

# The Colorado Experiment

## Part 1: Purpose of the Experiment

**Arthur Jones**

In the previous chapter, I mentioned the circumstances that first led me to suspect that too much exercise might be as counterproductive as too little exercise. During the twenty years that have followed that realization, an enormous amount of information has come to my attention from a variety of sources...the results of research in a number of related fields...improvements in available equipment...and of perhaps greatest importance, enough time to carefully examine as many as possible of the related factors.

More than thirty years ago, when I first became interested in exercise, almost nothing in the way of factual information existed on the subject...but now, the situation may well have reversed itself; perhaps “too much” information is now available...so much information that it has become almost impossible to absorb it all.

Another problem being introduced into equation by the fact that only most of the information is fragmented, exists only in apparently unrelated bits and pieces...an almost unavoidable result when due consideration is given to the actual number of factors involved, physical factors, physiological factors, biochemical factors, neurological factors, psychological factors, an almost infinite number of factors.

Under the circumstances, I realized long ago that the final answers would not emerge during my lifetime; but I also realized that the trend in current training practices was in exactly the wrong direction. While I perhaps didn't know exactly what was “right”...I certainly could see a number of things that were “wrong”.

If for no other reason, I was clearly aware that many current training practices were wrong simply because they weren't logical, because they attempted to deny established physical law.

For example; from my own personal experience, and from the experiences of many other people, I was aware that a very rapid rate of muscular growth was at least possible. Why, then, I was forced to ask myself, couldn't such a rate of growth be maintained right up to the point of individual potential?

A physical law simply states that a given set of circumstances will produce a particular result, invariably. If the law is valid, then the result must be produced...and if the result is not forthcoming, then the only logical conclusion is that the circumstances were not those that were required.

So, if we do something once, and a particular result is produced, then the same result should always be produced...and if it isn't, then that is clear proof that the circumstances were changed in some manner, even though such a change may have evaded our attention.

In my own case, a certain type and amount of exercise produced a particular result...for awhile, up to a point. But beyond that point, exactly the same type and amount of exercise produced no apparent result at all. Obviously, then, some factor had been changed, the circumstances had been altered.

Eventually I realized that the change in circumstances occurred within my own system, growth was produced as long as I was working within the limits imposed by my recovery ability. But if the demands exceeded the ability of my system to meet them, then growth was literally impossible.

A certain "balance" was obviously required; if the recovery ability exceeded the demands, then growth was at least possible, and if it was being properly stimulated then it would occur...but if the demands exceeded the recovery ability, then growth was impossible, regardless of the stimulation provided.

Practical experience also made it obvious that increases in strength resulting from exercise were not matched by equal increases in the recovery ability. In effect, as we became stronger, we were working closer to the limits of our recovery ability...and, eventually we reached a point where our recovery ability was being entirely dissipated in restoring the energy potential consumed by our workouts, so that nothing was left for growth.

Realizing that a constantly depleted recovery ability made growth impossible, and being unable to increase the recovery ability, the only choice remaining was a reduction in the demands.

When such a reduction in demands was made, the result was immediate growth...because we had thus restored the required conditions for growth.

Having thus been forced to recognize that there was a limit to the amount of exercise that we could stand, we then turned our attention in the direction of trying to determine just how little exercise was actually required. Since we could not increase one factor (the recovery ability) in order to restore the required balance, we were forced to reduce another factor (the amount of exercise) in order to produce the same result.

A logical conclusion, literally an unavoidable conclusion, and a conclusion that was fully supported by practical application. But since it was also a conclusion that ran directly contrary to widespread opinion, I realized that it might not be readily accepted.

So we decided to conduct an experiment under conditions that could not be disputed, realizing in advance that efforts would probably be made in the direction of trying to deny the results...if for no other reason that the fact that many people seem unable to admit that their own theories might be wrong.

Since we have our own training facility in Florida, it would have been far more convenient to conduct the experiment here; but we realized that doing so would leave us open to charges of misrepresentation after the fact. So, instead, the experiment was conducted in Fort Collins, Colorado, under the supervision of Dr. Elliot Plese in the Colorado State University's Department of Physical Education Laboratory.

Literally dozens of utterly phoney “research projects” have been highly advertised during the last thirty years, so I think we can be excused for going to rather great length in our attempts to avoid any slightest chance of misrepresentation. Additionally, since commercial interests amounting to hundreds of millions of dollars of annual revenue might be threatened by the facts that we hoped to establish by the experiment, a certain amount of caution was obviously called for.

