flexibility, throwers can become extremely injury prone, especially in the shoulder and elbow. Core stability can help in the transfer of physical power and force from the ground through the body to the javelin. Stretching and sprint training are used to enhance the speed of the athlete at the point of release and, subsequently, to the speed of the javelin. At release, a javelin can reach speeds approaching 70 mph.

In August 1978, the U.S. Olympic Committee conducted a javelin-throwing clinic, and invited a group of national class American throwers in Houston, Texas. Attending the clinic were some of the best American throwers currently competing in the event: Jace Derwin, Tom Petranoff, Bill Schmidt, and Bob Roggy. Comparisons of the throws of these athletes were made with those of the six top finishers in the 1976 Montreal Olympics. The Olympic athletes were analyzed in their order of finish, beginning with the gold medalist: Miklos Nemeth (Hungary), Hannu Siitonen (Finland), Gheorghe Megelea (Romania), Piotr Bielczyk (Poland), Sam Colson (U.S.A.), and Vasyl Yershov (Russia).

Biomechanical procedures were followed with the javelin throwers in the same way as had been applied in the other field events of discus and hammer. Following the computer processing of the data, the information was sent from Amherst to Houston to present to the athletes and coaches.

One area of interest was to compare the center of gravity locations of the two groups. The American throwers decreased the velocities of their centers of gravity during the throw more rapidly than any of the finalists in Montreal. The Olympic finalists averaged a 43 percent decrease in velocity, from the time of rear foot impact during the release step phase, until the moment that the javelin was actually released. The Houston clinic throwers, however, averaged a 55 percent decrease in velocity for this same phase of the throw.

A second aspect of the study was the javelin itself. Measuring the attack positions of the thrower’s javelin revealed unexpected results. The relationship to the throwing plane to the angle of attack differed markedly between the two groups. The Olympic throwers averaged 30 degrees out of the plane. Only Tom Petranoff, at the Houston camp, rotated his javelin more than 20 degrees out of the plane; Bob Roggy and Jace Derwin were at approximately 15 degrees; and Bill Schmidt, the straight-line thrower, at zero degrees.

A third factor was the velocity of the javelin. It would be expected that the velocities of the Olympic throwers would be greater than the Houston throwers and this expectation was verified. All the velocities produced by the Olympians at the moment of release were greater than the Houston throwers.

The source of the difference between the two groups was found to be in the method or style of delivery. The Houston throwers produced a constant velocity from the time they initiated the throw until the release and, therefore, no acceleration of the javelin was produced. The Olympic athletes, however, achieved tremendous accelerations. The two distinct styles of throwing can be likened to spiking a volleyball (American) or throwing it (Olympians). In all the cases listed above, as well for every analysis we did, we suggested exercises to remedy the differences.

Our analysis yielded fantastic results. In a matter of a few months, all of the athletes improved their results in all events that we analyzed. Our successes were very significant and the athletes and coaches were more than pleased with the procedures and practices that were now being provided by the U.S.O.C.

Thanks to our successful operations at Squaw Valley and other camps, such as those in Houston, the training center was becoming too small. The Squaw Valley Training Center’s living accommodations could not handle the number of athletes who wanted to attend, the dining room struggled to serve all of them in a timely fashion, and the location was prohibitively far for the athletes living on the East Coast. Thus, the U.S. Olympic Committee began looking for a more suitable site.

As things transpired, Colonel Miller learned that the U.S. Air Force Academy in Colorado Springs was moving to another location. However, when the Air Force left the Colorado Springs site, the necessary facilities for a better Training Camp than Squaw Valley would become available. It sounded too good to be true.

Colonel Miller, Dr. Dardik, and I traveled to Colorado Springs to tour the facilities. We could see that there was plenty of room to support the existing training camp and plenty of room to expand. We all agreed that this was a good place to move and grow. Thus the Olympic Complex, former home of ENT Air Force Base and the headquarters of the North American Defense Command, officially became
The Discus Thrower and his Dream Factory

Gideon Ariel & M. Ann Penny Ariel

The U.S.O.C administrative headquarters in July 1978. The Colorado Springs site still exists today, and provides housing, dining, recreational facilities and other services for as many as 557 coaches and athletes at one time at the complex.

