

Report of the Faculty Athletic Committee

Interim report of the Faculty Athletic Committee to the Faculty Council, Oct. 8.

INTRODUCTION

By the Chairman:

Before the report itself is presented, the Faculty Council may be interested to know and should be aware of the work that went into its preparation.

A sub-committee of the full Athletic Committee was appointed by the Chancellor. It consisted of Professors Gerald A. Barrett, Clifford P. Lyons and Robert A. Melott, with Joseph H. Stallings, President of the Student Body, serving as a specially appointed member and Dr. Edward McG. Hedgpath acting as chairman. During the eight days beginning Monday, September 27, the sub-committee had nine sessions, most devoted to taking testimony. (In fact a total of 25 hours were consumed in hearing witnesses.) Others were devoted to discussion and drafting. Subsequently, the full committee met four times. The sub-committee heard a total of thirty-nine witnesses, of whom twenty-one were players or former players. Three of the witnesses appeared at their request. The other thirty-six were invited individually by the committee. One person invited to appear did not come. Specific invitations were issued to all those the committee believed had, or might have, pertinent information—players, coaches, physicians, trainers, and those who wrote letters which appeared in the press that indicated some personal knowledge of the events in question. An open invitation to anyone who had information bearing on the situation was published in the *Daily Tar Heel*. The chairman of the committee personally made a request at a team meeting for any players not specifically invited by the committee to appear if they so desired. At this time the team, and each witness as he appeared, was assured that any information given would be held in strict confidence. No restraints were placed on those who appeared to discuss anything which they felt important, even when in the committee's opinion it did not bear directly on matters under study. Comparative data were sought from other institutions. The purpose was to produce a complete and impartial report. The committee believes that its purpose was achieved, and the report now submitted has been approved by the entire Faculty Athletic Committee, the Chancellor, and the President of the Student Body. At the request of the chairman, and with the approval of the committee, it will be presented by Professor Robert Melott, Assistant Dean of the School of Law.

REGARDING THE ILLNESS AND DEATH OF WILLIAM C. ARNOLD, JR.

The information ascertained by the committee regarding the illness and death of William C. Arnold, Jr. is as follows. The information collected and reported herein was uncontradicted except where specific mention is made of conflicting statements.

Arnold was a junior in the College of Arts and Sciences who had three years of collegiate athletic eligibility remaining. He was a member of the varsity football team. He suffered a heat injury at or near the end of football practice on Monday, September 6, 1971.

September 6 was the 18th practice day and the 30th practice session of the 1971 football season. Specifically, practice had started on Friday, August 20. On Friday, Saturday, and Monday, three practices were held each day. These were at 7:00 a.m. for one hour and twenty-five minutes with a five minute break for rest and fluid, from 11:00 a.m. to noon without a break, and at 6:00 p.m. for one hour and forty-five minutes, again with a five minute break. As required by the National Collegiate Athletic Association rules the uniform for these practices was shorts, tee shirts, helmets, and football shoes, with no pads or contact work allowed. On Tuesday through Saturday and on Monday of the second week there were two practices per day, the first at 8:45 a.m. for an hour and a half and the second at 4:00 p.m. for two hours and ten minutes. The uniform for the two-a-day sessions, was shorts, helmets, shoulder pads, net jerseys, and football shoes. A five minute rest and fluid break was scheduled during both sessions. On Tuesday, Thursday, and Friday, practice was held once a day at four in the afternoon for two hours and fifteen minutes. These practices were in full uniform and a rest and fluid break was given. Game type scrimmages were held on Wednesday and Saturday of the second full week; offensive and defensive units alternated active participation. There was a one-hour period of calisthenics and other conditioning drills in shorts and tee shirts on each of the three intervening Sundays at 9:00 a.m.

The practice on Monday, September 6, was planned to last not more than one hour and fifty minutes without a break. The specific schedule for offensive interior linemen, of which Arnold was one, was:

4:00-4:15—warm-up by walking through play patterns and blocking assignments

4:15-4:25—calisthenics and agility drills

4:25-4:40—practice of blocking assignments at full speed

4:40-5:00—full team practice of pass plays

5:00-5:20—full team practice of short yardage running plays

5:20-5:30—full team practice of goal line plays

5:30-5:40—full team practice of kicking game including kick-off returns, punt protection and punt coverage

5:40-finish—8 sprints

During the period from 4:25 to 5:40 each player would participate in every other or every third play inasmuch as personnel are alternated and the team is at least two and in some instances three deep at each position.

