



Sprint Training at Auburn University by Michael Bottom (1994)

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Coach Bottom is presently coaching at Auburn University, where he developed and implemented an in depth mental training program, as well as the Auburn sprint program in 1993 1994. His 1994 accomplishments include; four (4) finalists in the Top 16 in the 50 freestyle and 2nd in both sprint relays at the Men's NCAA Championships, and four (4) of the Top 8 finalists in the 50 freestyle at the US National Championships.

I have a passion, a passion for sprinters. When I joined Dave Marsh three years ago at Auburn, I had this exuberance and I knew all these things from things

I studied. David Salo, who was chastised in the early 80's for **some of his articles written on sprint swimming, was my** mentor. He used to send me his stuff. I have a file of all his articles and stuff that he had written. Every one of **my sheets comes out of Ernie Maglischo's. It is a great** book. Coaches that are just beginning to learn about the energy systems, should grab a hold of this and read it. **He does a great job. Everything he presents is with new** studies. I used to think I had the answers, then I met David Marsh. I would actually try to put in those things that I thought I knew all about, and David Marsh would **go, "No, no, no. Let's work it this way." It's amazing** what David Marsh has done with that program. I'm **amazed because every time we swam, we got faster.** **We** shaved to try to make NCAA's. We shaved for SEC's. We shaved for NCAA's. We shaved for nationals. Every **time the swimmers got faster.**

So I'm going to share with you some secrets about **David Marsh's program. I am no longer employed with Auburn. Ira Klein is sitting back there with a gun, and if I say anything that's over the line of proprietary information, he's going to shoot me. The other thing that I** have learned is that both David and I have these guns at our hip that we shoot from. David walks on deck, writes the workout or he says, "Mike, we need to hit this **energy system," and I get up there and write it down. Well, Ira comes into the scene with a computer, and he's got** everything computerized. One thing I tried to learn from **Ira is a little organization.**

Let's look at why we're here today. I work mostly with the guys this year. The way Auburn works is, David coaches. He sends Ira a few people, he sends me a few people, and we work it through. Ira had the hard core distance. I had the two hard core sprinters. So, Bill and Dean were the only people I really had control of this year. Ira had a few of the long term distance guys. What David would do is he would send people in and out of the programs. Sometimes they would be coming my way, sometimes they would be going Ira's way. The mastery of the program is the way David did this on deck. He

would look at them and say, “You need to be **here today,” or, “You need to be over here.” Again, it’s** that coach/athlete relationship. It’s knowing your athletes. It’s being able to see your athletes. I’m amazed because David Marsh had so many athletes in the water that he could shuffle them around like that. He’s good.

This is a synopsis of the drops that we had this year. The program has only been around for four years. Bill has dropped in the last year eight tenths in his 50 yards and nine tenths in his 50 meters. Dean has dropped seven tenths in his 50 yards and a second in his 50 meters. That’s a substantial drop. What we did at the beginning, and another thing David Marsh is great at, is to educate them. The first week that I was there, he called in all of the athletes, sat them down and gave them an energy systems talk. I was amazed that all these college athletes **were sitting there listening to an energy systems talk. That’s the kind of thing we go to as coaches. We have to** be educators and not just ramming things down kids’ throats. They need to understand and know what they are doing so that they know when to put the effort in or when to back off. In order for that to happen you need to **be educated . That’s where Ernie comes in. He’s great at that energy system stuff.**

First, let me give you the basic philosophy of Auburn University. I wrote this up and David said, “Mike, make sure you say this,” because he knows how excited I get about sprinting and I might forget about the other part of it.

“The general philosophy of the Auburn swim program is to provide an atmosphere where a student athlete can reach his or her full potential over a four or five year developmental time frame. David Marsh is a firm believer

that all athletes need to establish an aerobic base. First year student athletes at Auburn find out that aerobic training is the foundation to fast swimming. In their first year, even sprinters swim longer events and are less likely to be moved into speed training until late into the season.

Most collegiate athletes have put in the needed background mileage over years of age group swimming and the early season aerobic conditioning only adds to their already established base. David teaches the team about the energy systems and helps them to understand the importance of this base to all aspects of their swimming.

A sprint program is for those athletes who have matured both physically and mentally. Sprinters need, like all swimmers, to elevate their aerobic foundation. They also need to understand experientially the different levels of training. A sprinter must be able to perform at 110% or 50% while maintaining their technical skill. Most age group swimmers do not have the skills, understanding, or aerobic background to be placed into a "sprint" program. Therefore, this talk should be understood and applied as it is entitled, "Sprint Training for College Swimmers".