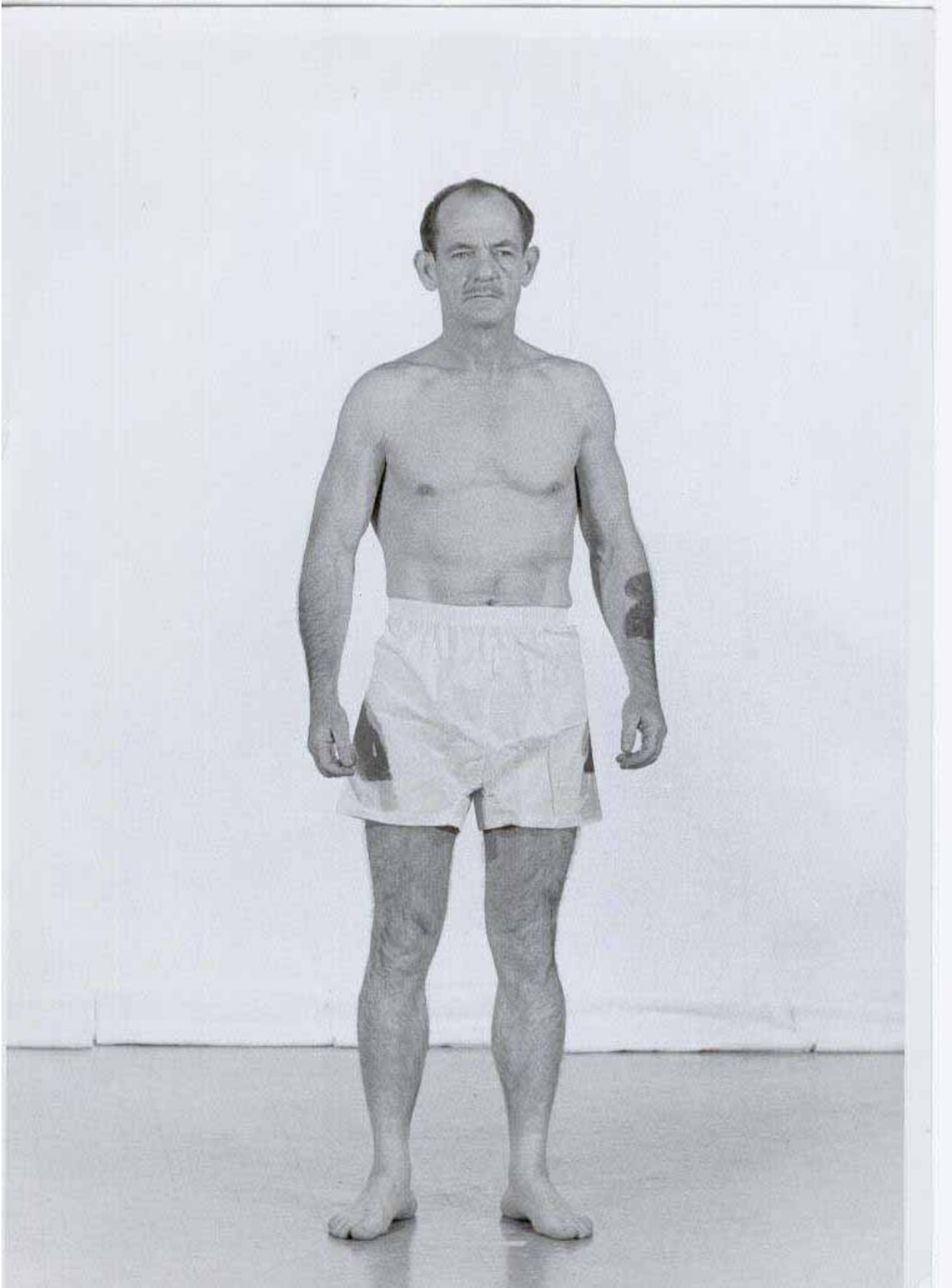
Even in the face of the fact of daily flights conducted in the city limits of their home town, it took the Wright Brothers several years to gain acceptance...and such hesitation existed even in a situation where no slightest threat to established commercial interests was involved. So we were not foolish enough to think that human nature has changed enough in the meantime to bring about instant acceptance of something as dramatic as hoped to do.

But we also realized that it had to be dramatic in order to attract the attention that we feel it deserves. The results of the Colorado Experiment will probably be a controversial subject for years to come, but in the end the facts will be clearly established and accepted by almost everybody; so perhaps controversy is a necessary evil, required to bring the truth into the open.

We hoped to establish several points during the course of the Colorado Experiment, and we also hoped to add to our own store of knowledge...now, after the fact, I am still not sure whether we demonstrated more than we learned, or vice versa. We certainly demonstrated what we set out to demonstrate; but in the process we learned a great deal as well.

Among other things, we hoped to demonstrate that (1) very brief workouts are capable of producing rapid and large scale increases in muscular mass and strength...(2) nothing apart from a reasonably balanced diet is required...(3) the so-called “growth drugs” are not required.

But in the course of the experiment we also learned that it is possible to produce large scale increases in muscular mass while actually REDUCING the starting level of fatty tissue. I had always felt that adding fat while increasing muscular weight was neither necessary nor desirable, but I had not previously realized that it was literally possible to increase muscular tissue rapidly while simultaneously reducing fatty tissue. So the experiment was far more than just a demonstration, it was a learning process as well.



A rare photo of Arthur Jones prior to his participation in the Colorado Experiment.

## Part 2: Background of the Experiment

### **Dr. Elliot Plese**

Late in 1970 my attention was called to a supposedly new concept in exercise called Nautilus, and a few months later, in June 1971, I visited the Nautilus plant in Florida for the purpose of examining the equipment being manufactured there, and for the secondary purpose of discussing the involved training principles with Mr. Jones, the inventor of the Nautilus equipment.

If the equipment appeared to offer improvements by comparison to conventional exercise machines and barbells, it was my intention to conduct a research project in which such a comparison could be made under controlled conditions.

After observing the training in progress at the Nautilus facility, and after talking to Mr. Jones for a number of hours over a period of three days, and after questioning several other people who had been using the new equipment for various lengths of time, I reached the conclusion that this new theory of exercise and the equipment that was required for its practical application was indeed worthy of serious investigation. In particular, I was impressed by the speed of the workouts, and the overall brevity of the training. Even if the final results proved to be no better than these produced by other methods, I realized that the reduction in training time was an enormous improvement in itself.

At the time of my visit to Florida, Casey Viator was being trained by Mr. Jones for the 1971 Mr. America contest, and after seeing him, I had no doubt that he would win. Which he did. Casey was 19 years of age, and weighed 218 pounds at a height of less than 5 feet, 8 inches. The mass of his muscular structures was far more than anything I had expected, but I was even more impressed by his strength and functional ability. His flexibility exceeded a normal range of movement to a marked degree.

During his last training session prior to the contest, Casey performed only three exercises for his legs, and the entire portion of his training devoted to his legs was completed in less than four minutes. He performed only one set of each exercise and moved immediately from one exercise to the next. Upon testing his pulse rate at the end of the brief leg training session I found it to be approximately 170.

The entire workout was continued at the same fast pace, and repeated checks indicated that his pulse rate seldom if ever dropped below 140 and never climbed above 180. Having devoted a number of years to research projects that were primarily concerned with cardiovascular conditioning of athletes, I realized that Casey was in marvellous condition, and I also realized that the possibilities for applying such a method of training to athletes in almost any sport were apparently unlimited.

I had previously been led to believe that exercise was necessarily divided into two distinct categories, exercises intended for cardiovascular conditioning, and exercises intended for the purpose of increasing strength. But it appeared these previous conclusions were in error, because the Nautilus training I observed in Florida seemed to be performing both functions, building strength and improving cardiovascular condition at the same time. While Casey was undoubtedly the strongest man I had ever seen, he was also in splendid condition. During the leg portion of his workout he started by performing more than 20 repetitions of the leg press with 750 pounds, stopping only when another repetition was impossible. He then moved immediately to the next exercise and performed 20 repetitions of the leg extension with 225 pounds. And this was immediately followed by the final exercise, 13 repetitions of the full squat with 503 pounds. Each exercise was terminated only upon reaching a point of failure, and no rest was taken between exercises. It was an impressive demonstration of body strength and condition, to say the least.