The sprints are run in groups of approximately five players across two-thirds of the width (exactly 35 yards, 1 foot and 8 inches) of a football field. A group is started as the group ahead of it reaches the middle of the field. The sprints take eight to ten minutes to complete and are with only rare exceptions the final part of every practice.

The ascertainable climatic conditions at 4:00 p.m. on Monday, September 6, were temperature 83 degrees F, humidity 62%. Descriptions by coaches and players of the weather of that afternoon varies. A few stated that it was not remarkably different, one or two that it was the hottest practice day of the year, and the majority that it was hotter or more humid or both than usual but not the most uncomfortable day. Recorded weather data reflects that a combination of temperature above 80 degrees and humidity above 60% existed during 8 of the previous 29 practice sessions. There was unanimous agreement, however, that a shower occurred at approximately 5:30 p.m. that lasted to or through the end of practice and lowered the temperature noticeably and provided substantial relief.

No information was developed that would tend to indicate anything unusual in William Arnold's life prior to Monday, September 6. His closest friends reported that he had made a particular effort to get himself into good physical condition prior to the start of practice as demonstrated by his giving up smoking, although he had previously been a heavy smoker. He was working hard to earn a starting position, particularly by correcting certain fundamental errors in his stance and blocking techniques that were his major shortcomings. He had a net weight loss of two pounds during the eighteen days of practice. He was trying, on the advice of the coaching staff, to gain approximately five pounds. His life for the twenty-four to thirty-six hours immediately preceding the Monday afternoon practice was routine. He ate with his teammates, worked out, played cards and studied on Sunday, and, as best can be determined, attended classes as scheduled on Monday. As was his habit he was the first one dressed and the first one on the field that afternoon. His performance during practice was similarly unremarkable. He participated enthusiastically as was usual for him, but his performance was neither unusually outstanding nor noticeably poor.

Statements of members of the coaching staff indicate that the general plan was to begin on this Monday a tapering off of the intensity of practice, in order to have the team physically ready for the opening game on Saturday. For this reason the practice period was shortened and the major emphasis of the practice was the perfecting of play execution rather than contact. Players stated that the tempo of the practice seemed fast but not unusual for the week preceding the first game. A few players said that the heat or humidity or both affected them more than usual, but, again that the rain provided substantial relief. One player, Bill Thornton, who has a history of susceptibility to heat illness, was observed by a coach manifesting symptoms of heat exhaustion. This occurred at approximately 5:30. Thornton was removed from practice temporarily, and when he stated, after resting for a short time, that he felt himself more than slightly affected, he was turned over to a trainer for treatment. He was driven to the field house, and when he did not respond to treatment there was taken to the infirmary. He was admitted to the hospital, stayed overnight, treated during this time for heat exhaustion, and released the next day. Louis Jolly, the other player known to have a history of susceptibility to heat illness, was not adversely affected on this day.

The only incident at practice deemed by players or coaches sufficiently important to mention was that the second offensive line, Arnold's group, ran two or three extra punt coverages to correct mistakes. Each requires the lineman to run approximately forty yards. The group ran a total of five or six of these plays. There was general agreement that this was not a particularly unusual occurrence but was the only departure from the schedule during the practice.

Arnold finished first in his group in the first two sprints, finished with the group on the third through the sixth, stumbled near the end of the seventh but finished, and fell after running approximately twenty yards of the last and was unable to finish. One player, running behind Arnold, stated that Arnold appeared more tired than usual, and that Arnold started the seventh sprint headed a few degrees to the side but got straightened out after a few steps. This player and one other also stated that Arnold looked pale and not in control of himself. The other players in the group and the three coaches supervising them stated either that they noticed nothing unusual in Arnold's appearance or actions before he

fell or that what they noticed was not alarming. In explanation of the latter it was reported that Arnold always became pale toward the end of practice and that a normal manifestation of tiredness for him was running awkwardly with his arms flailing. Similarly, almost every player and coach interviewed commented on the fact that Arnold was well known on the team as a heavy breather, having a proclivity to breathe quite audibly after even slight exertion, but he had no known history of unusual sensitivity to hot or humid conditions.