Our first job was to move the laboratories from Squaw Valley to the new location. Committees and various leaders in the field gathered together to plan the move and select the proper staff. These included administrators, coaches and scientists to begin the operation. It was a grand operation but soon the entire training camp was up and running at its new home on the slopes leading up to the beautiful Rocky Mountains.

Dr. Dardik continued as the Chairman of Sports Medicine and I was appointed for a full quadrennial of 4 years as the Chairman of Biomechanics. My appointment was extended during several different quadrennial periods until after the conclusion of the Los Angeles Olympic Games in 1984. The work of Chairman required a tremendous commitment and extensive amounts of work but, having been an Olympian, I felt that it was worth the extra effort for the athletes. At least they had an advocate who had been there and understood what they were experiencing.

Our Biomechanics Committee was swamped with as many biomechanical projects as we could possibly handle but we lacked enough proper equipment. For one thing, we needed an on-site computer at the Colorado Springs Center to run the analysis. It was inefficient to collect the data in one place, ship it to the CBA laboratory in Amherst, and then return the results to Colorado Springs. We needed a powerful computer in Colorado Springs. The big question was how were we going to get it with a budget of zero funds?

Suddenly, while I was driving one day on Route 9 from the office to my little house, I had an inspiration. At that time, CBA used a Data General Nova-3 Computer in our laboratory in Amherst. The Data General Nova-3 was a mini-computer that, ultimately, served as an interim step between the massive mainframe computers, like Honeywell and Control Data, and the soon to be introduced desktop computers of IBM. At that time, the two main competitors in the mini-computer market were Digital Equipment Company (DEC) and Data General.

During these early days of mini-computers, I took courses at the Data General headquarters in Worcester, Massachusetts, which was located on Route 9. Twice a week I drove back and forth on Route 9 between our office in Amherst, and Data General, located fifty miles eastward.

In those days, computers were a new phenomenon and were much more complicated to operate than anything we have now. For example, just to power up the system, the operator had to learn a complicated toggle switch procedure. Today, the operator merely has to turn on the power switch and the internal software does the remaining steps. That complicated toggle switch procedure was one among the many other things that were required to operate the computer. Times have changed greatly since those early computer days! I was fascinated by the computer and the myriad things that could be accomplished with this modern miracle. I took extensive notes in the classes, studied them diligently during the week, and tried to absorb everything about our computer and the ways to improve our software. For me, it was a love affair with a machine.

Since I traveled to Worcester for the classes, I had become very familiar with the personnel and the hardware. I also learned that Data General was planning to introduce a new computer called “Eclipse”. One day after working with Ariel, I decided that I would make a bold and unique proposal to the President of the company, Mr. Edson De Castro. I did not discuss this idea with anyone, nor
Chapter 12: The Olympic Connection

had I made an appointment. I just went to his office on the third floor and knocked on the door. A secretary opened the door and I asked her if I could see Mr. De Castro. She looked at me as if I were crazy.

"Do you have an appointment?" she asked me.

"No, unfortunately, I don’t have an appointment. However, my company bought a Data General Computer and I am here taking the classes that Data General provides to people and companies like me. But the reason I need to see Mr. De Castro is as a representative of the athletes of America. The United States Olympic athletes need his help. I am the Chairman of Biomechanics for the United States Olympic Committee and I believe with all my heart and mind that Data General and America can make a good, rewarding relationship."

She told me to wait for a minute and quietly shut the door. Several moments later, she came back and invited me into what turned out to be Mr. De Castro’s office. Mr. De Castro was also the chief engineer who had envisioned the Eclipse. He was a fantastic engineer and pushed for many of his own ideas. Some of his concepts included support for virtual memory and multitasking which were suitable for a small office environment, like CBA’s. Not only was the Data General system fast, but the new Eclipse was packaged differently so that it looked like a tall, sleek, blue refrigerator.

