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Anatomy of the Ankle Joint

Wilbur Bohm

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a Preventive

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Oldest and Best Physical
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at Louisiana Tech, at work on a
cadet, at the Athens, Georgia,
Pre-Flight School.



Something About the Anatomy of the Ankle Joint

By Wilbur Bohm

Athletic Trainer, Washington State College

WITH the article in this issue on *The Ankle Wrap as a Preventive* and with the one scheduled for March on *The Treatment of Ankle Injuries* by Fitz Lutz, it seems fitting to have before us some information on the anatomy of the ankle joint. I have used the drawings and some descriptive material from the *Training Room Manual*, published by the Cramer Chemical Company and wish to thank this organization for their permission to use it.

Diagram 1 illustrates the medial aspect of the bones of the right foot.

Your anatomy book will divide the foot into three parts, the tarsus consisting of seven bones, the metatarsus, five and the phalanges, fourteen.

From an athletic angle we divide the foot into two parts, the longitudinal arch extending from 1 to 6 and the transverse arch which includes the nineteen bones of the metatarsus and phalanges, and might also include all the bones of the tarsus except the talus and calcaneus which are shown as 1 and 2. In other words, there is an arch the length of the foot and another the width of the foot.

The keystone of this longitudinal arch is held in place at a, b, and c, by the plantar ligaments. The close relationship of this arch to the ankle joint stresses the importance of supporting it well, during the entire period of treatment, as well as for sometime after a sprain of the ankle joint, as a traumatic flat foot may result from an injury to this arch. It also makes it imperative to apply some form of good support to it, during the period lapsing between the removal and retaping of the injured ankle. Six or seven days after the application of adhesive tape to a part, the tape should be removed, and the skin left exposed to the air for twenty-four hours, before adhesive tape is applied to the part again.

Just above 2 are the tibia and fibula carrying the weight of the body. This weight is sustained and diffused by these two arches and when conditions are normal, freedom of action and buoyancy of carriage are the result.

One important thought to keep always in mind is that the two protruding, so-called ankle bones are not a part of the foot; one is an extension of the fibula forming the external malleolus, the other the tibia forming the internal malleolus.

The following articles will appear in the Trainers Section this spring:

Treatment of Ankle Sprains—Fitz Lutz.

Physiotherapy—Use of Heat Treatments and Whirlpool Baths—Bill Dayton.

Treatment of Knee Injuries—Mickey O'Brien.

Shoulder Injuries—Eddie Wojewski.

Hand and Wrist Injuries—Phil Hudson.

The arch, which is called the foot, is merely a carriage for these two bones and the body above, and may be compared to a saddle resting upon the back of a horse.

Another thought to remember is that an arch, called the foot, weighing about two pounds, carries a weight of approximately 165 pounds.