It should be noted here that the moment Arnold fell was a time of general confusion in every practice. The entire team was running toward the entrance gate, managers were picking up equipment in a truck, and coaches were engaged in various activities, primarily talking to players or each other. This normal element of disorganization combined with the unusual occurrence of Arnold's falling resulted in a fairly wide variation of accounts of the events and particularly the conversations that took place. The consensus of statements and the composite version that emerges is this:

On the eighth sprint, Arnold fell after running about twenty yards, tried, and was partially successful in his attempt to continue, and then fell back to the ground. By this time the runners behind him passed him and headed for the gate. Three coaches approached Arnold from distances varying from a few feet to thirty yards. Arnold was lying on his back. One coach asked him what was wrong and Arnold responded, "It's my legs," or words to that effect. The coach then asked what was wrong with his legs to which Arnold replied, "They just won't go, Coach." Two of the coaches began helping Arnold to his feet, encouraging him to get off the field under his own power. No one recalls the exact words used. Simultaneously, both, and then only one, of the coaches helped support Arnold as he moved in a slow trot. The coaches grasped Arnold under the arms as he was rising and one states that he then held him under the arm and by his shoulder pad as they moved toward the gate. At the gate, the coach still with Arnold told him, "Okay, Billy, you've got it made now," and released him. The other witnesses said one of two things: either that the coach had supported Arnold continuously or that the coach supported him alternately with Arnold taking some steps on his own. Beyond the gate Arnold took one or two steps and started to fall again. He was caught by two of the players in the rather large group that was congregated there. They put Arnold's arms around their shoulders and a third player helped by grasping Arnold's belt. They went several steps with Arnold partially supporting himself and walking, but to a very limited extent. Arnold then ceased to support himself at all. His weight became too much for the three players and they began to lower him to the ground. At this point they either released him prematurely or he slipped from their grasp and his upper body and head fell the last twelve to eighteen inches to the ground. So far as can be determined Arnold was lucid at this time or at least until momentarily before this time. After regaining their grip, the players picked him up again and carried him a few more yards to the embankment beside Parker Dormitory at the point where the fence on the south end of Navy Field ends. They lowered Arnold to the ground. By this time several coaches, including the head coach, and the head trainer had caught up to the group. The head coach told the players to leave Arnold in their care and to go on to the lockers. The head trainer ran to the field house to get a vehicle. Almost simultaneously the manager driving the equipment truck drove up, stopped, and several coaches and players picked Arnold up and placed him on the truck. The truck and the trainer arrived at the field house at almost the same time. The trainer directed two or three players to cut Arnold's equipment off. At this time another trainer arrived with the station wagon that had taken Thornton to the infirmary. Arnold was placed in the station wagon and driven to the infirmary by the second trainer while the first trainer telephoned the team physician to prepare for their arrival. Arnold was turned over to several nurses at the infirmary who had been alerted and immediately applied ice packs to his body.

Time estimates of these events also vary. The minimum is eight to ten minutes and the maximum twelve to fifteen minutes from the time Arnold fell during the last sprint until he was turned over to the medical personnel at the infirmary.

William C. Arnold died of a heat stroke combined with degeneration of the liver and kidneys at approximately 3:15 a.m. on September 21, 1971. This completes the recital of events preceding his death.

At this point it is necessary to discuss in some detail medical information obtained by the committee.

Dr. Arthur L. Finn, Associate Professor of Medicine in the Department of Medicine, was the attending physician during William Arnold's hospitalization. He is an expert in metabolic medicine. He gave the committee the following information:

"What follows is a summary of my understanding of current knowledge about the various illnesses classified as heat illnesses.

"Basically, there are three recognized heat-related illnesses, namely, heat

cramps, heat exhaustion, and heat stroke.