Mr. De Castro gestured for me to sit and asked me what he could do for me. Although my heart was pounding and I was sure that he could hear it thundering, I began, “Mr. De Castro, I use your computer, the Nova-3, in my own company, Computerized Biomechanical Analysis, Inc. or CBA. We conduct studies for many companies on their products and are currently heavily involved with the United States Olympic Committee. We conduct studies on U.S. athletes, and recently we moved the U.S.O.C. Training Center from Squaw Valley to Colorado Springs. Currently, CBA has to do all of the computer work at our office in Amherst, but this is extremely time-consuming and inefficient for the athletes waiting in Colorado Springs for their results. It would be much more efficient if the Olympic athletes had a computer on-site in Colorado. Obviously, the best computer possible, in my opinion, is the Data General and the new Eclipse would be perfect. I will install my company’s proprietary software for the biomechanical analysis at no cost, if you will give them the computer.”

When I finished talking, I sat politely and waited for his response.

He sat quietly for a few minutes and then asked for some contact information. He jotted my phone number and address and said that his staff would contact me. I thanked him very much and left. I assumed that nothing would happen but after all, “nothing ventured, nothing gained.”

The next day I received a call from Mr. Howard Steiner, the Public Relations Manager of Data General. He told me that he had read the article in Sports Illustrated and would like to visit me at the CBA office. We set up the meeting, and two days later Mr. Steiner walked into our office. We gave him an extensive presentation of what we did, how we conducted the projects, and showed some results on several of the Olympic athletes. Clearly, he was very impressed by what he saw in our CBA laboratory. The call took place and Colonel Miller must have been convincing because Data General sent him the following letter:

May 7, 1979

Colonel F. Don Miller, Executive Director

See “Table of Contents” or “Index”
Biomechanics in the service of athletes
by Françoise Coffrant,
Director of the periodicals “Arc” and “Arc International”

The Medical Commission of the International Olympic Committee has informed all delegations and athletes who are going to take part in the Olympic Games in Moscow that the “anti-doping” tests will be particularly strict. Everything must be done to discourage the use of doping substances.

The American delegation for its part has acquired a highly perfected data processing plant designed to improve the performance of athletes during training. Colonel Miller, who is in charge of this plant, stated last September that he was also relying on his country’s technology to prepare the Games.

To improve performances without doping is the task set himself by Gideon Ariel, a former athlete and now professor at the University of Massachusetts, who has been studying the human body with the help of computers for about ten years now.

Helped by the company which markets the instruments, he has recently agreed to supervise the training sessions specially prepared for the United States Olympic Committee.

Gideon Ariel, born at Tel Aviv in 1940, is far from unknown in sports circles. He was a member of the Israeli Olympic team at the 1960 Games in Rome as well as the 1964 Games in Tokyo, throwing the discus in which he is still holder of the record in Israel.

After his military service in Israel, he won a scholarship to Wyoming University. He then attended courses at the University of Massachusetts where he obtained a doctorate in data processing. Having becoming an American citizen and a professor, he founded a biomechanical analysis company at Amherst in Massachusetts.

This company, CBA—Computerized Biomechanical Analysis—the first research company specialising in this type of study, was created for the specific purpose of improving top-level athletic performances. Encouraged by the results, CBA has during the last years widened its field of research to include industrial products, sports equipment, safety precautions at places of work.

In actual fact computerised biomechanical analysis existed before Ariel: it will be remembered that the Swedish scientist Ingvar Fredericson studied the movements of horses for 10 years and discovered that the hindquarters were submitted to almost dangerous strains on racetracks that were a general rule too hard in the straight sector.
Dear Colonel Miller:

Thank you for taking time out from your busy schedule to meet with us last week. We are very pleased and enthusiastic about your response to our concerns about the planned implementation of the Data General Computer System.

We believe that your decision to make Gideon Ariel responsible for the implementation of the S/250 Computer system insures that it will be operational in the shortest amount of time.

I have received your executed copies of the Data General field service and program license agreement. I have been in touch with our field service organization and it will be handling this installation on a priority basis.