Diagram 2 illustrates a lateral aspect of the ankle. It is presented to show the

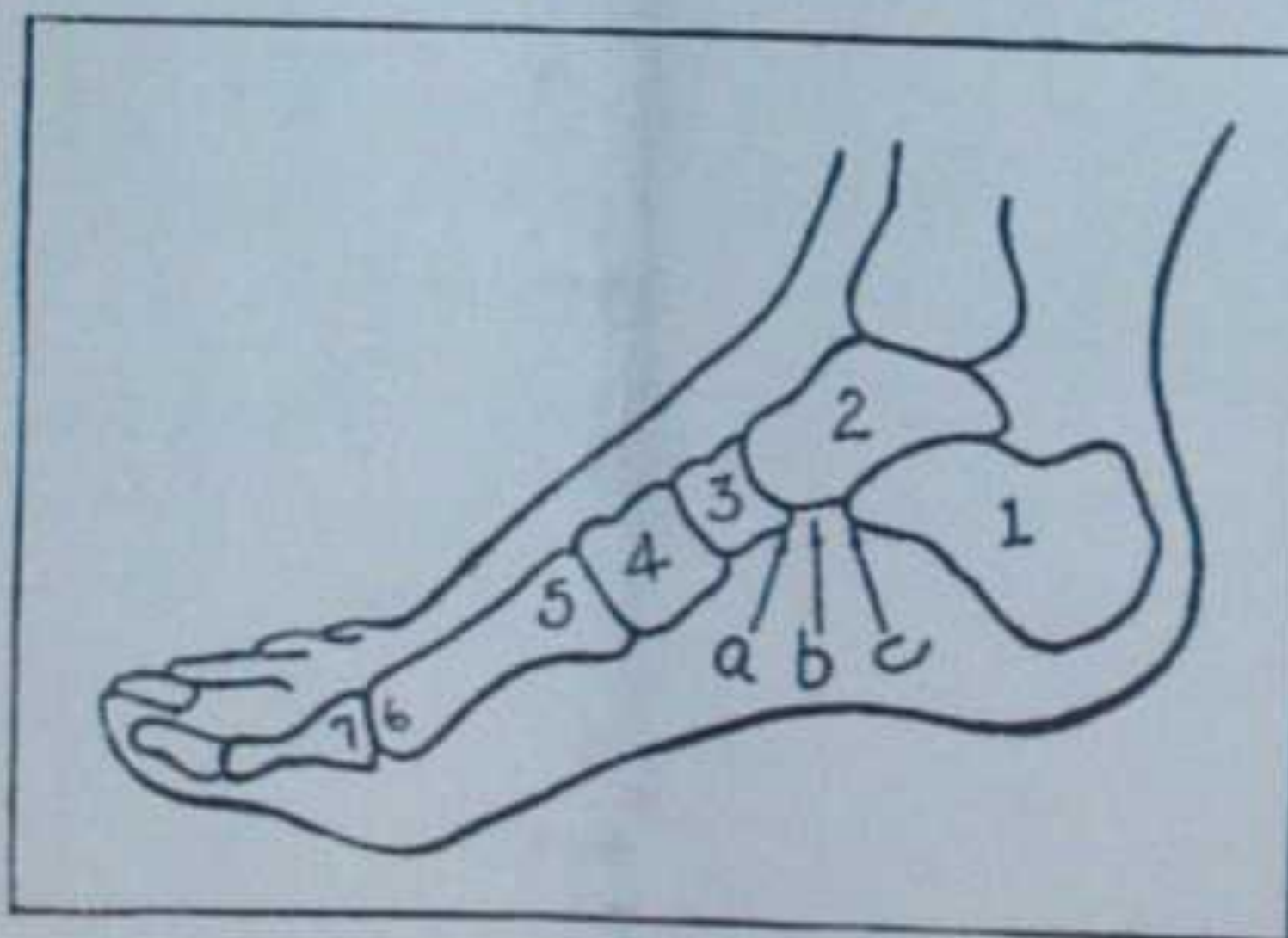


DIAGRAM 1

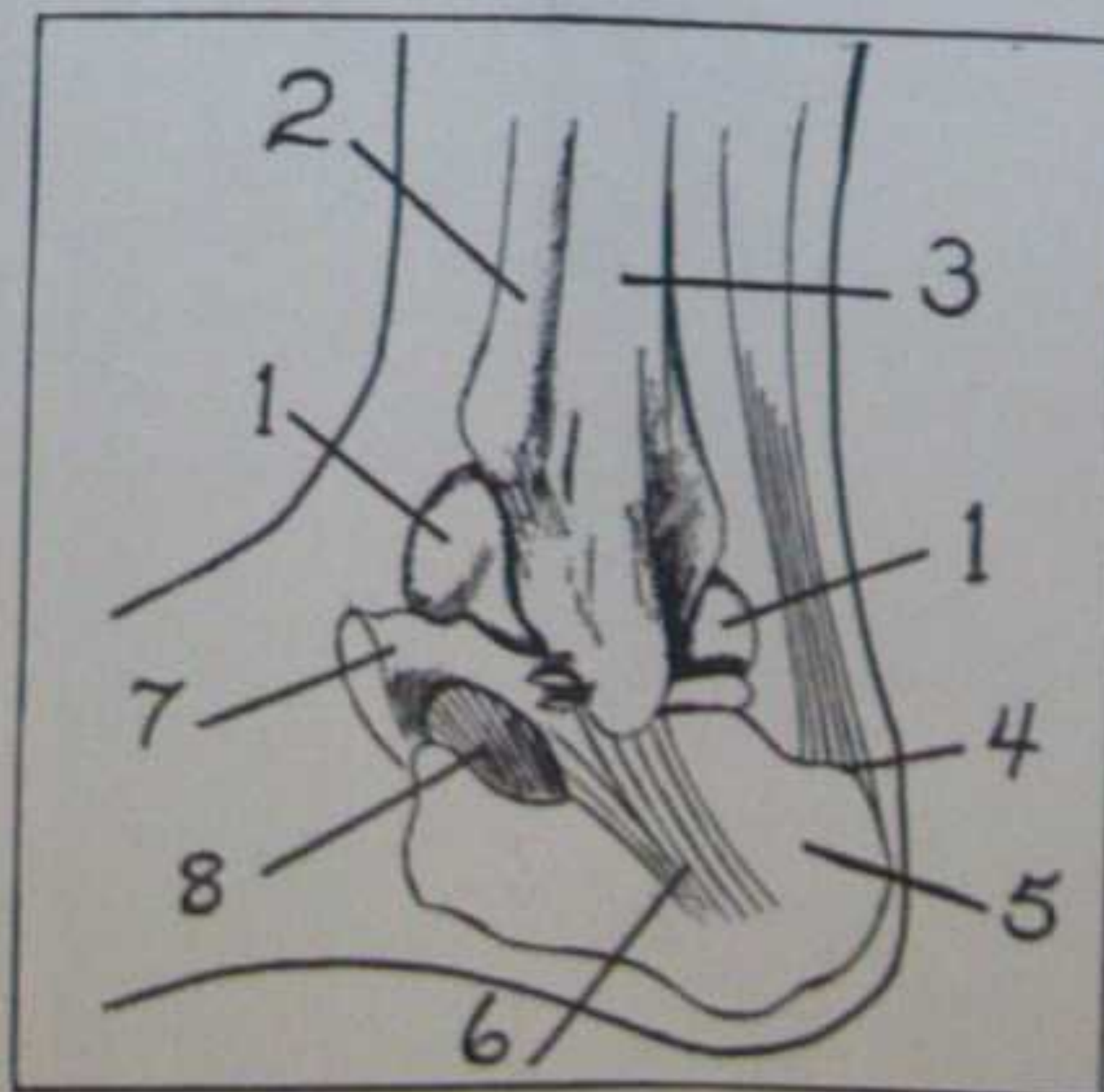


DIAGRAM 2

bursae with relation to the body structure. The two bursa, (1), serve as shock absorbers, as well as to prevent friction. They are fibrous sacs, lined with a synovial membrane, and when they are injured fluid is poured out by the cells in the membrane, and the sac is filled with fluid causing distention. A bursitis results. These bursae, as well as other bursae in the region of the ankle, may be injured in a sprain of the ankle joint. Hence, a bursitis is a common complication in the sprained ankle, the tibia, 2, and the fibula, 3. One of the most common complications of an ankle sprain, is a fracture of the lower end of the fibula, at a point about one and a half inches above the external malleolus, or at a point formed by the extension of the fibula down over the outside of the ankle. When not a complete fracture, it may be broken only partially through, and a so-called green-stick fracture results. This brings out the importance of having the sprained ankle joint X-rayed as a routine procedure.

In this diagram are shown the tendon of Achilles, 4; the calcaneus (heel bone), 5; the lateral talocalcaneal ligament, 6; the talus, 7; and the anterior talocalcaneal ligament, 8.

The synovial membrane invests the deep surfaces of the ligaments and sends a small process upward between the lower ends of the tibia and fibula.

Keep in mind the lateral calcaneal ligament, 6, on outward sprains. When it is stretched beyond normal, the synovial membrane is injured allowing fluid to flow out into the area.

Diagram 3 illustrates the medial aspect of the ankle and outlines some of the ligaments that may be injured: the talonavicular ligament, 1; the deltoid ligament, 2; posterior talotibial ligament, 3; the medial talocalcaneal ligament, 4; the posterior talocalcaneal ligament, 5; the long plantar ligament, 6; the plantar calcaneonavicular ligament, 7; the calcaneocuboid ligament, 8 and the medial cuneonavicular ligament, 9.