"The first of these, heat cramps, consists of a completely trivial, although occasionally somewhat painful, series of abdominal and/or extremity pains thought to be due either to severe salt and water deficiency, or to the replacement of these deficiencies by excessive ingestion of water. In general, however, these symptoms are not common among athletes and are in any event quite minor and easily treated with fluid and salt intake.

"Heat exhaustion, on the other hand, can be a somewhat alarming event, although it is in general easily preventable and easily treated. It is due to the circulatory insufficiency brought about by dehydration as the result of the failure to replenish fluid losses due to sweating. Any normal individual may lose several quarts of fluid from his body in an hour of vigorous activity. If this rate of loss continues, and especially if there has been fluid deprivation prior to, or during the course of, exercise, the decrease in body fluids may result in dizziness, nausea, vomiting, and fainting. This is, in general, a very benign condition and easily cured by giving fluid. In addition, it is very easily prevented by providing fluid intake during exertion. Humans have a remarkably accurate mechanism for evaluating thirst and for replenishing fluid losses. We simply drink whatever water we need, and stop drinking when our sensation of thirst has abated.

"The third and major heat-related illness is that of heat stroke. In order to discuss this properly, it is necessary to review the body's normal mechanisms for the dissipation of heat. Normally about 60 to 70% of heat generated by the body is dissipated by the mechanism of convection, whereby an increase in blood flow delivered to the skin provides an increased surface area for the loss of heat from the blood to the atmosphere. Such a loss of heat requires that the temperature outside the body be lower than the temperature of the body; in general, this is the case, and in particular such was the situation on September 6, 1971. A second mechanism for loss of heat is by way of sweating with subsequent evaporation. Needless to say, cooling by this mechanism is inhibited by humid conditions, by the absence of a breeze, and by the wearing of clothing. The sweating mechanism normally accounts for something like 20 to 25% of the heat dissipation of the body. The remainder of heat losses are through breathing and through urination.

"As far as we can tell, heat stroke occurs when the body's production of heat exceeds the ability to dissipate it. It was once thought that complete cessation of perspiration was a factor in his illness, but most people now believe that this is not necessary. It has been shown that normal people can raise their body temperature to as high as 104 degrees following vigorous exercise in a hot humid environment. However, the individual's ability to dissipate heat is equal to the rate at which he produces it. When this ability to dissipate heat is lost, body temperature rises rather rapidly, and when it rises above perhaps 106 degrees, consciousness is affected."

Dr. Finn stated further that the onset of heat stroke, as distinguished from heat cramps and heat exhaustion, cannot be recognized by a layman and in fact probably cannot be diagnosed by a physician in time to prevent its occurrence once underway. Similar statements were made by the team physician, Dr. Joseph DeWalt.

It is next necessary to consider the cause or causes of heat stroke and the possibility of prevention. Again, from the statement of Dr. Finn:

"From what I have said, it may follow that dehydration could conceivably lead to a predisposition to heat stroke. The reason for this seems to come from simply physiological considerations. That is, I have already stated that the major mechanism for the dissipation of heat requires an increase in blood flow to the skin. If there has been significant loss of body fluids through the mechanism of sweating, one might imagine that the resultant decrease in blood pressure might impair blood flow to the skin and hence impair cooling. It therefore would follow that dehydration or water deprivation could conceivably lead to the imbalance between heat production and heat dissipation which I mentioned above. On the other hand, extensive experience with cases of heat stroke has yielded no clearcut example in which dehydration could have been considered a factor. Thus there is no evidence for the supposition that dehydration predisposes to heat stroke, despite the fact that, from physiological considerations, one might predict such a relationship. There is, however, experience from U.S. Army studies that seem to have indicated that there are a few cases in which heat exhaustion (which is in fact due to dehydration) has occasionally been followed directly by heat stroke. If this experience is correct, then once again one might have to conclude that dehydration could be a factor in some cases of heat stroke. On the other hand, even in those patients, it is entirely possible that the two separate illnesses are distinct but happen to occur coincidentally. I see no way of distinguishing between these possibilities.

"Thus, although the withholding of fluids will predispose and in fact cause heat exhaustion, there is virtually no objective evidence that such a condition would cause heat stroke.