The truth is our swimmers need an aerobic base. Even if you're a 50 freestyler in college you need an aerobic base because they don't swim just the 50 freestyle. They swim the 100 freestyle, they swim relays. Yesterday in Ernie's talk he mentioned that in a long meet, whether it be an age group meet or a college meet, every swim is followed by a warm down. Every swim is preceded by a warmup. By the end of that meet that kid has swum probably 6,000 yards a day. So that aerobic training comes into place even in that warmup/ warm down situation. It comes into place when they get into bed

that night right after they swim that long session. So the aerobic training is the key and the base of Auburn swimming. It's why Auburn sprinters have been able to swim faster, and faster, and faster every time: they get in the water.

With that in mind let's go back. Yesterday the Colorado coach, Kathy, talked about balance. She talked about all aspects of a program. She talked about nutrition. Nutrition is a hot topic right now and athletes need to understand nutrition. There are certain people who were saying high amounts of carbohydrates. We heard a talk yesterday by Dr. Barry Sears who was saying mixed protein carbohydrates. What's the truth? That's for you to find out. Those views are dramatically opposed. One's preaching high carbohydrates and one's preaching protein carbohydrates. Protein carbohydrates was my stance, but I'll be darned if I was going to tell the team to do that. David Marsh believes in the high carbohydrates. We've gone back and forth and I still haven't convinced him but I will. So those are areas that you as coaches need to research to have good sprint programs.

Mental training was key in our success. David Marsh allowed me to have the team once a week, sometimes twice a week, to do mental training sessions. We would do rehearsal, deep visualization, and talk. You can't change subconscious patterns in athletes unless you try to hit the subconscious and there are several different ways of doing that. You hit the subconscious with repetition and visualization. The thing that I found, especially with age groupers, is that you tell them what to do, how to change their stroke and they have it perfect in practice. They're swimming and you're going, "Yeah! He's catching right!" Then they get to the meet and look at the block and you have a different swimmer. You have that old swimmer that takes off and does exactly the same thing wrong. You try to think what happened. You try to keep your cool. You try not to strangle them. You ask them, "What have I

been telling you?" The problem is that it didn't reach the subconscious level in a race situation. It reaches the subconscious level in the practice situation, the nice low pace situation. In the race situation, when the pressure is on, and when there were people screaming and hollering, and the coach was looking right at you, it all went away. They went back to the subconscious tapes that played way back when. They reverted back. Somehow you have to get to that subconscious and you can do it in several ways. You could do it with race rehearsals, or you could do it with visualization. I think the best way to do it is to get them to know what it feels like and then use visualization to implant that into their subconscious.

Another area that we found very interesting is that the better the athletes were in other areas of their lives, the better they were in the water. It just doesn't make sense does it? Steve Furniss is here with TYR. One year Steve had broken his leg. At that time he was the world record holder in the IM. He broke his leg and had to redshirt a year. Steve's academics were hurting a little bit, and we said, "Well, he'll pick up his academics with his extra time." Well, I don't know how he did, but we were told that it was very questionable on whether he was eligible or not for the next year. What happens when the athlete has that extra time or the athlete is not focused in all areas of their life is that they lose focus in the main areas. They lose it. At Auburn University, the men's team has a grade point average of 3.2. That's #8 in the country. As the academics of the team have become better, so has the athleticism. David Marsh is a firm believer in plugging all those different areas.

The secret of sprint training is intensity and focus. There's not one eye that's not trained on me right now. That's focus. That is the secret of sprint training. If you could take the focus of the athlete, and put it exactly where you want it, that's the secret of sprint training. There are several areas of focus, and

there are several ways to get focus. One is education. David Marsh is very good at educating. He spends time with the team in meetings, and makes sure they know what they're doing and why they're doing it. We sat down with the sprinters, and I'm basically giving you the same talk that I gave the Auburn sprinters a year ago.

Fast sprint swimming uses the anaerobic energy system. Intermediate energy sources stored in muscles, CP and ATP, are used first. The next energy is supplied by an eleven step process incurring the muscle called glycolysis. During glycolysis, stored glycogen is broken down into lactic acid and in the process releases ATP to be used as energy in the muscle cell. That's not new stuff. Read Ernie's book. It's right there. Everybody's book has this stuff in it. So the secret to training sprinters is training the energy system. If you don't have any oxygen, you use glycogen in your muscles. It goes down and you get a couple of ATP's out of it. You don't get much energy out of every little bit of glycogen, but you get quick energy. Those are sprinters. They need quick energy so you've got to train the quick energy systems. Acidosis is the buildup of lactic acid that causes the muscles to tie up. You know how some of them fall apart at the 100? Some of you train them well, but most of them fall apart. You always feel terrible, but inside you're going, "Heh! Heh! Heh!" You get to see that at practice two or three times a week. That's great.