Two football players from Alabama, the Anderson brothers, Dennis and Walter, were spending the summer in Florida for the purpose of training under the supervision of Mr. Jones, and they trained in exactly the same manner that Casey did, using very heavy resistance and moving immediately from one exercise to the next.

A long talk with one these brothers, Dennis Anderson, brought forth the following information. A year earlier, a four week training program of Nautilus exercises increased his strength in the squat by exactly 50% from 6 repetitions with 280 pounds to 6 repetitions with 420 pounds. Similar strength increases were produced in all areas of movement, as a result of eleven brief workouts performed over a period of 28 days.

His brother Walter, produced equally good results from the same training program, and was also very enthusiastic about the new style of training. "Dennis and I trained with weights for four years," he told me, "but we gained more from four weeks of Nautilus training than we did from all of our barbell workouts put together. When we went back to school after a month down here, our coach couldn't believe the condition we were in. And we were faster, too."

Ellington Darden, a graduate student from Florida State University, was visiting the Nautilus facility at the same time, and he made an interesting comment, "The results are undeniable; but it would be interesting to know what percentage of the results are produced by the Nautilus machines, and what percentage are a result of pushing by Mr. Jones."

To which Mr. Jones replied, "You can't push with a rope. No amount of pushing will produce results by itself; the machines are tools, and like any tool they must be used properly if you expect to produce good results. All I do is make sure they use the machines properly; and if that takes pushing, and it sometimes does, then I push."

Everything I saw in Florida tended to confirm an impression that Nautilus training was perhaps the most significant development in the field of exercise, so I continued to communicate with Mr. Jones after my return to Colorado. Several months later, we agreed to conduct a 28 day test of high-intensity training under my supervision in the Colorado State University Exercise Physiology Laboratory, using Mr. Jones as the only subject. Initially, no thought was given to the use of Casey Viator as a second subject, since he was already very near the limit of his muscular potential.

Casey's involvement in the experiment came about by accident. In January of 1973, Casey lost part of one finger in an industrial accident, then nearly died when an injection produced an allergic reaction. The result being a loss in bodyweight and strength; on the day of the accident he weighed just over 200 pounds, but lost approximately 18 pounds before being released from the hospital.

Because of the nature of the injury, he was unable to resume training for a period of nearly four months, and during that time he lost an additional 17 pounds, reducing his bodyweight to approximately 167 pounds at the start of the experiment on May 1<sup>st</sup>, 1973. But in spite of the loss in bodyweight and several months out of training, Casey proved to be surprisingly strong. During an initial strength test conducted immediately prior to the first workout of the experiment, Casey's performances were recorded as follow...

Leg press.....	32 repetitions with 400 pounds
Standing Press.....	8 repetitions with 160 pounds
Supinated-grip chinning.....	7 repetitions with 50 pounds
Parallel dipping.....	12 repetitions with 50 pounds

A universal machine was used for both the pre-experiment strength tests and the later post-experiment tests, since we were interested in determining strength increases that would not be effected by skill. For the same reason, the above four exercises were selected as tests; since these movements are all basic exercises.

All strength tests were performed in strict style, and were carried to a point of muscular failure.

Bodyweight was determined by weighing nude on a calibrated scale. Muscular measurements were recorded with a paper tape crosschecked for accuracy with a steel tape. And percentage of bodyfat was measured by Dr. James E. Johnson, using the Whole Body Counter in the Department of Radiology and Radiation Biology. Resting pulse rate, breathing rate, and blood pressure were measured and recorded, and a number of tests were conducted with an eletromyograph.

Exactly similar tests were conducted with the second subject, Mr. Jones. With one rather surprising result; his bodyfat level was the lowest ever recorded in our laboratory during a number of years of conducting such tests, and we could find no record of a lower level in any of the literature. Yet Mr. Jones was not in an emaciated or weakened condition; on the contrary, he was in very good condition for a man of any age, and almost unbelievable condition for a man of his age.

The bodyfat levels of both subjects were very low at the start of the experiment; Casey Viator's starting level of bodyfat was 13.8% and Mr. Jones recorded a level of only 6.3%.

Sixteen Colorado State University athletes that were measured for direct comparison purposes recorded the following levels of bodyfat.

Best, Allen - 19 years / 221.9 pounds / 29.7% bodyfat  
Beyhl, Randall – 20 / 256.5 / 38.1%  
Chearno, Rick – 21 / 234.3 / 20.7%  
Craig, Jim – 20 / 244.9 / 36.3%  
Gallas, Dan – 18 / 232.3 / 28.2%  
Jones, Kim – 21 / 229.7 / 16.0%  
Kirk, Tracy – 22 / 213.1 / 31.2 %  
Kuhn, Greg – 20 / 223.7 / 28.2 %  
Lang, Andy – 22 / 248.2 / 34.5%  
Larson, Robert – 20 / 236.5 / 38.3%  
Newland, Ed – 21 / 288.0 / 39.8%  
Norman, Dave – 20 / 180.2 / 16.4%  
Price, William – 20 / 204.2 / 26.2%  
Simpson, Al – 21 / 267.1 / 35.7%  
Tracy, James – 20 / 217.7 / 31.2%  
Wallace, Tom – 20 / 229.7 / 19.7%

The average body fat level of these sixteen subject was 29.3 percent. Five other subjects from Florida, members of the party brought to Colorado by Mr. Jones, were also measured. With the following results.

Jones, Eliza – 29 / 118.14 / 27.8%  
Orlando, Nick – 32 / 186.34 / 16.9%  
Butkus, Dick – 30 / 257.27 / 35.2%  
Perry, Houston – 52 / 223.83 / 46.2%  
Perry, Katie – 40 / 145.31 / 42.7%

Dick Butkus, a professional football player for the Chicago Bears, came to Colorado to start a training program under the supervision of Mr. Jones; unfortunately, his schedule did not permit him to stay in Colorado long enough to establish a trend in his bodyfat level resulting from the training.