"There are two other factors which appear to have been related to the frequency of heat stroke. The first of these is acclimatization. This is a phenomenon whereby a person's salt loss through sweating is gradually reduced following the arrival in a hot area. For reasons that are not entirely clear, acclimatization seems to reduce the incidence of heat stroke, at least among army personnel. Because of this, the army has adopted the attitude of gradually exercising personnel new to a hot humid area over a period of three to four weeks. "Apparently, the most effective way to reduce the incidence of heat stroke has been to restrict activities under conditions of extreme temperature and humidity. The army has adopted certain specific regulations of temperature and humidity under which no vigorous exertion is allowed. As a result of this program and the requirement of acclimatization, there was a tremendous drop in the incidence of heat stroke in the army, but it is important to note that heat stroke did not disappear entirely.

"One must ask the question as to why Billy Arnold developed heat stroke and no one else did. The answer to this is not at all clear, and there may be some kind of predisposition which is at this point totally unknown. This has been the situation in most cases of heat stroke; that is, only a very small proportion of the exposed population becomes ill with this disease. The reason for this, as I said, is completely unknown.

"In conclusion, it is my opinion that the only certain way to prevent heat stroke among football players is to put an end to football. Since this is not a reasonable nor a rational proposal, and if the army experience is a valid one, then we can expect a reduction in the incidence of heat stroke across the nation if (1) practice in hot humid environment begins slowly and only gradually increases in duration and vigor over a three to four week period; (2) practice is eliminated under certain climatic conditions; (3) water is provided to players on an ad lib basis (although, as stated above, there is no hard evidence that this is necessary to prevent heat stroke, it is certainly helpful for the prevention of heat exhaustion); (4) rest periods are allowed during the course of practice (this may be extremely beneficial, although again there are no hard data. It stands to reason that an individual who is on the borderline with regard to the onset of hyperpyrexia—the medical term for very high fever—may well be able to recuperate and lower his body temperature if given a period of rest at the right time. Again, a possible prophylactic measure); (5) players are encouraged to describe any symptoms which they have, especially those common in heat-related illnesses. It is expected that, in general, football players would be unlikely to complain even when they are getting quite ill, so that the only hope would be to encourage them strongly to do so. As far as I can tell, there is no possible way for any observer to detect whether an individual is getting ill before the fact, but it is quite likely that the particular individual would have some symptoms prior to loss of consciousness.

"Thus it is my opinion that the disease called heat stroke is largely (though almost certainly not entirely) preventable. On the other hand, it seems to me that at least for the period prior to the onset of symptoms... it is impossible to establish in any unequivocal way exactly what the conditions are that produce heat stroke in a given individual."

A letter from Dr. Richard M. Portwood at Duke University Medical Center was made available to the Committee. It reads in part:

"I am presently serving as Director of Student Health at Duke University and, quite naturally, I have followed with some concern the reports concerning the unfortunate young man on your team who suffered the heat stroke recently. "As a physician, one of the more disturbing features of some of the news stories that have covered the incident has been the implication that a 'water break' might have prevented the situation in the first place. I write you at this time to express my disagreement with this idea. During my internship in Dallas, Texas, in 1954, which was an extremely hot summer in that community, I spent the first 3 months beginning in July as the medical intern in the emergency room. I personally attended to at least 20 victims of true heat stroke. Typically, the problem developed when basically healthy individuals emerged from their air conditioned buildings into what at times was heat of as much as 110 degrees. For some reason which we didn't understand then, and still do not, the people's sweating mechanisms failed to function and as a consequence of this their temperatures rose to the level that was incompatible with health. At no time in my experience, was there any evidence either by history or by physical examination that would suggest any degree of dehydration nor any reason to think that drinking water or any other type of liquid would have prevented the catastrophic increase in body temperature.

"Certainly, dehydration and/or salt depletion can lead to difficulties including cramps or collapse. I do not, however, feel that heat stroke can be prevented by any process involving simple replacement of fluids or salts."

