The Country Boy—Jozef Pribilinec
By Ladislaw Krnac
(From the November 1989 issue of International Race Walkers Club Newsletter)

Three months before the Olympic Games in Seoul, Jozef Pribilinec, one of the most successful walkers of the eighties, the only gold medal hope of Czechoslovak track and field, made a surprising move. He wanted, and got, the green light from the leadership of the Army sport center in Banská Bystrica to practice alone, without his long time coach Kuraj Bencik. After 11 years, the athlete usually knows better than anyone else what helps his body and mind and what does harm. He needs a consultant and not a teacher with a cane in his hand. At the age of 28, Pribilinec mastered the risk of his decision and made it his way, preferring more speed work than endurance. Today, he is the first Slovak Olympic champion in track and field, and the first walker to better a time of 1:20 for 20 km at the Olympics. Afterwards, he gave no interview without praising the role of his coach, but every time added—"I fought on my own..."

Maurizio Damilano (Italy's 1980 Olympic gold medalist at 20 Km) told me, during the 1986 European Championships, that Pribilinec is the man with the most devastating kick of all contemporary walkers. The duel between Ronald Weigel and Pribilinec in Seoul proved that the successor to Frigerio, Dordoni, and Pamich was right.

Pribilinec has one sister and four brothers, but only he chose sport as the mainstay of his life. As a boy, he loved to ski around his native village of Kopernice in the mountains of middle Slovakia. He came to walking by chance. With entries full for every event of a youth meet except for the 10 km walk, he learnt, in just one day the rules and technique, and won in about 62 minutes. Winning over the motivation, Pribilinec, said goodbye to skiing. That happened back in 1977 when he was 17; 11 years later he was an Olympic champion.

What was the price? Earlier, knees not protesting, he managed 10,000 kilometers in a year, later reduced to around 7,500. He wrecked a pair of shoes after every 750-900 kilometers. During a race, he usually loses about three kilograms (6 1/2 pounds). He married in 1978 and his wife well understands solitude!
Gary Morgan leads Dave McGovern and Jeff Salvage in National 2 Hour in Cambridge, Mass. on October 8. (Photo by Elliott Denman.)

FOR THE DISCRIMINATING RACER (ALSO FOR WALKING BUMS)

Sat. Feb. 10 Women’s 3 km, Men’s 5 km, Toronto (C) 30 km, Portland, Oregon (D) 4 mile, Atlanta, 8 am (H)
Sat. Feb. 16 LA Times Indoor 1 mile (Qual. times: 6:45 men, 7:36 women) 8 mile, 4:15 (B)
Sat. Feb. 17 5 km, Atlanta, 9 am (H) 15 km, Long Branch, N.J., 11 am (L) 15 km, Tacoma, Wash., 9 am (C) 24:49
Sun. Feb. 18 5 and 10 km, Seattle, 8:10 am (B) 5 and 10 km, Los Angeles, 8:10 am (B) 15 km, Denver, 9 am (F)
Fri. Feb. 23 Masters Indoor 2 mile, Cincinnati, Ohio (O) National TAC Indoor Championships, 5 km, men, 1500 women (or 3 km women, I’m told that’s what the entry blank says, but national schedule says 1500), New York (G)
Sat. Feb. 24 Georgia 30 km Championship, Atlanta, 8 am (H) 30 km, Portland, Oregon (D)
Feb. 17–25 Arizona Senior Olympics 1500 meters and 5 km (E)
Sun. Feb. 25 Indoor 2 mile, Air Force Academy (F) 5 km, Stone Mountain, Georgia, 9 am (H) 5 km, Salem, Oregon (D)
Sun. Mar. 3 Los Angeles Marathon (B) 10 km, Denver, 9 am (F)
Sun. Mar. 4 Ohio TAC Indoor 1500, Columbus (K) 5 km, Atlanta (H)
Sun. Mar. 11 Western Zonal 20 km Championship, Long Beach, Cal. (B)