Keep in mind here that the deltoid ligament, 2, fans out over a large area and greatly restricts movement in an outward direction. When this ligament is strained or torn, it causes one of the most serious complications of an ankle injury. The particular ligament is composed of white fibrous tissue, which has a poor blood sup-



DIAGRAM 3

ply, and as a result it takes a long time for the torn ends of the ligament to become "cemented together," and, like a rubber band, it takes time for an overstretched ligament to regain its normal tone, and looseness due to having been overstret-

The Ank

Head Civil

WHEN twenty-four hundred nest young men spend four or more every day hurling wires through one of the most complete physical toughening programs ever, the experience is likely to prove valuable for the trainers who handle as for the young men themselves.

Such is the case at our navy pre-school in Athens, Georgia, where six who like to think of ourselves as young college trainers are daily learning tricks in the job of keeping the future O'Hares, Gaylers and Thattop-fighting trim.

Prevention of injury is naturally one of foremost concern, because even one of these fledglings is bound on a destiny, and even a few days of through our carelessness might spell a serious delay to some important mission of the future.

Our need for vigilance is the more because the navy did not "punches" when it mapped out the pre-flight system of conditioning the world's finest, fittest, fightingest. is a spot for "softies" anywhere program, it is yet to be uncovered ball, basketball, soccer, gymnastics, wrestling, man-to-man combat are only a part of a cadet's daily necessary body-hardening activities keep him constantly on the mo all burners burning.

