

The Colorado Experiment

by Arthur Jones

The following is a brief, preliminary report of an experiment conducted at Colorado State University in May of 1973. A detailed, book-length report titled "Progressive Exercise" will be published in 1974.

LOCATION . . . Department of Physical Education, Colorado State University, Fort Collins, Colorado.

SUPERVISION . . . Dr. Elliott Plese, Director of Exercise Physiology Lab., Colorado State University.

DATES . . . May 1, 1973 through May 29, 1973 for one subject (Casey Viator), an elapsed period of 28 days . . . and May 23, 1973 for the second subject (Arthur Jones), an elapsed period of 22 days.

LEAN BODY-MASS and **FAT CONTENTS** determinations for both subjects were produced by the **WHOLE-BODY COUNTER** under the supervision of James E. Johnson, Ph.D., Associate Professor, Department of Radiology and Radiation Biology, Colorado State University.

PURPOSE of the **EXPERIMENT** . . . it is the author's contention that the growth of human muscular tissue is related to the intensity of exercise; increases in strength and muscle-mass are rapidly produced by very brief and infrequent training . . . if the intensity of exercise is high enough.

It is the author's second contention that increasing the amount of training is neither necessary nor desirable . . . on the contrary, a large amount of high-intensity training will actually reduce

It is the author's third contention that "negative work" (eccentric contraction) is one of the most important factors involved in exercise performed for the purpose of increasing strength and muscle-mass.

It is the author's fourth contention that nothing in the way of a special diet is required . . . so long as a reasonably well-balanced diet is provided.

It is the author's fifth contention that the use of the so-called "growth drugs" (steroids) is neither necessary nor desirable . . . on the contrary, repeated tests with animals and double-blind tests with human subjects have clearly demonstrated that the use of such drugs is strongly contraindicated.

It is the author's sixth contention that maximum-possible increases in strength and muscle-mass can be produced only by the use of full range, rotary form, automatically variable, direct resistance.

FULL-RANGE resistance is provided only when the involved body-part is moved through a full range of possible movement against constant resistance . . . from a starting position of full muscular extension (a "pre-stretched" position) to a finishing position of full muscular contraction.

ROTARY-FORM resistance is an absolute requirement for full-range exercise . . . since muscular contraction produces a rotary-form movement of the related body-part, it is necessary for the resistance and the body-part to rotate on a common axis.

for high-intensity exercise . . . since movement produces changes in usable strength, it is necessary for the resistance to vary in proportion to the resulting changes in strength.

DIRECT resistance is also required in order to avoid the limitations imposed by the involvement of smaller, weaker, muscular structures. The resistance must be "directly" imposed against the body-part moved by the muscles being exercised.