JANUARY 1990
FROM HEEL TO TOE

Northern California's JoAnn Nedelco and Southern California's Larry Walker were named the outstanding master's racewalkers for 1989 at the annual TAC/USA Convention in Washington, DC in December. Vissha Sedlak and Max Green were very close seconds. In addition, one walker was recognized for significant performances in each of the five-year age categories. These recipients were: Women: 30-34--Kathy Kinch, Wyoming; 35-39 Martha Iverson, Colorado; 40-44 Vishsa Sedlak, Colorado; 45-49 JoAnn Nedelco, California; 50-54 Jill Latham, Missouri; 55-59--Ruth Eberle, Missouri; 60-64 Viisha Sedlak, Colorado; 65-69 JoAnn Nedelco, California; 70-74 Jill Latham, Ohio and three brothers, 10, 8, and 3. The two oldest brothers also do racewalking. His address is: Kieran Strangman, 10 Carrodus Street, Fraser, A.C.T., 2615, Australia. Veteran subscriber Bob Mimm comments: "I agree with Leonard Jansen zero percent. His "hide your head in the sand" approach to the problems of race walking makes no sense. Ignore the problems and they will go away! There are problems, but they will only change with open discussion. Let's try to find out why one judge will give everyone in a race a call, while another judge will not. Let's find an electronic method of judging walking. Until then, let's not hide the problems. Besides, the controversy makes the exciting ORW even more interesting." On the same matter, Tom Knatt comments: "Why don't we require participants in races to (1) have a grease mark on the outside of each knee, applied before the race by judges, which will be straight when the participant's knee is straight and (2) have light colored (white or yellow) soles for race shoes to facilitate judging for lifting? Soles could be spray painted if they didn't meet the standard. We are short changing ourselves in racewalking by not being able to control the judging adequately. Money is available to most other track and field events because there is not as much controversy in the judging. If we find an electronic method of judging walking, Until then, let's not hide the problems. Besides, the controversy makes the exciting ORW even more interesting." On the same matter, Tom Knatt comments: "Why don't we require participants in races to (1) have a grease mark on the outside of each knee, applied before the race by judges, which will be straight when the participant's knee is straight and (2) have light colored (white or yellow) soles for race shoes to facilitate judging for lifting? Soles could be spray painted if they didn't meet the standard. We are short changing ourselves in racewalking by not being able to control the judging adequately. Money is available to most other track and field events because there is not as much controversy in the judging. If we find an electronic method of judging walking, Until then, let's not hide the problems. Besides, the controversy makes the exciting ORW even more interesting." On the same matter, Tom Knatt comments: "Why don't we require participants in races to (1) have a grease mark on the outside of each knee, applied before the race by judges, which will be straight when the participant's knee is straight and (2) have light colored (white or yellow) soles for race shoes to facilitate judging for lifting? Soles could be spray painted if they didn't meet the standard. We are short changing ourselves in racewalking by not being able to control the judging adequately. Money is available to most other track and field events because there is not as much controversy in the judging. If we find an electronic method of judging walking, Until then, let's not hide the problems. Besides, the controversy makes the exciting ORW even more interesting." On the same matter, Tom Knatt comments: "Why don't we require participants in races to (1) have a grease mark on the outside of each knee, applied before the race by judges, which will be straight when the participant's knee is straight and (2) have light colored (white or yellow) soles for race shoes to facilitate judging for lifting? Soles could be spray painted if they didn't meet the standard. We are short changing ourselves in racewalking by not being able to control the judging adequately. Money is available to most other track and field events because there is not as much controversy in the judging. If we find an electronic method of judging walking, Until then, let's not hide the problems. Besides, the controversy makes the exciting ORW even more interesting."
Two Styles of Race Walking—Which is Better?

by M. Kaimin, V. Tupa, A. Polozkov, A. Frukov, and N. Maikhailov

(Taken from Legkaya Atletika, No. 12, 1979 and No. 1, 1980) Most coaches teach their students a straight-legged foot-plant. Some believe that the minority, are confident that a bent-legged foot plant is more effective. In this style, the leg is straightened towards the center of gravity of the body, the vertical orientation of the leg. The question arises: What distinguishes these methods from each other and which is the most effective? In order to answer these questions, the authors ran an experiment, which involved one of this articles co-authors—an international-class Master of Sport equally skilled in both methods. Tensodynamography, electromyography, and stroboscopic stereophotography were used in order to record the walkers’ movements. The location of the stercameras was such that one of them covered the left side of the body and the other (simultaneously) the right. The walkers’ joints were marked with 21 neon bulbs, which flashed at a frequency of 56 times a second. The sportsmen were directed to walk at maximum speed with each method.