But an interesting point may haven been illustrated by another member of the party, Houston Perry. Mr. Perry had just lost approximately 30 pounds as a result of a well advertised diet, yet his level of bodyfat (46.2%) was higher than that of any of the other subjects. It appeared that his loss from the diet had consisted of a loss in lean body mass rather than bodyfat. This subject had been employed by Mr. Jones for less than a week, as a pilot, and had never performed any type of systematic exercise.

When compared to the other subjects, it is obvious that both Jones and Viator had very low starting levels of bodyfat; and I fully expected to see a marked increase in body fat content during the experiment; but in fact, quite the opposite occurred. While rapidly increasing in bodyweight, in muscular mass, and in strength, a steady loss in bodyfat was recorded for both subjects. To me, this was the most significant result of the experiment.



## Part 3: Conduct of the Experiment

Insofar as I can determine, there is no known drug that will improve the performance, or increase the muscular mass, of a healthy individual. Furthermore, I would like to go record at this point by stating..."I do not believe that such drug will ever be discovered. I think that such a result from any chemical is impossible."

I am fully aware that some drugs can improve the condition of a weakened individual, in cases of sickness or accident...but I also believe that a state of normal health is possible only in the presence of a very delicate chemical balance that is regulated automatically by the system. If any chemical is added for the purpose of upsetting this balance, the result can only be counterproductive.

In effect, there is no such thing as a "super chemical balance"...if the chemical balance is normal, you are healthy...if not, you are sick...and it matters not whether the state of imbalance is produced by too much or too little of a practical chemical. This has been proven repeatedly in literally thousands of tests conducted with animal subjects, and no slightest evidence exists in support of an opposite result with either animal or human subjects.

Certain hormones will help add muscular mass to a steer, or a gelding...but they will NOT produce the same result with a bull or a stallion. When an animal has been castrated, removing the testicles produces an abnormal situation where normal growth is impossible, giving such an animal the hormone drugs merely tends to restore a normal situation, a situation that would have existed naturally if the animal had not been castrated.

In such cases you are merely removing something and then trying to replace it in another manner; first creating a subnormal condition and then trying to restore normal health.

Yet the widespread bias in favor of such so called "growth drugs" borders on hysteria. Even suggesting that the use of these drugs is anything less than necessary automatically labels you a fool in some circles. And there is certainly no doubt that a lot of people are being fooled on this subject; but you can NOT fool your endocrine system, and when you add an un-required chemical for the purpose of disturbing a normal balance, you are NOT improving the situation.

Pointing to recent strength records as proof of the value of such drugs actually proves nothing. The fact remains that the single strongest human recorded in history established his records long before the drugs were ever used. Paul Anderson established records prior to 1958 that have never been approached and androgenic-anabolic drugs were apparently first used in athletic circles in 1960.

Bob Peoples established a deadlift record thirty years ago, lifting nearly 800 pounds at a bodyweight of approximately 180; today, a very few individuals have reached or passed that level of performance...but most of them weigh nearly twice as much as he did, and some of them weigh more than twice as much.

Men who establish such records are merely statistical standouts, literally genetic freaks; they are NOT the products of drugs, regardless of their opinions on the subject.

Great strength is a result of two factors...(1) individual potential, which cannot be improved...and (2) hard training, which will increase the strength of almost anybody.

But a third factor exists as a prerequisite...NORMAL HEALTH, without which, reaching the limits of potential strength is simply impossible. So you can improve a sick individual in some cases, but you can NOT turn a normal individual into a superman by chemical means. Such a result is impossible, and ridiculous on the face of it.

In a later chapter I will cover the use of such drugs in sports in far greater detail; for the moment, it is enough to go on record that drugs are of no value to a healthy athlete. But I am clearly aware that my position on drugs will be considered proof of my ignorance by many people; and that some others will consider it proof of my hypocrisy. In plain English...some people will call me a fool, and others will call me a liar. Simply because, at the moment, thousands of people have been so brainwashed on the subject of drugs that they have literally become “true believers”, looking upon themselves as the only ones in possession of the truth, and considering anybody who takes a different position either a fool or a fraud.

Equally strong superstitions exist on the “need” for high-protein food supplements, and the “requirement” for several hours of daily training; with exactly the same amount of actual proof that exists in support of drugs, NONE.

But again, these beliefs have taken such firm root that it is almost impossible to discuss the real facts with the believers; in many quarters, such beliefs have produced nothing short of a fanatical religion.

So we wanted to clearly demonstrate that rapid increases in both muscular mass and strength could be produced without the use of drugs, with nothing in the way of a special diet, and as a result of very brief training, and we wanted to do so under circumstances that would make both the results and the conditions undeniable.

Certain factors are required for the production of increases in muscular mass and strength; these factors are (1) high-intensity exercise...and (2) normal health. Nothing else is needed, and nothing else was provided in the Colorado Experiment.

Thirteen Nautilus Machines were transported by truck from the factory in Florida to the Exercise Physiology Laboratory at Colorado State University. Seven of them were standard production-model machines, identical to thousands of other Nautilus machines. But six of the machines were prototypes...“first of a kind”, experimental machines of a type that we have named OMNI MACHINES.

The Omni series of Nautilus Machines provide the user five options in the style of exercise that can be performed...(1) “normal”, which involves both positive and negative work...(2) negative-only...(3) positive-only...(4) negative-accentuated...(5) “hyper”, which involves maximum-possible positive work and even heavier negative work in the same repetition.

The Omni Nautilus Machines were never mentioned in print prior to the Colorado Experiment, and never have been previously used outside our training facility in Florida. Dr. Elliot Plese was aware of their existence, but had never seen them, the only prior use having been the training of professional football players under strict supervision and with no publicity.

For a period of approximately a year before the Colorado Experiment we conducted research to clarify the relative merits of “negative” exercise as compared to “positive” exercise, and the Omni Machines were a result of this research, designed in such a manner that a user could restrict his exercise to any particular style desired.

POSITIVE EXERCISE, or positive work, is produced when you are lifting a weight. Physiologists also call this CONCENTRIC CONTRACTION, but I prefer the less confusing term.

