My First Half-Century in the Iron Game

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Some can, and some cannot, Proper exercise will increase the muscular size and strength of almost anybody; but some people have much more in the way of potential than others. Nobody can tell you in advance just how big, or how strong, you can become; but careful consideration of the factor covered in this article will give you at least some idea of just what can be done in the way of increasing size and strength.

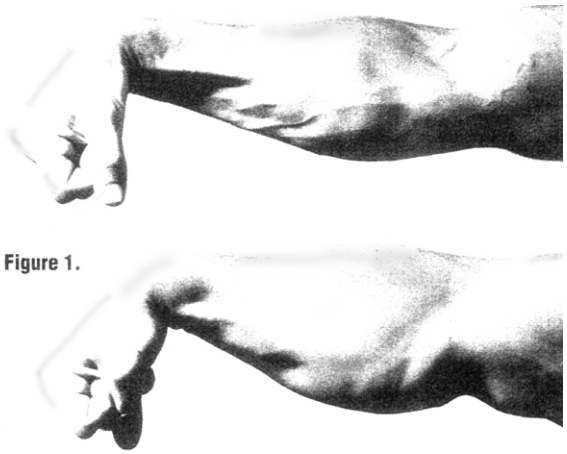
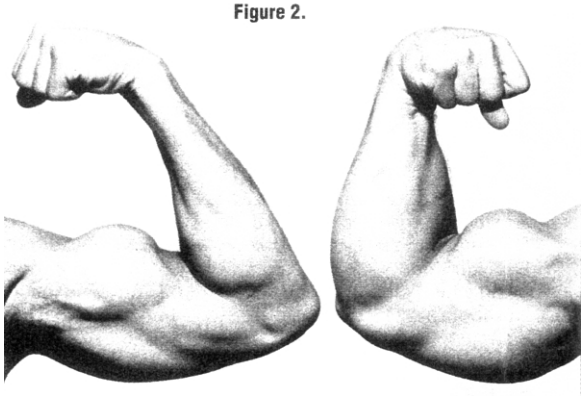


Figure 1.

Both of the forearms illustrated above belonged to advanced bodybuilders, and both were developed to a point very close to their maximum potential size; little if anything in the way of an increase in muscular size could be reasonably expected by either of these men, they were already as big as they could get. Yet there are obvious differences in these arms; the arm near the bottom of the picture is much larger than the other one, and the lower arm has a different shape, a difference in shape that was responsible for the difference in size.

Figure 2.



The potential for muscular size is largely determined by the relative lengths of the muscle belly (the contractile part of a muscle) and the related tendon. A relatively long muscle belly and a short tendon means a far greater than average potential for muscular size; while a short muscle and a long tendon means less than average potential for muscular size. This relationship being a genetic factor that is not subject to change.

Notice that the wrist tendon in the upper arm is much longer than the same tendon in the lower arm; and notice that the lower muscle belly is much longer than the other one. The forearm shown in the lower part of the picture belonged to Casey Viator. Casey and Sergio Oliva had the largest forearms I have ever measured, and both of these men have unusually long muscle bellies and short tendons in their forearms.

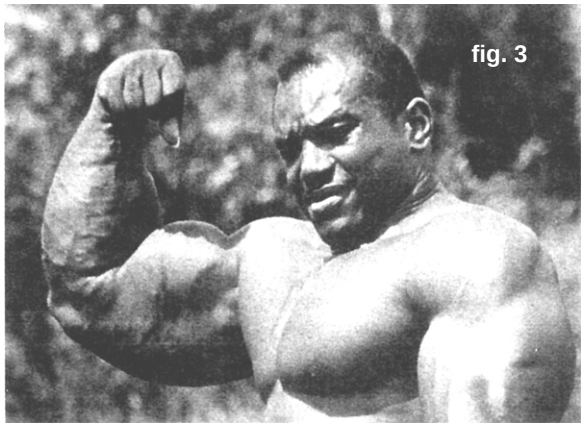


fig. 3

Obvious differences in the length of the muscle bellies and tendons are clearly demonstrated by this picture as well. The most obvious differences shown here are in the forearms and triceps; while there is some difference in the length of the biceps muscles, it is not as great a difference as that shown in the forearm and triceps muscles. Casey Viator's triceps, on the right in this picture, is much longer than the same muscle in the other man's arm; longer and thus much bigger. Casey's potential for great muscular size was far above average in his forearm and triceps muscles, but not that far above average in his biceps muscles.