It’s my understanding that the installation of air conditioning equipment will begin because the computer room was measured last week at 30 degrees F. Given the substantial heat dissipation from the computer and related peripheral equipment the installation of air conditioning equipment will be essential to the reliable operation of the equipment.

With the time required for this preparatory work as well as the development work going on at Dr. Ariel’s laboratory, the System will be operational in Colorado Springs by approximately July 15.

We would like the U.S.O.C to announce our donation on June 4 in New York City in conjunction with the National Computer Conference. Also, we would like very much for you to participate with us in making this announcement at the 21 Club of The Four Seasons.

In July, we then could follow this up with a press tour of the laboratory. If this proposal is agreeable to you, I would like to immediately begin planning with your staff.

Data General announced the news regarding the donation and the publicity tour in their quarterly newsletter. It was actually a good arrangement for everyone involved. Data General would be able to generate news stories about the donation through the U.S.O.C. rather than relegating it
to an advertising segment. The U.S.O.C. could use the publicity to stimulate excitement about the athletes and their activities as well as promote the need for additional equipment. Although the Olympic Committee could do little to generate funds to support the athletes, they could authorize the use of the Olympic rings. Fortunately, many companies wanted to display the rings on their products and take advantage of the advertising opportunities. For this reason, Colonel Miller, Dr. Dardik, and I were optimistic that there would be many new and useful donations in the near future.

The United States Olympic Training Center would receive a very powerful computer. The athletes could take advantage of the biomechanical analyses on-site in Colorado Springs. The time which had been wasted communicating with the CBA laboratory halfway across the country could now be more productively utilized with additional analyses.

I was excited about the Eclipse system at the Colorado Springs Center but, as they say, there is no free lunch and this computer donation came with strings attached. I would have to travel to European and American cities to tell the Data General / Olympic story.

For CBA, it was a wonderful opportunity to describe our services in forums around Europe and in the U.S. Data General would organize the advertising campaign, cover the travel and publicity expenses, and I hoped to garner new projects for CBA.

The introduction of the Eclipse S/250 occurred at the National Computer Show in New York City in 1979. The Data General publicity staff created a beautiful and futuristic booth with the computer and ancillary hardware to demonstrate our biomechanical analyses. Al Oerter and I were present at this event. It was an exciting honor to work with Al. Al and I demonstrated how the computer helped the American athletes in their quest for gold at the Olympics. In Tracy Kidder’s book, The Soul of a New Machine, he described the race for the construction of the best and most powerful mini-computer of the time and included the presentations Al and I made at the New York Convention.

The donation of the Data General computer to the U.S.O.C immediately made exciting news headlines. The Data General marketing machine was nothing short of miraculous. They arranged for the introduction of the donation to be made by Colonel Miller and me on NBC’s Today Show with Tom Brokaw.

To create a spectacular publicity event, I convinced Data General, NBC, and Tom Brokaw that we should conduct a biomechanical analysis on Tom Brokaw. We would perform a biomechanical comparison between the styles of running
of Tom Brokaw and Bill Rodgers, who was the American record holder in the marathon. Track and Field News ranked Bill Rodgers as number one in the world in the marathon in 1975, 1977, and 1979. Of the 59 marathons which Rodgers ran, 28 were run under 2 hours, and 15 minutes. In all, he won 22 marathons in his career. He came to be referred to by sportswriters and others as “Boston Billy” because of his many successes in the Boston Marathon. We set a filming date for the two athletes to race on the running path through Central Park in New York City.

The day of the race could not have been more perfect for running and filming. It was a crisp spring day with a brisk breeze blowing and the sun shining brightly. We had found an appropriate area in New York’s Central Park which had a path for joggers and runners. Many New Yorkers trained on this path which circled the park through trees, past the lake, and shared the area with people riding bikes as well as equestrians. The location we found was flat, straight, and had no trees which would block filming Tom and Bill as they ran past us.