Recognizing the inherent hazard involved in maintaining such a pre-stall of trainers has been consta

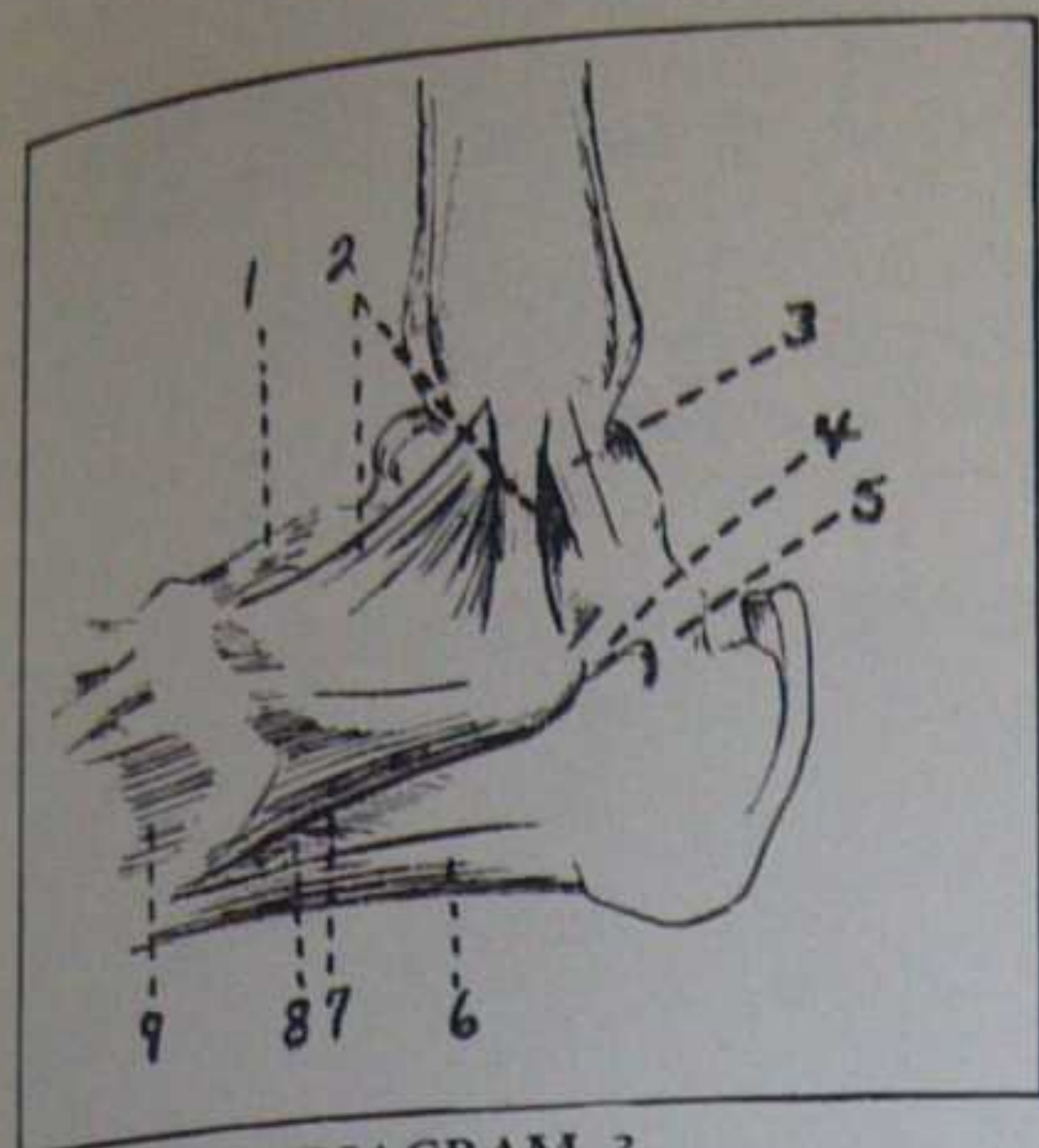


DIAGRAM 3

ply, and as a result it takes a long time for the torn ends of the ligament to become "cemented together," and, likewise, it takes time for an overstretched ligament to regain its normal tone, and lose its laxness due to having been overstretched.

Hence, continued support in the form of adhesive tape should be applied to this particular ligament, whenever it may be placed under some undue strain, even after healing has taken place. This prevents further sprains of the particular joint, and thus the chronically weak ankle is prevented. After the healing of an ankle injury, I tape it for each succeeding contest the remainder of the season of any sport.

Diagram 4 illustrates a posterior horizontal bisected view (coronal section) of the bones of the left ankle showing ligaments that may be injured: the anterior tibiofibular ligament, 1; the calcaneofibular ligament, 2; the deltoid ligament, 3; and the anterior astragalus (talus)—tibial ligament, 4.