Active rest after lactate producing sets accelerates the removal of lactic acid from the muscles by 100% in the first 5 minutes, and 400% in 20 minutes when compared to passive rest. This explains why swimming down is so important. The principle then is, why just swim down after a long set? Why swim down after a race? Why not swim down in practice in between sets? Why not swim down after each last swim? Why not include swimming down as part of your workout?

After initial storage of ATP and CP are used up in the first 15 seconds of anaerobic exercise, glycogen stored in the muscle is the only energy source that can be used in anaerobic exercise. That's what I'm told. That's what they say. That's what the studies show. You can't use glucose in the blood to swim fast. You can't use fats stored in your butt to swim fast. You have to use the glycogen. It's the only way you're going to swim fast. Now that's a key principle.

United States Swimming has a new set of symbols. They mean a lot of the same things but they're new. So my stuff, since I gave it to them last year, is old. Let's go over these real quick. I'm sure everybody probably knows what these are, but I'll feel better if I refresh my memory. There is A1 which is recovery; basic swim down; easy swimming. A2 is ENI. You're moving pretty good. It's a hard warm down. It's after you swim a blast 100 freestyle and you're supposed to keep moving and your heart rate is up there, and you move slower. ANI/SPI is lactate tolerance. AN2/SP2 is lactate production. People get these two mixed up. I'm going to try to help you understand because I really didn't understand until I started preparing for this talk. Lactate tolerance is the good stuff. That's the stuff you have fun with. You watch them in pain. Lactate tolerance means the ability to postpone acidosis. Rest intervals are long enough to allow muscle PH to return to normal. What that means is you want as much lactate in the muscles as possible. You want them to sprint. Here's a set that we had: 100 blast, 50 back, 200 stroke drill. The 100 blast is when they go into lactate tolerance. Another set is a 25 underwater streamline kick (no breath), 75 blast. When they get on that last lap, it is fun to watch. They go into acidosis and they have to go through that pain, training the pain. Lactate production, on the other hand, is fun to watch because they're swimming fast. What you're doing is, hopefully, improving the ability of the muscle to produce anaerobic energy as quickly as possible. Rest intervals are long enough to allow lactate acid removal. Swimmers

should not enter into acidosis during the set. If this occurs, reduce the distance or increase the rest. Basically you have them swimming hard, fast swims and you're hoping to increase the speed of this reaction. That's what lactate production is all about. It's because the muscles can no longer contract. That is a great feeling. If I see them tightening up at the end, I'm going, "Yes, lactate production! We're training it!" That's what you've got to see. The tightening up, the acidosis.

The causes of fatigue for 25 and 50 events are CP and ATP depletion (immediate energy sources), and an inadequate rate of anaerobic metabolism. Basically you're talking about immediate energy sources. In the 100, it's acidosis. It's too much lactic acid in the body and pain tolerance. That's a good one. That's why I like to see them in pain because you know they're working this pain tolerance.

Lactic acid is neutralized to some extent by buffering activity within the muscle cells. It is also transported out of the muscle cell, into the bloodstream and into adjacent muscles. **This buffering and elimination process** cannot keep pace with the production of lactic acid when **an athlete is sprinting and acidosis eventually will occur**. So basically what happens is you tie up. Acidosis is **eventually going to occur because you got these little guys in the muscles with buckets and they're trying to** pump out the lactic acid as quickly as they can. You've **got other guys throwing soda ash on it to neutralize it. After a while that guy can't get the soda ash out fast enough and he can't get the bucket of lactic acid out of** the cell. He tries to hand it to the cells around him, but they're going, "No. No, I'm not taking that stuff." So it ends up in the blood. It ends up building up and you end up tightening up. Acidosis, that's the stuff.