In their appropriate running gear, Tom and Bill sped past the cameras as fast as they could run. Ann and I filmed numerous simultaneous sequences from two cameras with which we could produce three-dimensional results. The two men seemed to enjoy the opportunity to “work” outdoors on a beautiful spring day. In addition, Tom expressed his pleasure that we had him run first so it appeared that he was ahead of the premier marathon runner!

Suddenly, some horses cantered past with their riders clearly enjoying the spectacle of our filming project. With another one of my inspirations, I asked the riders if we could film them to compare equine with human gaits. With a great deal of laughter, the men and the horses chased each other on the running trails, while we filmed the events. I believe it goes without saying that this was the first time that the head and star of the Today Show had ever been compared running against the premier American marathoner and some horses! I kept in touch with Mr. Brokaw for many years since this event and I continue to admire him as a person and in his profession. Mr. Brokaw was and remains one of the most brilliant and humble broadcast journalists anywhere.

After our exhilarating day of data collection in New York’s Central Park, Ann and returned to Amherst to process the data. After we had acquired the biomechanical analyses on Tom, Bill, and, of course, the horses, we arranged with Data General for the opportunity to present the information. The Data General advertising staff scheduled a time for Colonel Miller and I to appear with Tom Brokaw on the Today Show.

See "Table of Contents" or "Index"
The Discus Thrower and his Dream Factory

Gideon Ariel & M. Ann Penny Ariel

The Today Show appearance would provide Colonel Miller with a forum to publicly thank Data General and explain what a wonderful donation it was for the Olympic athletes. I was able to describe the biomechanical techniques which would be performed on the new Olympic system by using the biomechanical analysis we had performed on Tom, Bill and the horses. Mr. Brokaw was enthusiastic about the donation and seemed to enjoy the comparisons made. Mr. Brokaw and I crossed paths several times after this initial event and he has always amazed me with his humor and the depth of his insight into situations.

The Data General Eclipse S/250 was installed quickly in the specially designed biomechanics laboratory at the Colorado Springs Training Center. I arranged to have one of my former University of Massachusetts undergraduate students, Rocco Petitto, come to work under my direction at the center. Mr. Petitto had worked with me and executed hundreds of biomechanical projects on athletes during the previous three years while he completed his undergraduate degree. He was extremely talented and more than qualified for the position. There were many athletes and coaches at the center at that time so Mr. Petitto was busy all day, every day.

Since Data General had announced their donation to a world-wide audience, it was easier to approach and convince other companies to make contributions to the U.S.O.C.

One of many contributions came from the Megatek Corporation. Megatek manufactured a graphics terminal that could calculate 3D coordinates provided by our CBA software. The results of the interaction of our software and their hardware allowed visual presentation on the screen of the motions of the athlete in 3-dimensions. The processor on the system was so fast that the athletes appeared to move in the normal manner of their sporting motion. It allowed athletes and coaches to examine the performances of stick figure forms. The ability to study how the body moved, without the distractions of clothes or background scenery, was extremely useful as a coaching and learning technique.

Data General wanted the U.S.O.C. computer donation to have as much publicity as possible. Since the Colorado Springs biomechanics lab could function with Mr. Petitto coordinating the athletes and conducting the research, it was unnecessary for me to be there for as many days as previously required. The same held true for CBA since Ann and the staff could conduct the research needs that we had at that time.

Data General, therefore, quickly arranged events which portrayed their system in ways that contributed to the improvement of the athletes and, obviously, enhanced their own image. Knowing that the U.S.O.C. and CBA were in capable hands allowed me the time to fulfill my obligation to Data General. Their staff organized events for me to present the biomechanical uses as well as to convey the excitement of working with the Olympic competitors.