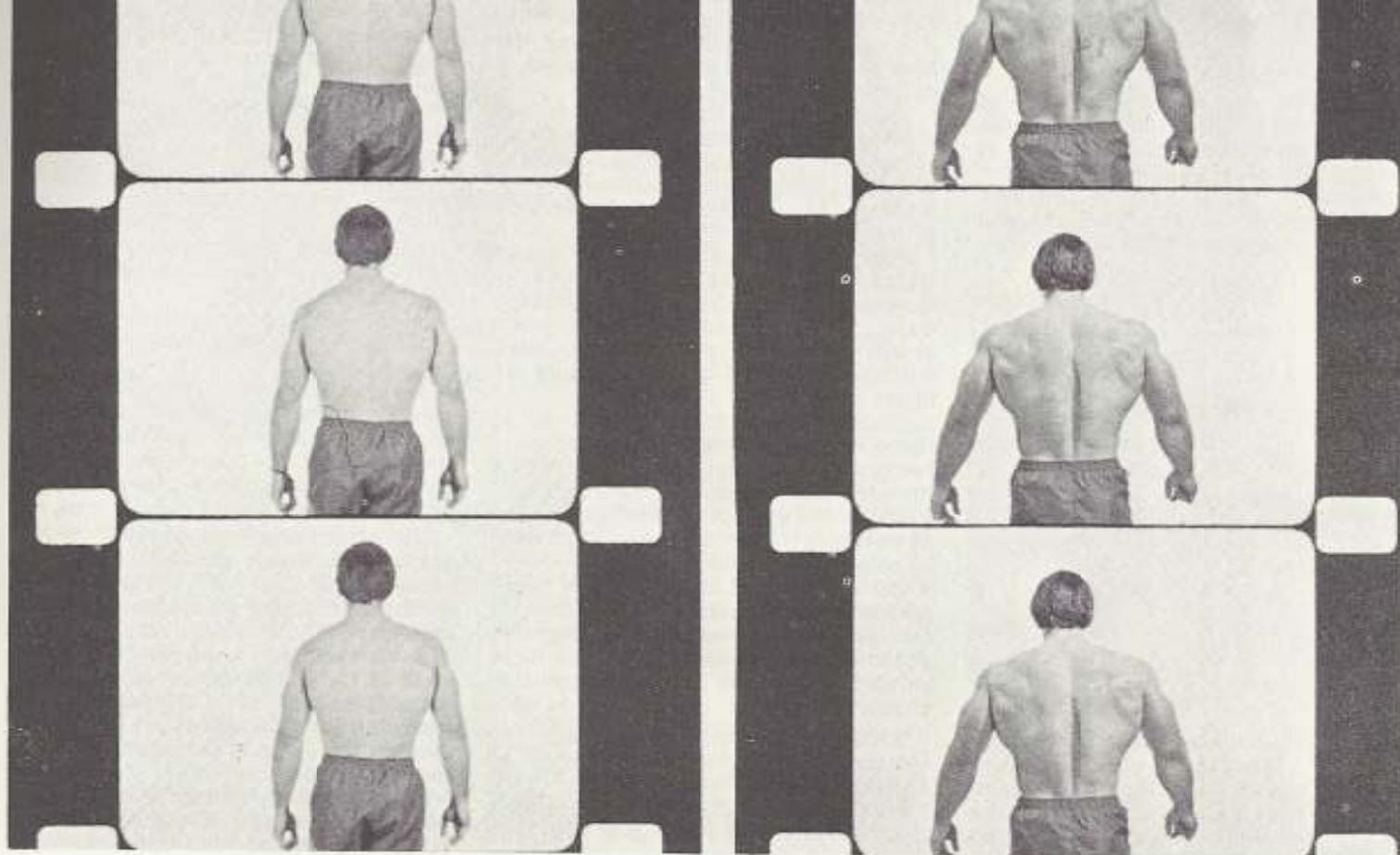
Conventional forms of exercise provide none of these requirements; the results being that . . . muscles are not worked throughout a full range of possible movement . . . resistance is limited to an amount that can be moved in the weakest position . . . little or nothing is done in the way of improving flexibility, since there is no resistance in the fully extended position . . . and no resistance is provided in the fully contracted position.

Only Nautilus equipment was used in the Colorado Experiment; equipment designed to provide all of the requirements for full range, rotary form, automatically variable, direct resistance.

RESULTS . . .

First subject (Casey Viator), 28 days
 Increase in bodyweight . . . 45.28 pounds
 Loss of bodyfat . . . 17.93 pounds
 Muscular gain . . . 63.21 pounds
 Second subject (Arthur Jones), 22 days
 Increase in bodyweight . . . 13.62 pounds
 Loss of bodyfat . . . 1.82 pounds
 Muscular gain . . . 15.44 pounds

It should be clearly understood that neither of the subjects was an "average" subject, and there is no implication that subjects of average or below average potential will all produce



regular basis for a period of several years; with barbells and other conventional training equipment until June of 1970, at which point he placed third in the Mr. America contest . . . and with both barbells and Nautilus equipment until June of 1971, when he won the Mr. America contest.

From September of 1971 until September of 1972, he trained primarily with Nautilus equipment . . . with limited use of a barbell, primarily the performance of barbell squats.

From September of 1972 until December 23, 1972, he trained exclusively with Nautilus equipment . . . limiting his exercises to "negative only" movements. At the end of that period of training he weighed 200.5 pounds.