In this picture of Sergio's arm (fig. 3) it is obvious that all of his arm muscles are far above average length; and it is also obvious that he does not have the "classic" shape of muscles that is shown by most advanced bodybuilders; he has neither the high "peak" of biceps muscles nor the usual "horseshoe" shape of the triceps, shapes that can be produced

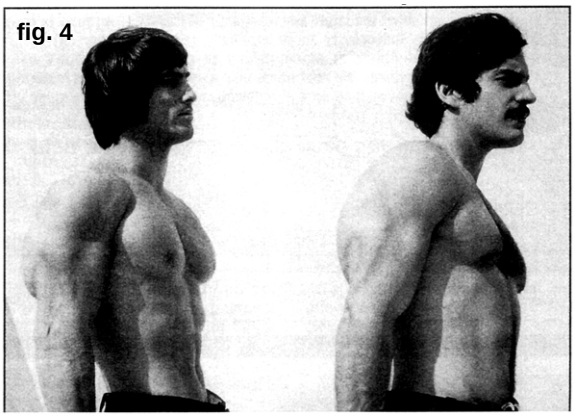


fig. 4

only by much shorter muscles. So it is an either/or situation: you can have the shape or the size, but not both.

The two upper arms shown in figure 4 were exactly the same size, 17 inches in circumference; but there is an obvious difference in the shape of these arms, both the triceps and biceps shown on the right are much longer than those on the left. The man on the left was very close to his maximum potential size, while the man on the right (Mike Mentzer) was far below his maximum potential size. I have measured Mike's arm when it was nearly two inches larger than it was the time this picture was taken, but it would be very difficult, probably impossible, for the man on the left to add even an additional half an inch to the arm shown here.

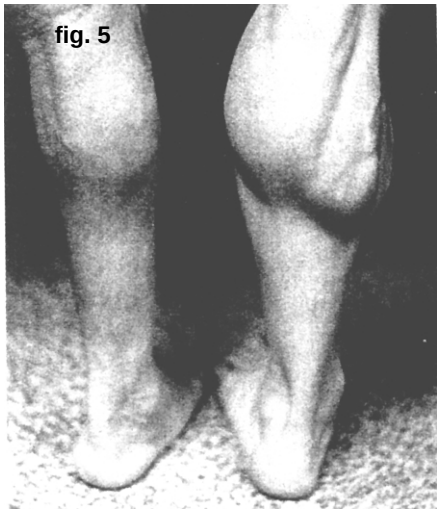


fig. 5

A comparison of these two lower legs provides another dramatic example of differences in muscle length, and thus differences in potential for great muscular size.

Taken more than twenty years ago, figure 6 shows my left arm compared to Casey's left arm; with obvious differences in both size and shape. At that time Casey was much younger than my oldest child and he outweighed me by about forty pounds; I weighed 172 and he weighed about 214 pounds, while our height was about the same. My left arm was then 15 5/8 inches in circumference, a full inch and a half smaller that it was when I was younger and heavier.

When this picture was taken Casey had been in hard training for several years while I had been training only eight weeks after a total layoff from training for several years. A comparison of the arms shown here will show that Casey's triceps muscles and forearm muscles are much longer than mine, with much less difference in length in the biceps muscles. While my forearm muscles are longer than average they are not as long as Casey's. And his triceps muscles are much longer than mine.

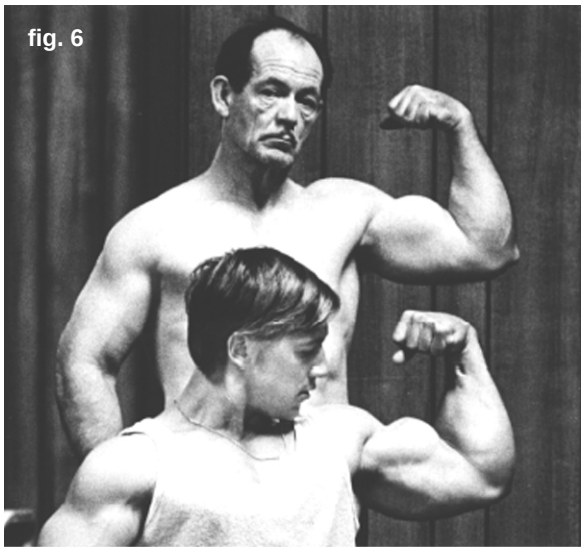


fig. 6

Casey's maximum arm size, measured "cold," was 19 5/16 inches; more than two full inches larger than my maximum size of 17 1/8 inches, and two inches difference in circumference of an arm is an enormous difference. The potential for this much larger arm size was provided primarily by Casey's unusual triceps length. The differences in our biceps muscles were nowhere near so pronounced. Some years earlier, at my maximum arm size, my biceps muscles may have been larger than Casey's ever were, but my triceps were never close to his maximum size.

As far as differences in strength were concerned, Casey was far stronger in most movements than I ever was; but I was probably stronger than he was in exercises performed largely or entirely by the biceps muscles. Even at the time this picture was taken, when I was far below my maximum size or strength, I could beat Casey in "chinning" (pull up) exercises, a movement that is largely performed by the biceps muscles.