Dr. Carl Blythe, a member of the Faculty Athletic Committee, has conducted professional studies concerning the question of cause and prevention of heat injuries in athletes. He has submitted the following statement:

"The heat illness problem has caused responsible individuals to be concerned

about athletic participation during the high temperature and humidity of late summer days. This concern has increased during the past 8 to 10 years because of the number of deaths reported in football athletes.

"Since the inception of the Annual Football Fatalities Survey in 1931 and through 1963 there have been 15 cases of heat stroke reported which resulted in death. In 1964 there were four cases of heat stroke, and in 1965 six cases of heat stroke resulting in death were reported. One of the eight indirect fatalities of 1966 resulted from heat stroke and two heat stroke cases resulting in death were reported in 1967. In 1968 and 1969 five fatalities resulted from heat stroke or heat exhaustion. In 1970 there were eight heat stroke or heat exhaustion deaths.

"Some medical authorities have become concerned about heat illness to the extent that they have made recommendations for curtailing practice during late summer. Others have suggested curtailing strenuous practice and games when the temperature rises above what they consider to be safe limits. Naturally, professional people feel a great sense of responsibility for the nation's youth, and the recent recommendations of these authorities reflect their concern for those participating in athletics.

"I feel that late summer and early fall practice is compatible with sound athletic procedures provided certain precautions are taken. The following recommended practices and precautions are based on the best available evidence. If these recommendations are followed, I feel that heat disorder problems can be controlled.

"It is axiomatic that top physical performance can only be achieved by an athlete who is in top physical condition. It is also recognized that individual capacities differ. Therefore, it is essential that the coach be able to recognize both the abilities and the limitations of his athletes. Many athletes report for formal practice sessions in excellent physical condition while others are indifferent to their state of fitness. Authorities state that the lack of physical fitness impairs the performance of an athlete who participates in high ambient temperatures.

"Along with physical conditioning, the factor of acclimatization to heat is of utmost importance. Acclimatization is the process of becoming adjusted to heat, it is necessary for an athlete to work in the heat if he is to become acclimatized to it. An athlete's vacation may be spent working in air-conditioned comfort or in a sedentary type occupation with little or no participation in vigorous activity. Consequently, many football candidates are not acclimatized to the heat when the football season arrives.

"The athlete who conditions himself and becomes acclimatized to a hot environment will have a lower heart rate, lower blood pressure, and a lower body temperature during activity. Therefore, he will experience less cardiac and circulatory stress. His performance will be more efficient from the standpoint of energy cost. This simply means that he will not tire as quickly, he will be more receptive to instructions, and he will give a more skillful performance for a longer period of time. The final stages of acclimatization to heat are marked by increased sweat loss and reduced salt concentration in the sweat.

"It is suggested that during the first week of practice a graded type of conditioning program be followed. Particular emphasis should be placed on learning the system to be employed, the signals, the plays, and the timing. This recommendation is based on the assumption that acclimatization to heat requires a minimum of three to four hours of moderate work per day in the heat for a period of four to seven days. Authorities have suggested that complete acclimatization may require moderate work in the heat for three weeks.

"An ideal situation is for the coach to have his athletes acclimatized or conditioned to the summer heat when they report for formal practice sessions. The advantages of having acclimatized athletes to begin with are obvious. A recommended procedure for attaining this ideal is to urge each athlete to exercise regularly on his own initiative each day for the four to six week period immediately preceding the opening of football practice.

"An athlete should not be exposed to severe exercise during his first exposure to high temperature. Even after acclimatization has occurred, it is important to alternate periods of strenuous exercise with periods of rest.

"The fully equipped football player is at a definite disadvantage in losing body heat. His uniform prevents the flow of air necessary for evaporation of sweat which is largely responsible for cooling the body. Recently, many teams have started wearing light, short-sleeved jerseys. This seems to be a move in the proper direction since it allows the athlete to lose some of the extra heat load caused by activity. Clothing should be loose and light since it will aid in sweat evaporation with a resultant cooling of the body. I do not mean to imply that protective gear should be discarded or improperly worn when participating in contact sports.

"Coaches and athletes will agree that adequate nutrition is necessary at all times for excellent physical performance. This is true regardless of the physical environment. However, athletic participation in the heat has its own particular problems of nutrition. Foremost among them is that of insuring

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