NEGATIVE EXERCISE, or negative work, is involved when you are lowering a weight. This form of work is also called ECCENTRIC CONTRACTION, and again I prefer the other term; primarily because “concentric” and “eccentric” sound too much alike and are frequently confused.

Most forms of exercise involve both negative and positive work; if you curl a dumbbell, you are performing positive work while the weight is going “up”...and negative work while the weight is going “down”.

If you do parallel dips, positive work is involved as your body is raised...and negative work as you lower your body.

Your muscles have distinct “strength levels”...your POSITIVE strength level is the weakest...your HOLDING strength level is considerably stronger...and your NEGATIVE strength level is the highest.

This simply means that you can “hold” more weight than you can “raise”...and that you can “lower” more weight than you can “hold”. For example. You might find that you can curl 100 pounds in good form, and that anything heavier is impossible...however, if someone handed you 120 pounds, you could hold it motionless in any position of curl. You would not be able to raise it higher, but you could prevent it from dropping. That would clearly demonstrate that your “holding” strength level was higher than your “positive” strength level.

AND...if, instead of 120 pounds, you were handed 130 pounds, you might find that you could lower it under control. It would not jerk your arm straight; instead, you could delay and slow its descent...even though you could not stop the downwards movement. This would demonstrate that your “negative” strength level was higher than your “holding” strength level.

Such relative strength levels are encountered in many daily activities but are frequently overlooked; for example, it should be obvious that you can walk down a flight of steps with a far heavier weight than you can carry up the same steps.

Both positive and negative work is involved in almost all sports activities, and even in our daily lives; but since we will cover the differences in positive and negative work in great detail in later chapters, it is now only necessary to establish that there is a difference.

The great value of “negative-only” exercise was at least suspected many years ago, but performing such style of exercise was difficult; because no equipment existed for the purpose, and it was necessary to involve a number of assistants to lift the weight, rendering such exercise impractical at best.

In negative-only exercises with conventional equipment, the trainee “lowers” a weight that has been lifted by assistants; which makes unassisted training impossible. But even with help, such a style of training is difficult; because a strong man can handle more weight in a negative-only style than two assistants can lift. Many years ago, Bob Peoples, one of the strongest deadlifters on record, was forced to use a tractor to lift a weight so that he could then lower it in a negative-only fashion; and he eventually became so strong that he was forced to help the tractor lift the weight.

Making use of assistants to lift weight, we tried negative-only exercises for a period of several months...with outstanding results. But eventually, several of our trainees became so strong that we were forced to design and build equipment that would lift the weight for them, since we were rapidly exhausting our source of possible helpers. The Omni Machines were designed to solve the “helper problem”, and they did.

For a period of about two years immediately prior to the Colorado Experiment, several companies in the exercise equipment business had been making what we considered to be grossly overstated claims on behalf of so-called “Isokinetic” exercise, a form of exercise limited to positive work.

The nature of an isokinetic device is such that negative work is totally removed...in fact, with isokinetic exercise, negative work is not only removed but is literally IMPOSSIBLE.

Having thus produced exercise devices that removed negative-work potential, the makers of these machines apparently felt called upon to announce that negative work is somehow “bad”, of no-value, dangerous, and counterproductive. From all appearances it would seem they were trying to convince the buying public that an actual shortcoming of their machines was somehow an advantage.

But the truth of the matter is that full-range exercise is utterly impossible without negative-work potential.

And it also happens that the intensity of work provided by negative work is far higher than it is in positive exercise.

So, by removing negative-work potential from their exercises, they were thus making full-range exercise impossible and lowering the intensity of exercise at the same time.

It should be clearly understood that we do NOT consider positive exercise “bad”...but we are clearly aware that negative exercise is better.

When the negative-work potential is removed from an exercise, there is no force available for pulling the muscles into the essential “pre-stretched” position at the start of an exercise, and no “back pressure” available to provide exercise in the fully-contracted position at the end of the movement; thus there is no resistance at either end of an exercise, and without resistance there is no actual exercise.

We will return to a comparison of negative exercise to positive exercise in later chapters; at this point it is necessary only to establish the fact that we were aware of the relative merits of these two vastly different forms of exercise prior to the Colorado Experiment.

It was my original intention to use negative-only exercise entirely during the Colorado Experiment, to avoid any slightest use of positive exercises; but circumstances made this impossible, since we were scheduled to start the experiment on a particular date and a delay would have involved a postponement of a year or more, and because we did not have a wide enough variety of negative-only equipment for such a program.

But it should be understood that my original intention to use negative-only exercises was NOT based on any thought that such a program could produce the best possible degree of results; on the contrary, we wished only to demonstrate that negative-only exercises could produce very good results.

As it turned out, we were forced by circumstances to use several types of exercise...(1) negative-only...(2) negative-accentuated...and (3) normal. But we did NOT use positive-only exercises.

The positive part of exercise certainly has value...but it also imposes limitations. It is thus essential to recognize the potential value, but equally necessary to be aware of the unavoidable limitations imposed by positive exercise.

Positive work has a far greater effect upon the heart and lungs, so improving cardiovascular condition requires positive work; but negative work is an absolute essential for full-range exercise, and thus a requirement for improving flexibility...and negative work is also better for the purpose of increasing strength. So you need both positive and negative work.

Unfortunately, when both positive and negative work are involved in the same exercise, as they are in all “normal” exercises, you are limited by the requirements to use a weight that you can lift...which weight will not be enough for a proper negative exercise.

In order to perform positive work, you must be able to lift the weight; if you can't lift it, then no work is possible. But proper negative exercise requires a weight so heavy that you can NOT lift it. Obviously, then, your positive strength level limits your ability to perform negative exercises properly...when both forms of work occur in the same exercise.

If the weight is right for positive work, then it is too light for negative work. But if it is right for negative work, then it is impossibly heavy for positive work. So you can have one or the other, but not both...not at least, with a proper level of resistance.

Thus, when performing exercises in a normal manner, you are unavoidably limited to a level of resistance that is usable during the positive part of the work...which will not be, literally can NOT be, heavy enough for proper negative work. In order to avoid this limitation imposed by positive work, you must remove the positive part of an exercise entirely...when training with conventional equipment, at least.