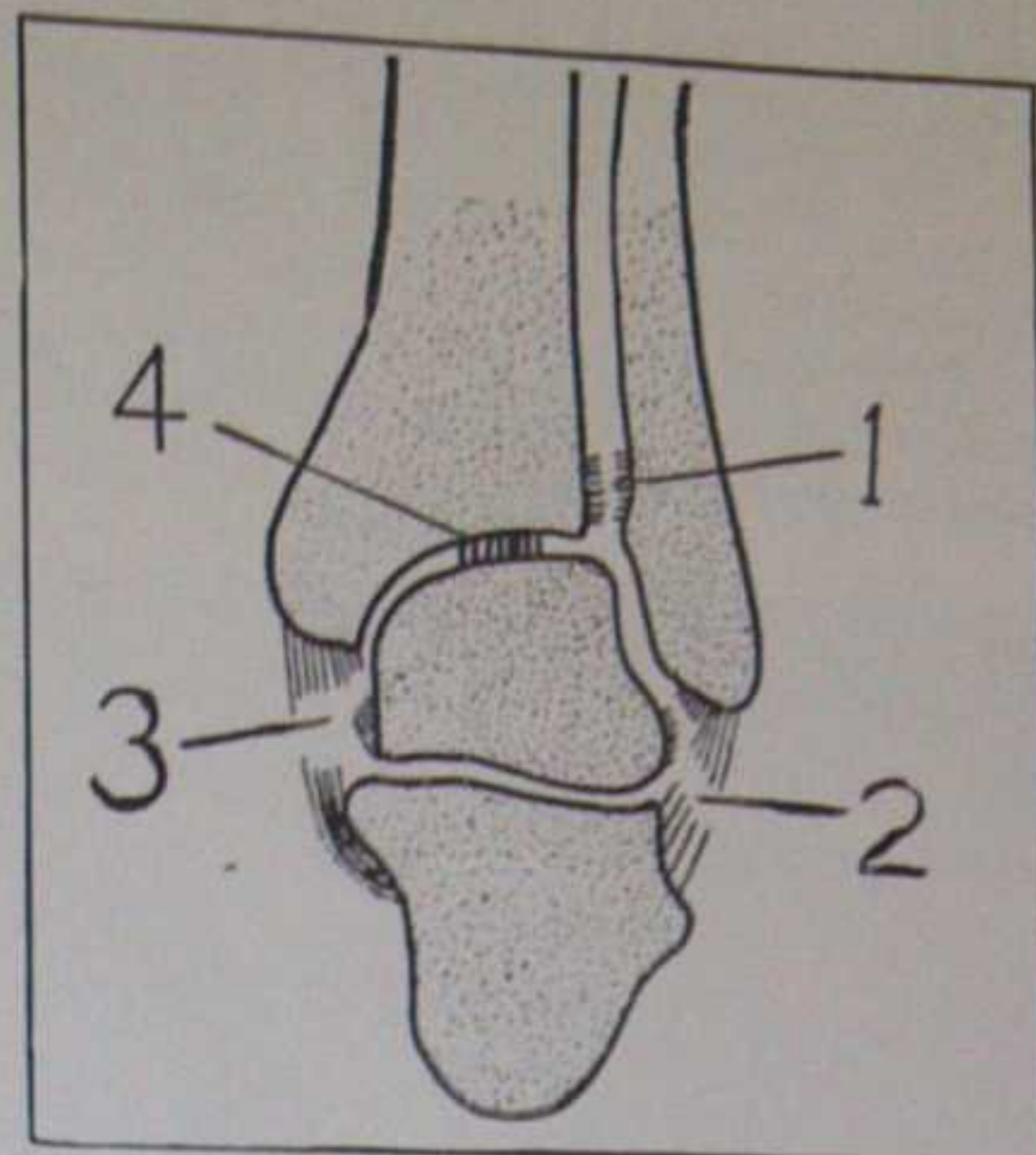


DIAGRAM 4

It is fair to assume that any or all of these ligaments may be injured when an ankle joint is sprained. It is also quite likely that the tendons and muscles in the region of the ankle joint are also ex-

posed to injury when the ankle is sprained, and as a result we may have numerous complications that may accompany the sprain of the ankle joint.

The Ankle Wrap as a Preventive

By Hank Crisp

Head Civilian Trainer, United States Navy Pre-Flight School, Athens, Ga.
Formerly Assistant Athletic Director
University of Alabama

WHEN twenty-four hundred earnest young men spend four hours or more every day hurling themselves through one of the most comprehensive physical toughening programs of this war, the experience is likely to prove as valuable for the trainers who handle them as for the young men themselves.

Such is the case at our navy pre-flight school in Athens, Georgia, where six of us who like to think of ourselves as veteran college trainers are daily learning new tricks in the job of keeping the navy's future O'Hares, Gaylers and Thaches in top-fighting trim.

Prevention of injury is naturally a matter of foremost concern, because every last one of these fledglings is bound on a career of destiny, and even a few days of time lost through our carelessness might spell disastrous delay to some important aerial mission of the future.

Our need for vigilance is the more intense because the navy did not "pull any punches," when it mapped out the laudable pre-flight system of conditioning the world's finest, fittest, fightingest. If there is a spot for "softies" anywhere in this program, it is yet to be uncovered. Football, basketball, soccer, gymnastics, boxing, wrestling, man-to-man combat—these are only a part of a cadet's daily round of necessary body-hardening activities which keep him constantly on the move with all burners burning.