In early January of 1973, he was involved in a serious accident at work and lost most of one finger as a result . . . and almost died from an allergic reaction to an antitetanus injection.

For approximately four months, most of January through April of 1973, he did not train at all; and since his level of activity was low, his diet was reduced accordingly. During that period of approximately four months, he lost 33.63 pounds . . . but 18.75 pounds were lost as a direct result of the accident and the near-fatal injection. So his loss from nearly four months out of training was only 14.88 pounds . . . less than a pound a week.

The second subject (the author, Arthur Jones) has trained on a very irregular basis for a period of thirty-four years . . . and reached a muscular bodyweight of 205 pounds at one time, nineteen years ago.

The author did no training of any kind for a period of approximately four years

approximately six weeks. Training was ceased entirely in early January of 1973 . . . and no training was done again until the start of the Colorado Experiment.

The author's bodyweight has varied from approximately 145 to 160 for the last ten years . . . briefly reaching a level of 180 at the end of approximately six months of steady training that was concluded four years prior to the start of the Colorado Experiment.

So both of the subjects have demonstrated the potential for greater than average muscular mass . . . and both subjects were rebuilding previously-existing levels of muscular size.

A certain percentage of a group of random subjects would undoubtedly produce equal results . . . a very low percentage might produce better results . . . a few subjects would produce little or nothing in the way of results . . . but average results would probably be less than those produced by the two subjects in this experiment. The primary determining factors being (1) individual potential for muscular size, (2) age, (3) general health, and (4) the intensity devoted to the training.

Actually high-intensity training is not easy . . . the training sessions are brief, indeed must be brief, but there is an apparently natural inclination on the part of most subjects to "hold back." Most exercises are terminated at a point well below an actual point of muscular failure . . . then, in an effort to compensate for the reduction intensity, the usual practice is to add more exercise to the program.

However, in fact, no amount of additional exercise will compensate for a reduction in the intensity of exercise . . . and if carried to extremes, which such

Casey Viator photographed on 35mm film before the experimental training May 1, 1973, weighing 166.87 on the left (at left on opposite page and above) and after 28 days of the experiment on May 29, 1973 weighing 212.15 lbs.

As stated previously, it is the author's contention that very rapid and large-scale increases will be produced in strength and muscular mass by a very brief program of high-intensity exercise; and it was the purpose of this experiment to demonstrate that such results can be produced in practice as well as in theory.

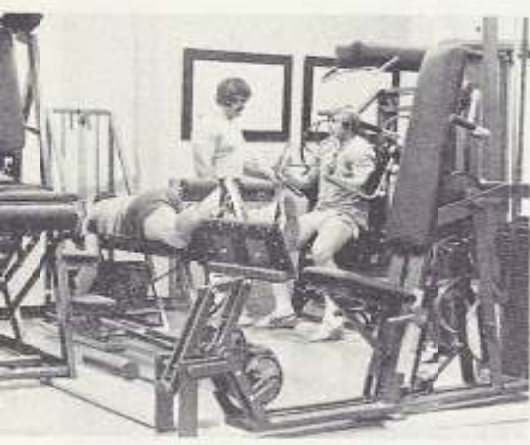
At the moment, in athletic training circles, it is well accepted that supplemental strength training can be of very great value to athletes involved in any sport. But in practice, a seemingly natural inclination to equate "more" with "better" is actually preventing most athletes from producing the results that could be produced.

Many coaches avoid supplemental strength training because they "don't have time" . . . but in fact, very little time is required; if the exercises used are high-intensity exercises properly performed.

Nor is it the author's contention that using the proper equipment is the entire answer in itself . . . on the contrary, good results can be produced with a barbell or with conventional training machines such as the Universal Machine, or with any equipment that provides both negative and positive work. The demonstrated superiority of Nautilus equipment will be largely wasted if the equipment is improperly used . . . Nautilus equipment is designed to provide a level of intensity that is



A view of one end of the laboratory at Colorado State University during the Colorado Experiment, showing seven of the Nautilus Machines used in the experiment, including two of the new Omni series of Nautilus Machines and the new Squat Machine.