But...when the positive part of an exercise is removed in order to provide a proper level of resistance for negative work, the result is a form of exercise that has very little effect upon the cardiovascular system. So negative exercise is better for strength building purposes...but worse for improving cardiovascular ability.

The Omni Nautilus Machines were designed in such a way that both limitations were removed; the Omni Machines provide the proper, high level of resistance for the negative work...but do not reduce the cardiovascular work from the exercise. Because, with the Omni Machines, you are still performing the positive part of the work...but doing it with muscular structures that are not involved in the negative part of the exercise.

In fact, the use of an Omni Nautilus Machine Increases the cardiovascular part of the work; because the level of resistance is raised in both the negative and positive parts of the exercise.

So the Omni Machines solved both problems, removed both limitations; providing us with the required high level of resistance for the negative part of the work, and at the same time increasing the cardiovascular effect of the exercise.

For example. In a normal exercise such as the bench-press, you perform both positive and negative work; positive work while lifting the weight and negative work while lowering it. Which style of exercise will have an effect upon your cardiovascular system, and will produce some degree of muscle growth stimulation.

Changing this to a negative-only style of exercises greatly improves the strength building part of the work, but reduces the effect on the cardiovascular system.

However, with the Omni Machines, you would raise the weight with your legs, and lower it with your arms. By taking advantage of the greater relative strength of the legs, you are thus able to use a weight that would be impossibly heavy for the arms, a weight that you could NOT lift with the arms; but you can lift it with the legs, and having done so, you can then lower it in a negative-only fashion with the arms. So you are still doing the positive part of the work, and since you are using more resistance than you can handle in a normal fashion you are thus doing even more positive work; while retaining the advantage of the negative-only style of training for the arms.

The fact that the legs are doing the positive part of the work while the arms are performing the negative part is of no slightest concern; since the heart and lungs neither “know” or “care” which muscles are performing the positive part of the work. Cardiovascular effects of exercise are produced to the amount and pace of work...so some muscles must be performing positive work for the cardiovascular results, but it doesn't matter which muscles.

Writing for a national magazine nearly a year before the Colorado Experiment, I pointed out the proven value of negative-only exercises for building strength...and I also mentioned the fact that such exercise was of little or no value for improving cardiovascular ability. Which was true at that time, since the available equipment made it necessary to totally remove positive work from the exercises in order to use a proper level of resistance for negative-only work. So, at that time, it was an “either/or” situation...you could have one or the other, but not both.

But the introduction of the Omni Machines changed the situation; it then became possible to increase the resistance to the high level required for negative-only exercise, while increasing the cardiovascular effect at the same time.

In the Colorado Experiment, we were primarily interested in producing rapid and massive increases in muscular mass, together with corresponding strength increases; in order to demonstrate that such a rapid rate of growth was possible...and, secondly, in order to demonstrate that such rapid growth could be produced as a result of very brief workouts.

Increases in cardiovascular ability can be supported on the basis of before and after tests, but increased muscular mass can be seen...provides a more dramatic, more obvious result, the type of result that is sometimes required to make a point.

With the use of “self-powered” machines that do not yet exist in practical form, it would be possible to provide the required high level of resistance for proper negative-only exercises while totally removing the positive part of the work; and if such machines had then existed, we would have used them in the Colorado Experiment...well aware in advance that doing so would have produced little or nothing in the way of cardiovascular benefits, but being willing to pay that price in order to demonstrate that positive work is not required for producing rapid increases in muscular mass and strength.

But since such “pure negative” machines did not exist, we were forced to use normal exercises, some negative-accentuated exercises, and some negative-only exercises performed on the Omni Machines...and a few pure-negative exercises that required the help of assistants to lift the weight.

The end result being that even the Colorado Experiment was not a clear demonstration of the superiority of negative-only exercise for strength building purposes, because other styles of exercises were also involved...and thus it remains impossible to say for sure just what percentage of the results was produced by a particular style of exercise.

Which I not meant to imply that no support for the superiority of negative-only exercise exists; it does, but it remains necessary to repeat and reconfirm our privately conducted experiments under laboratory conditions while being observed by impartial, or even hostile, witnesses. And such experiments must be limited to “pure-negative” exercises, with control groups of subjects using “pure positive” exercises for comparison.

Until and unless that has been done, and repeatedly...many people will remain in doubt on the subject of the relative merits of the two distinct forms of exercise. So it will be done, and done repeatedly...and in fact, it already has been done, but unfortunately such comparisons have not yet been given the publicity that they deserve. But in the meantime, already being clearly aware of the advantages of negative exercise, we can and do avail ourselves of these advantages while many other people are still trying to decide what to do.

The unfortunate part of the situation results from the fact that most people simply don't know the real facts, and when they are exposed to a barrage of advertising listing the so-called "advantages" of a positive-only form of exercise, they tend to become confused. In the end, the truth will be known...but in the meantime, millions of dollars will have been wasted on equipment of little or no real value, and thousands of trainees will have devoted years of training time to an almost worthless form of exercise. The facts are clear, and undeniable...but the stakes are high, so the facts will be denied in some quarters for years to come.

It would be easily possible for Nautilus Machines to be built with a so-called "isokinetic" form of resistance, thus providing positive-only exercise...and doing so would greatly reduce the cost of the machines, thus affording a much wider market and far greater profits. Be it clearly understood that there are no patents protecting such a form of resistance, it is freely usable for any purpose by anybody.

But incorporating such a form of resistance necessarily means REMOVING negative-work potential, which in turn means that a full-range exercise is then impossible. Because there is no force to provide pre-stretching at the start of an exercise, and no back-pressure to provide resistance at the end of an exercise.

And it also means a loss of the very high level of intensity that is encountered only in negative work, and with it a loss of a great part of the growth stimulation that is provided by high-intensity work.

So Nautilus Machines will never be built with such a form of resistance...since doing so would greatly reduce their value.

The claims of the people who are now selling and promoting various types of positive-only exercise devices strongly remind me of a man who has designed a new type of automobile...without understanding the function of an automobile. Having removed the engine on the grounds that an engineless car would be cheaper, he might then point to the result as an "improvement."

In an almost exactly similar situation, the makers of positive-only devices have removed the most important factor required for growth stimulation, negative work...and are now pointing to the result as an improvement.