Recognizing the inherent hazards involved in maintaining such a pace, our staff of trainers has been constantly co-



ONE of the most respected athletic figures in the South, Hank Crisp left his job as assistant athletic director at the University of Alabama to devote his wide experience to the service of his country. A background of twenty-one years at Alabama, spent variously as head trainer, line coach of football, and head coach of basketball, track and baseball, is now turned to the benefit of our Navy's future air fighters.

operating with the athletic instructors in ways and means of holding injuries to a minimum. Our success, I think, has been largely due to a mutual willingness to learn from each other. Where one trainer has demonstrated superior technique in treating a specific type of injury, or in improving a preventive, the rest have been quick to make their own favorite methods conform.

In preparing this first article of a series concerning some of these techniques, I have elected to describe the ankle wrap—one of the most important and most widely used safeguards in any athletic program.

The wrap which has been adopted here by the entire trainer staff has proven itself under the most trying conditions. Bearing in mind that the cadet is going full tilt through a variety of body-contact sports at least four hours a day, its record of effectiveness is better than 99 per cent of all cases will seem the more remarkable. The occurrence of ankle sprains or shin splints among wearers of the wrap has, in fact, been virtually negligible; arch trouble has also been greatly minimized. For these reasons, each cadet on admission is issued two eight-and-a-half-foot rolls of two-inch cotton webbing with which to have his ankles wrapped daily in the training room. The webbing is laundered over the week-end.

The accompanying illustrations will serve to demonstrate how the wrap is applied. Note that a woolen sock is always worn under the wrap to prevent blisters and excessive tightness. As seen in Illus-

tration 1, the ankle is first turned to the inside with the great toe pointed down and is held in this position throughout the procedure. This shortens the outside ankle joint and prevents the ankle from twisting to the outside where most sprains occur.

Illustration 2. Take two clockwise turns around the longitudinal arch, always pull-

ing toward the inside.