The man for whom the so-called "Scott Curl" was named had unusually large arms, and he also had unusually long biceps muscles; and he initially believed that his biceps shape and size was a result of performing curls in the fashion provided by a Scott curling bench, but later realized that his biceps shape and size was a result of a genetic factor rather than a result of his style of exercise.

The differences in the relative length of the muscle bellies and related tendons that are illustrated by the above pictures should be obvious, and thus it is not as easy to evaluate this factor in other muscles.

What determines the absolute limit of muscular size? Aspect ratio.

Aspect ratio is the relationship between length and width. In effect, the shape of something.

An aspect ratio of 2 to 1 would mean, in the case of a muscle, that the length of the muscle was twice as great as its width. Which, in turn, would mean that its shape would be relatively long and narrow.

If, then, the size of the muscle was increased in response to exercise, the aspect ratio (shape) of the muscle would change. The muscle's length would remain unchanged, while its width would be increased. If, later, the aspect ratio became 1 to 1, the width and length of the muscle would be equal.

But something apart from the shape of the muscle would also change: the "angle of pull" would change. Only the part of a muscle that is located on the exact centerline of the muscle is pulling in exactly the right direction; while any part of the muscle that is above or below, or to either side of, the exact centerline will not be pulling in the same direction. Thus part of the muscle will not be as effective as another part of the same muscle.

The greater the increase in the width of the muscle, the greater the chance in the angle of pull; and, eventually, a point will be reached where the angle of pull or part of the muscle has changed to such a degree that it is no longer functional. Any increase in the width of such a muscle would produce added force of contraction that would be entirely wasted. So there is a limit to just how wide a muscle can be; a limit dictated by aspect ratio.

Nobody knows just what the maximum possible aspect ratio for a muscle is, but it is obvious that such a limitation exists. And it is also obvious that if a muscle is longer than average, then its potential maximum width is increased in direct proportion to its unusual length.

But the potential cross-section of the muscle does not increase in direct proportion; in fact, the resulting increase in muscular cross-section will be much greater than might be expected. If the muscles length is twice as great as average, this means that its maximum width is also twice as great as average, but that its maximum cross-section is four times as great as average, and that its maximum "mass" (or overall size) is eight times as great as average. Thus it follows that having muscles that are even slightly longer than average gives you the potential of greatly increased muscular size.

If, for example, the maximum possible aspect ratio of a muscle was 1 to 1, and if the muscle belly was four inches long, this would mean that the maximum possible width of the muscle would be four inches; and if the muscle was a square in cross-section, and for calculation purposes we can treat it as such without introducing any error, then the cross-section maximum would be 16 square inches (four by four).

But if, instead, the muscle was twice as long, eight inches in length, then maximum possible width would also be eight inches; but the cross-section would then be 64 square inches (eight by eight), which means that an increase in length of 100 percent produced an increase in cross-section of 300 percent; and since the larger muscle is also twice as long, this means that the larger muscle would be eight times as large overall as the smaller muscle.

But this larger muscle would not be eight times as strong as the smaller muscle, nor even four times as strong; stronger, yes, but not stronger in proportion to the increase in size. Would not be stronger in proportion to size increase because of the unavoidable changes in the angle of pull of a large part of the larger muscle.

The actual mass of his muscles in the case of a man like Sergio Oliva must be seen to be appreciated, pictures simply do not do him justice; but the potential for such mass of muscular tissue resulted from genetic factors that cannot be changed. Some can, some cannot.

About twenty years ago, approximately three years after the introduction of the first Nautilus machine, Joe Weider published a series of articles that were nothing short of savage attacks against me, my products and my published statements; he apparently saw me as some kind of a threat to his commercial interests. Most of the statements made in those articles were totally untrue, and many of them were the opposite of the truth; nevertheless, some of his statements were believed by many people, and a few of them are still believed by some people.

Some of these false statements are still being repeated in print by other writers; the most common one being that large muscular size and high levels of strength cannot be produced by training with exercise machines, that only barbells can produce great size or strength.

As I have stated in earlier articles in this series, I am certainly not opposed to barbell training; in my opinion, the barbell was practically a miracle when compared to an earlier tool intended for the same purposes, could produce results that were utterly impossible to produce with any earlier form of exercise. But it does not follow that the barbell is a "perfect" tool for its intended purposes; nor does it follow that it is the "best" tool for its intended purposes. Nautilus machines were intended to be nothing more nor less than "improved barbells," were meant to solve some of the problems that are unavoidable when training is performed with a barbell. And they did solve many of these earlier problems. Much later improvements now incorporated into our current line of MedX exercise machines solved even more of these problems.

Apart from the skill required to compete in weightlifting contests, any result that can be produced by a barbell can be produced with an exercise machine; with much greater convenience, greater safety, and usually with a lot less time devoted to the workouts. And, in a number of important instances, results can be produced with exercise machines that are impossible to produce with a barbell.