The analysis of the resulting data showed that the second walking style—a bent-legged foot plant—was more effective and more economical than the first (straight-legged), with practically identical space-time characteristics. (That is, the length and time of the cycle, the tempo, the speed of cycle, and the support time. The walkers were taking about 1.2 meter strides at a rate of 210 steps per minute).

This advantage is indicated primarily by the energy cost of the rotary movements of the 15 main segments of the racers’ body, converted into a 1-meter path. Both the total energy cost and the individual energy cost in each plane was less for the bent-legged (BL) foot plant than for the straight-legged (SL) plant. The largest differences relate to the angular energy expended on lateral movements. In turn, its decrease in the BL style is achieved mainly as a result of leg movements. In the BL style, the sportsmen places his feet closer to each other in the lateral direction: the distance between the centers of the ankle joints is 11.9 cm as opposed to 15 cm in the SL style. This decreases the lateral amplitude of leg movement during the period of the leg forward carry (airborne phase) and decreases the oscillation of the pelvis and the body’s center of mass in the same direction by 1.6 and 0.8 cm, respectively. In the sagittal plane (in the direction of walking), in which the main movements of the body segments take place, the main differences also relate to the energy cost. The primary energy cost (60 to 70 percent of the energy cost spent on rotation of the whole leg) in this plane occurs as a result of the contraction of hip-joint muscles. In the BL style, the energy cost in the hip joint is significantly less than in the SL style during the push-off phase, in which the flexor muscles are stretched, and the force moment is directed at thigh flexion and the support time. Finally, in the horizontal plane, the energy cost in the BL style is lower by a result of a lesser contribution of trunk and arm rotation, i.e., their movements are nearer to the sagittal plane than in the SL style.

The second position that characterizes the BL style positively is the amortization (shock absorption) of the athlete’s body during the foot plant. In the SL style, amortization takes place during the rock-over of the foot from the heel onto the whole of the foot along with the yielding movement of the pelvis downward in the frontal plane. In the BL style, the rock-over from the heel is accomplished in the presence of an extension-type force moment in the ankle joint, i.e., the foot drops down onto the sole by means of eccentric contraction of the knee flexor muscles. The main differences in the BL style are as follows: In the BL style at a greater angle relative to the ground, the foot drops onto the sole almost immediately. The force moment in the ankle joint is directed at flexion of the foot, i.e., the tension of the gastrocnemius muscles exceeds the tension of the anterior tibialis muscles. These facts are often interesting from the perspective of the problem of fatigue of the anterior tibialis muscles. It is known that these muscles are already (contraction) both during the period of support (during the rock-over of the foot) and during the period of the swing forward, in which the athlete dorsiflexes his foot. As a result, muscle fatigue of this unlucky muscle, have arisen in the search for the solution to this problem. One of these hypotheses consisted in reducing the workload on these muscles, changing the coordination of the walking technique would not be broken.

In the BL style, the work of the anterior tibialis muscles is sharply reduced, and the amortization work of the rock-over from the heel onto the whole foot is practically nonexistent. This resulted in an increase in the amortizational yielding movement of the pelvis in the frontal plane. In the SL style, the right hip joint was 5.7 cm lower than the left (when the foot was grounded). In the BL style, it was 8.3 cm lower, i.e., there was greater rotation of the pelvis in the frontal plane. The center of mass of the pelvis in the BL style increased its vertical oscillation insignificantly (by 0.3 cm); however, the compensatory movements of the upper part of the trunk led to a 0.9 cm decrease in its vertical oscillations. The above-mentioned pelvic rotations in the frontal plane not only did not increase the range of oscillation of the walker’s overall center of mass, but even decreased it.

We have clarified the primary differences between the two walking styles, and they give more preference to the bent-legged style of foot placement. However, voluminous material concerning leg movements during the course of the investigation—was possible to consider, in passing, certain questions that have much significance for understanding and improving race walking technique in general. First: which joint muscles bring about an increase in walking speed and what detail of techniques is the most “vulnerable”?

In a number of textbooks and manuals, the thigh is considered to be the prime mover during the support period. A comparison of the speed and the angular speed of the segments of the leg relative to the horizontal axis, the force moments in the joints, and the longitudinal component of the speed of the sportman’s overall center of mass, indicates that this one is not so.