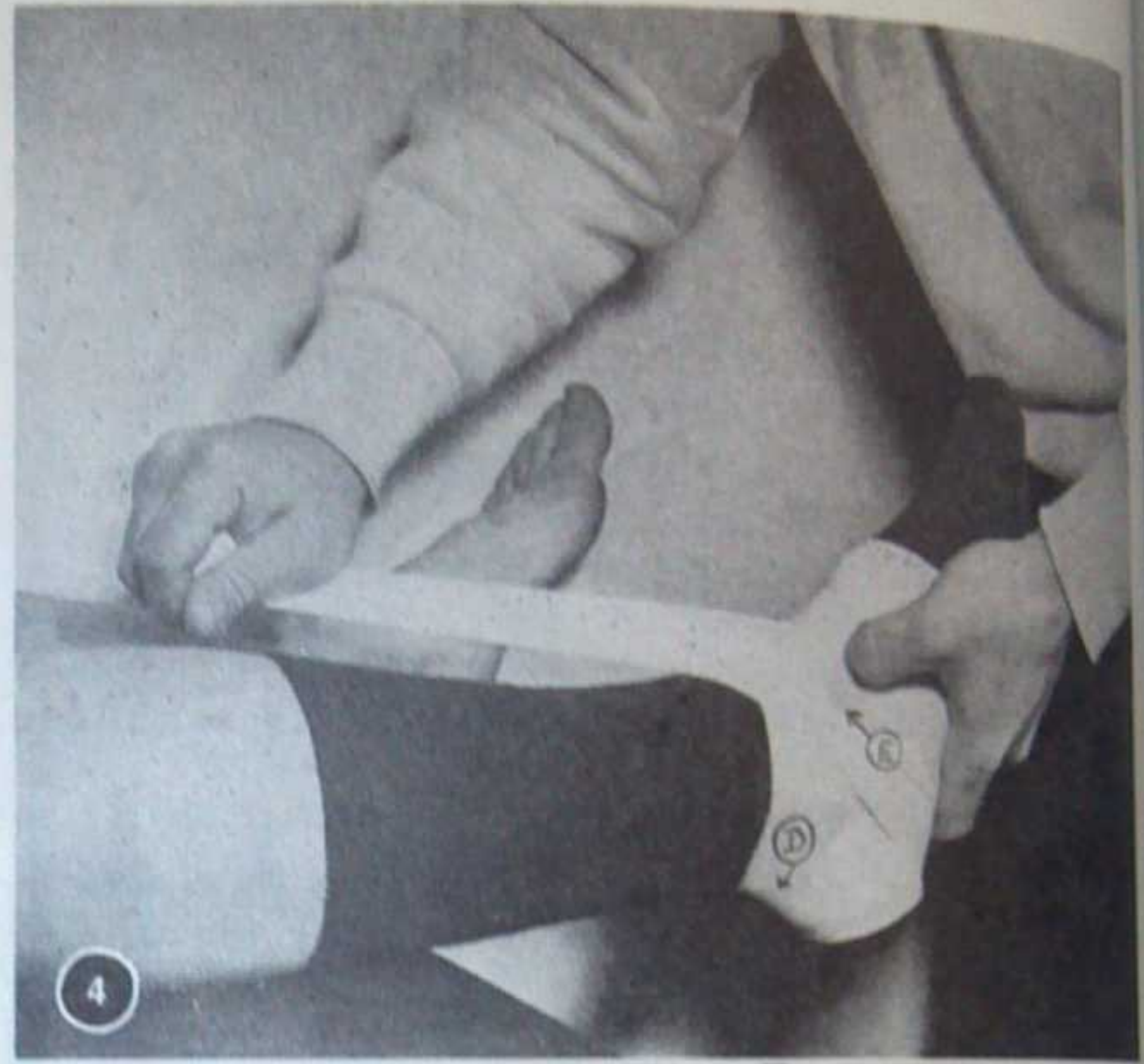
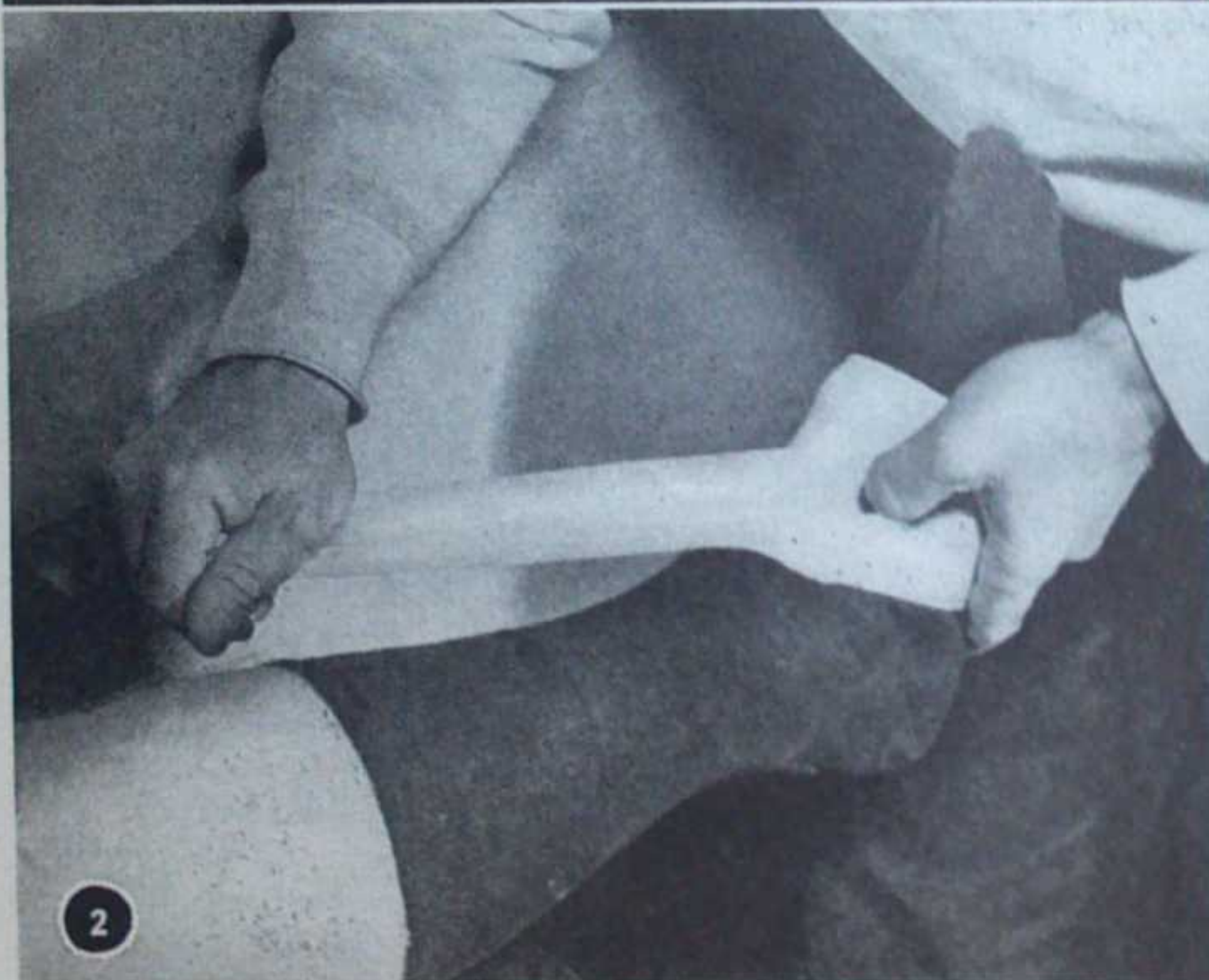
Illustration 3. The wrap is next taken to the inside, around the heel to the outside, and then under the heel to the inside.