Training the anaerobic energy systems results in: (a) an increase in the amount of stored CP and ATP in the muscle cell. Now this is debatable. Studies show both ways. I believe that you can increase CP and ATP in the muscle cell. That's what I tell my sprinters that's what happens. Maybe it isn't. There are smarter men than me that can argue both ways. I just take the middle and say that's what I believe. I think you can increase CP and ATP; (b) **an increase in the speed of glycolysis. This occurs as a result of an increase in the amount of key enzymes stored in the muscle cell.** The enzymes that go in there, that's what makes it happen. That's what makes **it go faster because you've got all these enzymes in there and it kind of like guys yelling and screaming "C'mon let's go!!"** It's like coaches on deck and **it** makes things go faster; (c) an increase in the cells' ability to buffer lactic acid; (d) an increase in the cells' ability to flush lactic acid out of the cell. The bucket guy gets **stronger and faster; (e) an increase in pain tolerance.** This is what I like. Coaches, you'll love this stuff. An **increase of pain tolerance, which is the ability of an individual to perform in the state of acidosis and to recruit other muscles in order to continue to move forward.** You don't know how much fun you can have with that principal. I tell you, it's the best one on the books. The best **thing is that if they are as intense as you are, they buy it. They go to that point of acidosis and they start struggling and you can see them falling apart. It's like watching a race; you're producing lactate. It's a terrible name for it. What a lousy name for a set, lactate production.** Everybody knows you hate lactate. Every swimmer hates it because it hurts. So why tell somebody they're doing lactate production sets. Call them speed sets. They learn quickly that they are fun sets. Now what's interesting about this cycle, and if you read Ernie's book, you can find out that if you train this, you can train it to go **slow or fast. When we do lactate production sets, we're training to go fast.** When we do EN2 or EN3 sets, which **are the long sets of endurance trying to keep it at threshold** or just above threshold, you slow this reaction down. That's what happens. I'm not saying not to do these things. I'm just saying that's what happens. Ernie said yesterday that this can be, during taper, retrained and **made to go faster again. I don't believe it.**

SP3 is the power training. That's where you have your weights and your increased stroke length. You're holding onto the water. That's what Nort was talking about today. Increasing the stroke length while maintaining the stroke rate. There are actually 3 different fast twitch fibers. Basically, the C fibers are the ones between the slow twitch and the fast twitch A fibers. The only way to hit the fast twitch B fibers are to put some kind of speed **into your workouts. Put some kind of power in your workouts. If glycogen stores are depleted due to lack of** exercise, rest, or proper nutrition, the body responds by **slowing down in order to use aerobic mechanisms.** **This** is a much slower process and the body cannot produce **the energy to continue fast swimming. A lot of coaches** will trash their swimmers. They'll go down to that **reduction of glycogen in their muscles and their body is saying, "Hey, I'm running out of glycogen here. I'm running down. We have to use other sources. We have to use those fast. We have to use the glucose in the** blood. We might have to use some of the protein **because I'm not giving up my glycogen. I'm not going to give you my last ounce of glycogen. So we're going** to slow you down." That's why when you just ran your swimmers through a 5,000 yard workout, and you get them up there to swim 50's at the end of practice to sprint, they look like dog <loo. They don't have any **glycogen and their body is saying, "Hey, what are you doing to me?" So, if you're going to do some speed work and some lactic acid sets do it before you do the** EN2 and EN3 stuff. It just works better that way. It's **nicer.**

Any questions so far?

Question: Active rest will increase the removal of by products. If you were not to promote active rest within the course of the workout itself, would that then increase the buffering capacity more quickly?

Answer: That's a great question. There are two schools of thought on that yes and no. I don't know.

These are the following objectives for the sprint training program at Auburn in 1993: (1) to increase the muscles' capacity to buffer lactic acid; (2) to increase the muscles' ability to convert glycogen to usable muscle energy; (3) to increase swimming power (weights, jumps, specific dryland exercises, power sprints); (4) to increase an athlete's tolerance of pain caused by lactic acid build up; (5) to educate the athletes in order to improve their performance and motivation to exercise the proper anaerobic energy systems; (6) to improve stroke efficiency, and; (7) to decrease reaction time.

Bill Pilczuk couldn't get into college out of high school. He as a 22.8 out of high school. He was told by every coach in the country to forget it. "First of all you are a dummy. Second of all, you don't swim fast." Or maybe it's first of all you don't swim fast, second of all you're a dummy. I don't know. He went to a junior college and worked his fanny off. He dropped a second. That's a good drop in a 50. I'll take it. Then another year at junior college worked. At this point, he's getting his grades up. He's not a brilliant student at this point, but he is getting his grades up. Junior year he comes to Auburn and drops another seven tenths. He's getting his grades up even higher. He's above 3.0 now. Senior year, he drops eight tenths. His grade point average for the last two quarters at Auburn was a 4.0. He

was number two on the Academic All-American list for swimmers. That is a story of focus. That's a story of intensity. That's a sprinter.