In the first half of the deceleration phase, when the speed of the body’s overall center of mass is moving, and when the longitudinal component of the support reaction is directed direct to the walker’s movement, the force moments in the knee and ankle joints are directed at clockwise rotation of the leg and unidirectional with the rotational speed of its segments. The magnitude of the moments reaches extreme values: their coincidence with the vertical component of the support reaction indicates that they are directed at countering the peak of lateral impulses. The angle of the segments at the time of placing the heel on the ground. The active muscles, here, are the thigh extensors, whose tension contraction (contraction) provides the indicated direction of the force moments.

Further, in the deceleration phase, a force moment, directed at he flexion, arises in the hip joint; in the knee joint—there is a force moment directed at extension (in the BL...
style) and at holding the fully extended knee joint (in the SL style). It is evident that this phase coincides with the regular pattern of activity of the biarticular (two-joint) rectus muscle of the thigh—the thigh flexor and the extensor of the knee joint. In the push-off phase, the speed of the body’s overall center of mass begins to increase and the longitudinal component of the support reaction is directed laterally to the sportsman’s movement. At this same time, the flexor force moment in the knee joint increases, and the force moment in the ankle joint, directed at increasing the angle therein, increases.

These factors indicated that the thigh (Knee joint) and the hip joint muscles do not create the speed increase in the body’s overall center of mass. The knee joint is straightened (extended) nonmaximally in race walking, and its muscle work at maintaining this position. The main segment that is directly related to increasing a walker’s speed is the foot; and the main joint in the ankle joint, with its flexors—the gastrocnemius and soleus muscles. There is forced knee joint extension, from inertia and body weight forces, but the muscles of the hip joint are stretched and oppose these external forces. The work of the thigh (hip joint) extensors and knee flexors in the first half of the deceleration phase is capable of diminishing the magnitude of braking, i.e., of reducing the walker’s loss of speed.

Second: the question of the “weakest” link in race walking technique. In our experiment, we used weights on the distal part of the lower leg (1.5 kg) and on the proximal parts of the lower leg (2.5 kg) when planting the leg in the bent position.

The most vulnerable is the flexion in the hip joint in the take-off phase during the forward carry of the leg (flexor moment). When walking with weights on the distal parts of the lower leg, the force moment in the knee joint did not change; but in the hip joint, it almost doubled. In spite of this, the increase in the flexor moment was clearly inadequate in order to provide the previous time for the forward carry of the leg. Walking tempo and linear speed dropped to 199 strides/min. and 3.72 m/sec (from about 4.2).

When walking with weights on the proximal parts of the lower leg, force moments increased both in the knee joints and hip joints; and the tempo and speed dropped even more—to 186 strides/min. and 3.43 m/sec. The coordination of walking was not changed when using weights, and the drop in tempo and speed was determined by the character of the force moments in the joints. An exception was the fact that extensor force moments, characteristic of the SL style, appeared in the phase of the rock-over of the foot.

Consequently, there arose a need for an additional amortization mechanism and for increased tension in the anterior tibialis muscles as a result of the large inertial forces of the lower leg at the time of placing the heel on the ground. Naturally, the use of weights in the SL style increases the work and fatigue of these muscles even more. In summary, the use of weights accomplishes the task of diminishing the fatigue of the anterior tibialis muscles: it is necessary to increase their workload during the process of training so as to increase their functional capacities.

Conclusions:
1. Race walking with a bent-legged foot plant is more energy efficient than walking with a straight-legged foot plant.
2. The prime moving link in race walking is the foot.
3. The flexors of the hip joint are the most vulnerable muscle group. Weights on the distal parts of the lower leg can be utilized to provide a local increase in their functional capacities.
4. The problem of fatigue of the anterior tibialis muscles can be solved in two ways: either decrease their tension during walking (by using bent-legged foot plant) or increase their functional capacities by walking with weights on the lower legs.

On the next page: Elliott Denman’s gallery of great guys of the sport. Elliott’s captions are:
Top: A great American walker still officiating in his favorite sport... the one, the only, Paul Schell.
Bottom: Two of the all-time greats of American walking. Fred Brown (left), who has been “Mr. Walking” in the New England states for half a century, and Bruce MacDonald, of Port Washington, N.Y., American walking’s only 5-time Olympian (1956, 1960, and 1964 as competitor; 1968 and 1972 as manager). Where would we be without these guys! And, Fred is still competing. As we head into the ’90s, a salute is definitely in order.