Perhaps these people simply don't understand the actual factors involved in exercise, or perhaps they don't care about the facts...take your pick. But in either case, it is a poor choice; on the one hand, their ignorance is showing...and on the other hand, they are engaged in outright fraud.



Eventually. Ignorance will be corrected...or fraud will be stopped; but in the meantime the public suffers.

Unfortunately, neither ignorance nor fraud are new in the field of exercise; on the contrary, exercise has been so deeply mired in both ignorance and fraud that the actual value of exercise has been overlooked to a great degree. Many – perhaps MOST – people look upon the entire subject of exercise with great suspicion, and with good reason; because, to them, exercise means a fanatic strutting on a beach, or an obviously phoney advertisement for overweight women.

Almost nothing is perfect, and we certainly do not consider our present style of training perfect...so we will be more than glad to improve it in any way we can, if and when the necessary information is available to us. But perfect or not, the style of training that we are using now is by far the most productive type of exercise known. And any attempt to compare it to a positive-only form of exercise is utterly ridiculous, on the order of comparing an automobile to an ox-cart.

A strong statement...but, if anything, an understatement; since the two forms of exercise are literally worlds apart.

Nearly twenty years ago, using conventional training equipment, I eventually reached a muscular bodyweight of 205 pounds of less than 5 feet, 8 inches. Five years ago, I was able to reach a muscular bodyweight of 180 pounds after nearly five months of steady training...at which point, additional growth was obviously impossible, for myself as an individual at that age.

Yet, four years later, and four more years removed from an age when my muscular potential was highest...I was able to duplicate those strength increases as a result of only six weeks of negative-only training.

In effect, I produced the same results...but I did so when four years older, at a stage in my life when that four years meant a significant loss in individual potential...and I did so from a tiny fraction of the previously required training time, since my negative-only workouts were much briefer than my previous workouts.

Up to this point in time, every single subject that we have trained in this fashion has produced a similar increase in his previous rate of growth.

When you have been training an individual for years, and when he has already reached a point where his strength is far higher than the average, and when you suddenly switch him to a negative-only style of training...and he immediately starts growing much faster than he ever did before, and rapidly reaches a new high in strength; then that is a significant result. And we have done that repeatedly.

And even while such a result is no proof that our method is yet perfect, it certainly is proof that it is an improvement.

So the Colorado Experiment was more in the way of a demonstration than an experiment...since we knew well in advance that we could do what we set out to do; but as it turned out, we did even more that we set out to do...while producing rapid increases in muscular mass, we also removed a large amount of bodyfat. Which was a result that surprised even us.

The Colorado Experiment was conducted entirely with Nautilus equipment, using as much negative work as it was possible to perform under the circumstances with the available equipment. The workouts were fast and brief, and in almost all workouts we performed one "set" of each exercise.

Each exercise was carried to the point of momentary muscular failure, and all exercises were performed in good form...stopping at both ends of the movement, and avoiding jerking.

We had overlooked only one factor of importance, the altitude. Coming from sea level immediately before the start of the experiment, we were not prepared for the 5,000 foot altitude of Fort Collins, and we were forced to reduce the pace of our workouts...which probably added at least two hours to our total training time during the 28 days.

But in spite of that handicap, Casey Viator still produced a muscle-mass increase in excess of 63 pounds, as a result of less than 8 hours of training...which is certainly significant.

## Part 4: Results of the Experiment

### Dr. Elliot Plese

On May 1<sup>st</sup>, 1973, a strength test was conducted in the weight-room at Colorado State University. Two subjects were tested, Arthur Jones and Casey Viator. At the suggestion of Mr. Jones, a Universal machines was used for the tests; because, as he said, "If we use our own equipment for the strength tests, a question may then be raised on the subject of basic strength increases."

A secondary reason for using a Universal machine was the fact that similar exercises performed with a barbell require more skill, and since we were primarily interested in measuring basic strength it was desirable to reduce the factor of skill as much as possible.

Exactly 28 days later, on May 29<sup>th</sup>, 1973, a second strength test was conducted with one of the subjects, Casey Viator; the other subject, Arthur Jones, was not tested at the end of the experiment, because he became sick on the night of May 26<sup>th</sup> and was admitted to the hospital with intestinal flu. Which sickness prevented him from completing the experiment as planned. However, all of the workouts that were performed by Mr. Jones were observed and timed by myself and a number of other witnesses, and his rapid increases in strength was obvious from workout to workout.

Having started at a bodyweight of 144.1 on May 1<sup>st</sup>, Mr. Jones was weighted immediately before his workout on May 26<sup>th</sup>; in a period of 25 days his bodyweight had increased to 162.375, a net gain in bodyweight of 18.275 pounds. But his bodyfat level had been reduced in the meantime; a bodyfat measurement in the Whole Body Counter on May 23<sup>rd</sup> indicated a loss in bodyfat of 1.825 pounds, so it is reasonable to assume that his actual gain in lean body mass (muscular tissue) was approximately 20.1 pounds.

But even if we take the figures recorded on May 23<sup>rd</sup>, the results are very impressive. During the first 22 days of the experiment Mr. Jones gained 13.62 pounds of bodyweight while reducing his bodyfat level by 1.82 pounds, a net gain in lean body mass of 15.44 pounds.

It was the original intention of Mr. Jones to train his entire body, performing one set of an exercise for each major muscle group; but upon arriving in Colorado for the start of the experiment, he was obviously suffering from a deep chest cold. The effects of the cold, in combination with the altitude and his age, made it apparent that he would not be able to train as much as he had planned. I suggested that the experiment be postponed for a month, but that would have been impractical because of other obligations. As a result, Mr. Jones restricted his workouts almost entirely to exercises for the upper body, the arms, the shoulders, the chest, and the back. A few light exercises were performed for the legs, but only enough to maintain muscle tone in that area of the body.

Which makes his gains in muscle mass even more remarkable, since it is well established that rapid weight gains are best produced by heavy exercise for the legs and lower back, a type of exercise that was not involved in his workouts.



Casey Viator's before and after photos during the Colorado Experiment.

The localized nature of his muscle-mass increases was very obvious, with little or no change in the size of his legs but large scale increases in the muscle mass of his torso and arms. His arms increased by one and five-eighths inches (1 5/8 inches).