Illustration 4. The wrap has here been carried outside around the joint to the inside and under the heel.

Illustration 5. Two complete turns are

then made from the outside to the inside around the articulation (above the joint).

Illustration 6. The whole wrap is then anchored with one-inch adhesive. An additional adhesive strip (not shown here) is finally placed from the heel stirrup to the top of the instep to keep the stirrup from slipping off the heel.



Cross-Country Running is the Oldest and Best Physical Conditioner

By Mike Ryan

Track Coach and Trainer, University of Idaho

THERE is no sport or exercise, that even approaches cross-country running and its affiliates in producing the rugged, superb physical condition that is necessary in the attainment of vigorous manhood, excellent performance in athletic competition and the toughness that is essential to make a full contribution to the armed forces or to the war effort.

Just as the name implies, cross-country running means running across the country as it comes, that is, through fields, up hill, down dale, jumping ditches, vaulting fences, etc. Its affiliates are, long distance running on the track, field or road, hiking or long distance walking and the old fashioned games of hare and hounds and follow the leader.

Cross-country running is as old and as natural as human life itself. Our ancestors in the early ages before roads and methods of transportation were devised, had to do their travelling on foot; they had to run down and slay wild animals for food, and ride "Shanks mares," in order to be successful in the battle for survival.

Therefore, it is natural for all of us to be able to run cross-country or to travel long distances on foot and it should be our natural desire to do so. The trends of modern civilization, however, have made life easier and the human race lazy and soft in a physical sense.

Running cross-country is rugged work and is the greatest developer of the vital system, the heart, lungs, stomach and legs, without which an athlete is not too hot and a mere layman is just so-so.

It also develops courage, stick-to-it-iveness and the power of mind over matter to a higher degree than possibly any other athletic endeavor. It provides continuity of action, without which perfect physical condition, stamina and endurance cannot be attained.

Almost since the beginning of organized athletic and sports competition, smart coaches and trainers have recognized the fact that cross-country running and its affiliates, road running and long-distance running on track and field, are the greatest conditioners and foundation builders. A condition foundation gained through the medium of cross-country running and its affiliates gives an athlete what it takes to go through a strenuous full schedule season

at full speed and top form.

Practically all champion boxers and prize fighters do road work as one of their most important training stunts.

Major league baseball players do a great deal of long distance running on their spring training trips. It has been said that John McGraw, famous manager of the New York Giants, used to send his charges ten miles a day during their spring training trips.

Many college football and basketball coaches require their players to take long distance hikes and runs as a pre-season conditioner, and during the season, they require them to run laps on the track every day to develop their legs and wind.

Track champions of all kinds usually do some sort of cross-country running every fall in their hey-day. Quarter milers, half milers, milers, two milers, etc., usually go in for cross-country running in a big way. Some of them develop into great cross-country runners as well as track performers. It is the backbone of their training system. There would be no nine-minute two milers or four-ten milers, without cross-country running. It is the training which developed such world famous track stars as Gregory Rice, Leslie Mac Mitchell, Glenn Cunningham, Gunner Haag, and Paavo Nurmi.

Many performers in other branches of sport, artists, singers, actors, business men,

etc., take regular cross-country and road runs, long hikes, etc., in order to retain the fine physical condition that is necessary to keep them at the top of their professions. It has always been said that Willie Hoppe, the world's greatest billiard player, who has been a champion thirty-five years, has always been an inveterate trainer and has gone in for long-distance hikes and road running during his career.

Cross-country running is very popular in the East and Middlewest. In spite of the fact that the sport is not accompanied by ballyhoo and fanfare it is estimated that 100,000 college and school boys and club men engage in cross-country competition every fall. In Europe, the sport is more widely engaged in and the European runners are usually better than Americans.

In these war times, when physical fitness and condition are so important for the successful prosecution of the war effort, it would seem advisable that every possible effort should be made in this country to increase interest and participation in this wonderful sport. It would be a valuable addition to the athletic or physical activities of every university, college, high school, and athletic club in the United States. I feel certain that it would greatly improve the condition of the men in our armed forces, if it were given more encouragement and a prominent place in the physical fitness program of the army, navy, marines and the air corps.

There is no limit to the number that can participate in cross-country training or competition. We have had races in this country with as many as twelve hundred competitors. Thousands can be accommodated in any section or city. No elaborate gymnasias or field houses are necessary. Open fields, roads, parks, golf courses, or what have you, and willing runners are all that are needed. Even weather does not matter. The hardy hill-and-dale boys can take it in sunshine, rains, snow or mud.

It is the most economical sport in the world to participate in. All the equipment that is needed are a pair of running trunks, a running shirt, and some kind of a pair of shoes, a stout heart and a willingness to work.

Well, what are we waiting for? Get them running!

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