From June through the end of August, 1979, I appeared on television news programs up and down the Eastern Coast of America. In addition, I was a contributor to several national programs, including National Geographic and The Human Body. There were radio and newspaper interviews across the country. I was even sent on a European city tour which began in England, then moved on to Sweden, Germany, Italy, and France. Fortunately, Data General had excellent publicity staffs in the U.S. and in Europe, so I only had to make my presentation. There were so many days of presentations and questions from the audience of news reporters that I usually had no idea of what city I was in at that moment. The trip became a blur of airports, hotels, and presentations. From the point of view of Data General, it was well worth the effort. I was pleased as well since the Olympic athletes were finally receiving some recognition and, more importantly, help in their sporting skills.
 Needless to say, these presentations were also fantastic for my own company. With each presentation, I was able to introduce myself and the services of CBA to a wider audience than I would otherwise have been able to reach. I really had not planned this symbiotic relationship, since I sincerely had wanted to find a way for the Colorado Springs Biomechanics Laboratory to have an affordable computer. I never thought of myself as a marketing genius. But the advertisement of my system by a third party, at their expense, was clearly a dream come true. CBA had managed to get all this exposure without having to find and expend advertising dollars. I was then and remain today a scientist who will spend money on equipment, software, and personnel, but not on advertising. However, we were thankful to be the beneficiary of Data General’s advertising. Some of the newspaper coverage is shown above.

During the time that the U.S.O.C. was relocating from Squaw Valley to Colorado Springs, CBA was heavily involved in the analysis and improvement of shoe designs. We studied many different sports and the interrelationship between the body, feet, shoes, and surfaces. The sports ranged from basketball, baseball, archery, cycling, and all the track and field events. This hefty amount of research resulted in extensive meetings with designers, engineers, and company directors to evaluate our results and create new and better footwear. As we sat around the CBA conference room table one day, I had another one of my crazy ideas!

“How would your company like to put the Olympic rings on all of your shoes?” I asked the head of sales of one of our clients.

“Of course, we would be ecstatic to use the Olympic rings, but it is impossible for us to get them,” he replied.

“How much would you be willing to pay, per pair of shoes, for the rings?” I replied.

After a short thoughtful pause, he responded, “I would estimate one dollar per pair would be a fair amount since we would have to adjust many other overhead considerations. The fee would basically be like a royalty or franchise fee. However, we have no way to obtain permission to use the Olympic rings,” he continued.

My answer was a big smile. I knew that I would only need to persuade Colonel Miller and I believed that the dollar figure might be sufficiently large to do just that. This company had the exclusive license for importing shoes from South Korea. In the 1970s almost all shoes, particularly sporting types, were made in Korea. Thus, millions of imported shoes, at one dollar per pair, would be a fantastic way to support the biomechanics and other scientific laboratories at Colorado Springs. With such a healthy influx of funds, Colonel Miller could avoid some painful cost cutting in order to support the center. In addition, as had Data General, the shoe company could benefit from the enhanced publicity of helping America’s athletes.

The contract was signed in short order with both the U.S.O.C and the shoe company happy with the results. The funds were used to expand and improve the Biomechanics Center, to hire some additional personnel to assist Mr. Petitto, and to purchase some additional necessary hardware.

Everything seemed to be perfect but there is an axiom stating that “rain should fall on the parade.” All of my work with the U.S.O.C had been completely voluntary. Ann and the entire CBA staff had worked on Olympic projects for years without compensation. CBA had paid any of our staff members who performed on behalf of the athletes or the Olympic committee. We had never requested nor received money from the Olympic Committee for their work. Larry Graham, our partner in the company, supported this uncompensated support since he was as patriotic and compassionate of the American athletes as we were. Companies that had donated their equipment to the U.S.O.C. had not paid me...
or my company any type of compensation. These companies had given their products just as I had given my software, staff time, and my own efforts for the benefit of the athletes. Unfortunately, jealousy is an evil beast.

Because of my very visible role in the Olympic effort, some of the professors at various universities began an ugly rumor suggesting that there must be a conflict of interest. For example, the head of the biomechanics department at Penn State, Richard Nelson, complained to the U.S.O.C. that it was a conflict of interest that Gideon Ariel was the Chairman of Biomechanics for the Olympic Committee while owning and operating his private company. A Professor at UCLA, Bob Gregor, who coincidentally was Nelson’s student, made the same claim. Not surprisingly, other university scientists joined the clamor.