Kathy called them thoroughbreds yesterday. I'll tell you what happens when you take a thoroughbred and beat them to death with long yardage. You'll beat them to death with long yardage. Don't do that. I plead with you don't do that. If you have a thoroughbred, yes they need aerobic training, but don't kill them. Send them to the colleges in good aerobic condition. Let's not annihilate them or mentally discourage our thoroughbreds. That's what happens. I remember George Habeas. George Habeas was, in my opinion the best coach I ever swam for. He didn't know what he was doing but he was doing this stuff. He was training the systems. He didn't know it. I remember him looking at a sprinter when we were doing a long set and he said, "Yeah, he's not doing all right but wait until the end of the season." The end of the season comes and this guy was one of the fastest guys on the team. That's a coach that knows and sees his swimmers, and understands them. That's what this is all about.

Any questions?

Question: You talked about Bill and his outrageous start. What did you do to help him achieve that?

Answer: We did a lot of reaction drills. We used the timing system. We did drills where we were smacking each other. You probably can't do that in age group swimming. You'll probably get sued, so don't do that. You can do it in

college swimming as long as it's out side of the twenty hours. Time everything. You have a stopwatch. Time off the blocks. Time from when they move to when their feet leave the blocks. The most fun drill that I did is when you take a long kick board, stand behind the blocks, tell them to take your marks. You hit the block and that's their signal to go. If you can get their butt, they're too slow. You tell them that you are going to swing at their bottom and you can bet that they're going to start getting off that block fast. It may not be in great form, but that improves the reaction time. Any other questions?

Thank you.

AUBURN UNIVERSITY SWIMMING SPRINT PROGRAM 100 SPECIALTY

NCAA SEASON

Phase I drills and base

6-8 weeks (September through mid-November)

- do drills that break down stroke and create correct patterns minimize resistance, balance in
- doubles 8-12,000 IM. free, spec. mix; singles 5-7,000 kicking, pulling

- lots of kicking: long/short and fast
- teach starts & turns, finishes, breakdown and build back up Dryland: strength and fitness
- weight room 3 times per week
- additional fitness 2-4 times per week

Phase II Drills, Lactate (tolerance) and Aerobic

5-6 weeks (mid-November to January I)

- develop and implement stroke drills to encourage more fluent strokes

*aerobic set 30-40 minutes, drill/swim set 3 times per week

*lactate 2-3 times per week

- kicking lactate: sets improve ability, develop
- kick while swimming, over exaggerate legs in stroke
- start swim with tubing, introduce water power program: racks

*sculling and feel on a regular basis included in warmup/warm down Dryland: powerTeach neurological system; speed of movement

*plyometrics

*phase in more stroke specific movements into weights and dryland

Phase III Fine Tuning

6-8 weeks (thru NCAA)

- 15 meter pool training: water power 2-3 times per week

- aerobic sets 1-3 times per week 20-30 minutes
- drills: perform drills that = to race technique
- starts, turns, finishes time on watch
- lactate peak 12 times per week:

*5 x 50 on 5'

*3 x 100 on 8-12'

*20 x 25 or (5 on 30) on 8-12' Dryland: abdominal, back strength

move power from weight room to pool

- weights: 02 times per week (maintenance only)
- 2 times per week reaction drill (some plyo inclusive)

ULTRA SPRINT TRAINING SUGGESTIONS

Early Season:

Priority Overload power (Sp2, Sp3): technique, lactate tolerance (Sp!). Aerobic conditioning, drills, skills, pulling, and swims between power/speed and lactate sets.

Dryland box jumps power weights 4 days, followed by water abs, stretch maintenance

Midseason: begin 90-75 days out

Priority lactate production (Sp2): technique, stroke count,. Maintain SP I, power and speed work. Monitor glycogen depletion and muscle tear down. Aerobic conditioning(REC, EN I) is built into lactate sets as prep or warm down, drills and skills. Work on starts, hit legs hard 3 days per week.

Dryland increase weight on specific exercises, decrease weight on general exercises, 3 x/week, reaction drills, stretch, plyometrics.

Late Season: begin 45-30 days out

Priority speed: maintain lactate and power, reaction drills, starts, fine tune and move to more specific sets. Dryland move all power work to the water, stretch, abs.

Taper: 2-3 weeks, rest, stretch, very specific power, speed and lactate sets.