In the lack of a post-experiment strength test, an accurate determination of his strength increases was impossible; but a reasonably accurate estimate can be based on the changes that occurred in the amount of resistance used in his workouts, since all exercises were continued to a point of momentary failure. For example, during the 1<sup>st</sup> workout on May 1<sup>st</sup>, he performed 7 repetitions on a Torso/Arm machine with 225 pounds; then 15 days later, during the 9<sup>th</sup> workout on May 16<sup>th</sup>, he performed the same number of repetitions (7) with 300 pounds, indicating a strength increase in that area of movement of exactly 33 1/3 percent. Very similar strength increases were obvious in all areas of movement that were exercised heavily.

Having seen him at the start of the experiment, I seriously doubted that he could produce much in the way of improvement in such a short period of time; but I was wrong, he gained steadily but rapidly, and was actually gaining faster near the end of the experiment. While the other subject's rate of gaining decreased near the end of the experiment, Mr. Jones showed a faster rate of gains during the final two weeks of his training. Which may have been due to the fact that his chest cold limited his gains during the first two weeks.

The following chart will clearly indicate the actual gains and the rate of gaining of both subjects.

SUBJECT, Casey Viator

DATE	BODYWEIGHT	GAIN	DAILY AVERAGE
5/1/73	166.87	Start	Start
5/15/73	195.8	28.93	2.06 pounds per day
5/18/73	199.72	3.92	1.30 pounds per day
5/23/73	205.81	6.09	1.21 pounds per day
5/29/73	212.15	6.34	1.05 pounds per day

SUBJECT, Arthur Jones

DATE	BODYWEIGHT	GAIN	DAILY AVERAGE
5/1/73	144.21	Start	Start
5/8/73	148.28	4.07	0.58 pounds per day
5/18/73	153.23	4.95	0.70 pounds per day
5/23/73	157.83	4.60	0.56 pounds per day
5/26/73	162.37	4.54	1.51 pounds per day

It should be noted, however, that the final bodyweight figure recorded for Mr. Jones is somewhat misleading; all of other weights were recorded early in the morning, with an empty stomach, but the final bodyweight listed for Mr. Jones was recorded several hours after a normal weighing time, immediately before his final workout. Previous comparisons had indicated a difference of approximately 2 pounds in this subject's bodyweight during that span of time; he was approximately 2 pounds heavier just before a workout, by comparison to his bodyweight recorded early in the morning of the same day.

So it would be reasonable to deduct two pounds from his final bodyweight, and if we do so, then the resulting gain would be only 2.54 pounds instead of 4.54 pounds. And the rate of gaining would be 0.84 pounds per day instead of the listed 1.51 pounds.

But in either case it is obvious that his gains were steady throughout the period of training, and equally obvious that his actual rate of gaining was increasing near the end of the experiment.

During the first two weeks of the experiment, Casey Viator gained 28.93 pounds, an average of 2.06 pounds per day. During the final two weeks he gained 16.35 pounds, an average of 1.16 pounds per day. So his rate of gaining declined by approximately 43% during the final two weeks; which was only to be expected. But even during the final six days of the experiment he was still gaining in excess of a pound a day.

Neither subject produced sudden spurts of growth that might have indicated dehydration prior to the start of the experiment; on the contrary, the actual gains and the rate of gains displayed by both subjects remained remarkably steady throughout the experiment.

But remarkable as they were, the bodyweight gains do not indicate the actual results; because both subjects reduced their starting level of bodyfat during the experiment, indicating that they were rapidly adding bodyweight while reducing bodyfat at the same time, a result that I previously considered impossible.

While increasing his bodyweight by 45.28 pounds, Viator reduced his starting level of bodyfat by 17.93 pounds, indicating an actual increase in lean body mass (muscular tissue) of 63.21 pounds.

The results produced by Mr. Jones have been listed above, and when due consideration is given to the great difference in age in these two subjects, I think the final results are equally remarkable.

For his part, Mr. Jones expressed dissatisfaction with his own results; saying that he fully expected to increase his bodyweight by at least 30 pounds. And he promised to repeat the experiment at a later date under better conditions, at an altitude of sea level and without the starting handicap of a chest cold. He also expressed the belief that his starting bodyweight was too low; he feels that he would have gained better from a starting bodyweight of approximately 155 pounds.

Casey's strength increases were fully on a par with his increases in muscle mass, as the following chart will show.

STRENGTH TEST	MAY 1 <sup>st</sup>	MAY 29 <sup>th</sup>	INCREASE
Leg Press	400/32	840/45	+440 = 110%+
Chinning	217/7	287/11	+70 = 32%+
Standing Press	160/8	200/11	+40 = 25%+
Parallel Bar Dipping	217/12	312/16	+95 = 43%+

During the initial strength test, leg presses were performed to a point of failure on a Universal machine, using 400 pounds; with 32 resulting repetitions. Four weeks later, Viator used 840 pounds in the same exercise, and performed 45 repetition; the increase in resistance was thus 110%, but the fact that he also performed more repetitions indicates that his actual strength increase was even higher.

Chinning was performed with a supinated (palms up) hand grip, with 50 pounds added to bodyweight in the form of a barbell plate fastened to the waist with a belt. In the final test, 75 pounds of added resistance was used, but in the meantime the subject had increased his bodyweight by 45 pounds, so the actual increase in resistance was 70 pounds. So his strength had clearly increased by 32% on the basis of added resistance, and even more than that when consideration is given to the fact that he also increased the repetitions from 7 to 11.

In the standing press, the increase was 25% on the basis of increased resistance, but the actual increase was even higher, since he also increased the repetitions from 8 to 11.

In the parallel dipping, 50 pounds of weight was added to bodyweight during the initial test, and 100 pounds during the final test, and again the subject had added 45 pounds of bodyweight in the meantime, giving an actual increase in resistance of 95 pounds. On the basis of the increased resistance his strength increase in this movement was 43%, but again he increased the repetitions as well, from 12 to 16, thus indicating an even greater strength increase.

It should also be noted that Viator was still suffering limited use of his right hand as a result of the accident that occurred during the previous January, and this affected him to some degree in all exercises involving the hands, chinning, pressing, and dipping.