My attorneys and the lawyers for the U.S.O.C. informed me that there was absolutely no conflict of interest. Many people volunteered directly to the Olympic Committee and hundreds of individual sporting programs participants earned their livings apart from their philanthropic work. Without dedicated entrepreneurs, there would not be an American Olympic program because the organization existed only because of the volunteers and the donations. I was told to ignore the criticism, but it was a painful experience and the bitterness continues even after all these years. It seemed so unfair for the people who did nothing to help the U.S. athletes to mount nasty, spurious attacks.

The biomechanics laboratory at Colorado Springs now needed additional staff members to compliment Mr. Petitto. Since I was only a volunteer and could not be present all the time since I ran my own company, Colonel Miller, Dr. Dardik, and I decided to hire a professor from the University of Illinois, Dr. Chuck Dillman. At that time, Dr. Dillman was a well-known biomechanist and he would be the Director of the Biomechanics laboratory. We also felt that the addition of a few more students from various universities beside Mr. Petitto and under the guidance of Dr. Dillman was a necessity.

Thus, the U.S.O.C. Training Center, with my directions to Dr. Dillman and Mr. Petitto, began to produce many important projects which helped the American athletes improve their skills. By providing a location where they could live, eat, train, and hone their skills, the level of competitiveness was raised significantly. Since the U.S. athletes were now engaged against stronger and more focused competitors from other state-sponsored programs, we had to try to use and discover every edge available to us. Hopefully, the Colorado Springs Training Center would be able to continue to find funding, build databases and laboratories, as well as continue to utilize the biomechanical strengths, as we had established.

The U.S.O.C. continued to receive news coverage from the major television and print media. Some of the stories and graphic materials of a few of the sports covered are illustrated on previous pages.

The 1980 Summer Olympic Games in Moscow were to be the first to be staged in a communist nation. Unfortunately for many athletes, President Jimmy Carter announced that the U.S. would boycott the Games as a protest against the Soviet invasion of Afghanistan. The United States and 63 other countries did not participate in the 1980 Olympic Games. Unfortunately, this decision not to compete was based on political rather than sporting reasons. It was unfortunate that this political decision interfered with the hopes and dreams of so many athletes throughout the World. It seemed a contradiction of the Olympic spirit which was to lay down arms, cease hostilities, and meet in the sporting area for athletic competition. Decision makers more powerful than anyone in sports, however, decided otherwise and the Moscow Olympics proceeded without the U.S. and many of her allies.

The next Olympiad was held in Los Angeles in 1984. No one was surprised when seventeen countries chose not to compete at the Los Angeles Games including fourteen in a Soviet-led boycott. Although the Western athletes were able to compete in an Olympic Game venue, it was disappointing that it was not the noble world affair that all the competitors hoped to enjoy. Without the Soviet-bloc countries, the U.S. won a record 83 Gold medals which broke the previous record of 78 from the 1904 Summer Games. But this was fewer medals than the previous overall record. Surprisingly, Romanian, China, and Yugoslavia—at the time ruled by communist governments—decided to compete and finished second, fourth, and ninth in the medal standings.

At the conclusion of the 1984 Los Angeles Olympic Games, the end of my second quadrennial term was approaching. My initial appointment had started in 1977 in Squaw Valley and continued to Colorado Springs. My second quadrennial term began in 1980 to overcome the difficulties associated with our non-participation in the Moscow Games. In 1980, Colonel Miller decided that Dr. Dardik and I would continue for an additional quadrennial term. It meant another four years of effort for me but, as usual, I wanted to do all that I could to help these American athletes perform to the best of their abilities.

A dream that had initially seemed to be impossible had been achieved beyond my greatest hope and expectation. The dream had begun with Bill Toomey, Russ Hodge and me in my small office in Amherst, Massachusetts. Discovering the indefatigable Dr. Dardik and linking with Colonel Miller, we had established the most advanced sports training center imaginable. I could happily hang up my hat now and move on with enormous pride in our accomplishments.
See "Table of Contents" or "Index"