One of the Broncos uses a Nautilus Pullover Machine, while another Bronco looks on and a third member of the team uses a Leg Curl Machine. The tall machine on the left is the new Squat Machine. The complex machine on the right is the new Omni Shoulder Machine.



Soon after the start of the Colorado Experiment, Casey Viator contracts the muscles of his arm while Dr. Elliott Plese monitors the result on one of the machines used for testing the subjects of the experiment.

Proper training will produce rapid but very steady increases in both strength and muscular mass . . . and this was demonstrated very clearly by the results of the Colorado Experiment.

For example. During the first 14 days, Viator gained 28.93 pounds, a daily average of 2.06 pounds. During the next 3 days, he gained 3.92 pounds, a daily average of 1.3 pounds. During the following 5 days, he gained 6.09 pounds, a daily average of 1.2 pounds. And during the final 6 days, he gained 6.34 pounds, a daily average of 1.05 pounds.

So it is clear that his "rate of gaining" was slowing down at the end of the

4.08 pounds. During the next 7 days, 4.95 pounds were gained, a daily average of .7 pounds. And during the final 8 days, 4.6 pounds were gained, a daily average of .57 pounds.

There were no "sudden spurts" of growth in either case . . . so we obviously were not putting back weight lost from dehydration; instead growth was very steady throughout the periods of training.

During a period of 22 days, the author trained a total of 12 times. Three workouts in a row during the first three days in order to quickly get over any resulting muscular soreness, then workouts spaced approximately 48 hours apart.

Total "training time" (in and out of the gym) was exactly 298 minutes . . . 4 hours and 58 minutes, an average of 24.8 minutes per workout.

122 "sets" were performed during the 12 workouts . . . an average of just over 10 sets per workout.

Out of the total of 122 sets, 54 were performed in a "negative only" fashion . . . 14 were performed in a "negative accentuated" fashion . . . and 54 were performed in a normal (negative-positive) style.

NEGATIVE ONLY means that the resistance was "lowered" only, involving eccentric contraction.

NEGATIVE ACCENTUATED means that the resistance was raised with both arms (or both legs), and then lowered with only one arm (or leg).

NORMAL means that the resistance was raised with both arms (or legs) and lowered in the same fashion.

Only one "set" of each exercise was performed in almost all workouts, and when two sets of an exercise were performed they were never performed in sequence.

When two sets of any particular exercise were performed, they were done at different points in a workout . . . and were done for different reasons. For example: a type of "dipping" exercise was sometimes performed for two different purposes . . . this exercise would be used immediately following a direct triceps exercise in order to involve the chest muscles for the purpose of working the already pre-exhausted triceps muscles to an even higher level of intensity . . . then, at another point in the workout, an almost exactly opposite purpose was served when the same exercise was used in order to provide an even higher intensity of work for the previously pre-exhausted chest muscles.

While the above paragraph may be rather confusing at first glance, this style of training is actually quite simple . . . as the following example will show.

When worked to a point of momentary failure against direct and isolated resistance imposed only against the triceps, the triceps can be forced to continue to a point of even greater intensity if a second exercise is performed immediately after the first exercise. But the second exercise must bring into use other muscular structures that make it possible for the triceps to continue.

So we first worked the triceps in a direct exercise, to a point of failure . . . and then immediately performed a second exercise, a "dipping" type of movement, with variable resistance.

to be worked far beyond a normal point of failure.

Thus, in that case, the dipping exercise was performed for the purpose of totally exhausting the triceps.

But at another point in the workout, the same dipping exercise was used to totally exhaust the chest muscles. In this case, the chest was worked first . . . to a point of failure. Then the dipping exercise was performed immediately afterwards, bringing the strength of the triceps into use in order to permit the chest muscles to be worked beyond a normal point of failure.

However, in general, we performed only one set of each exercise during each workout.

The author's gains from this very brief program were as follow . . . an average of 1.28 pounds per workout . . . an average of .126 pounds per set . . . an average of 3.06 pounds per hour of training.

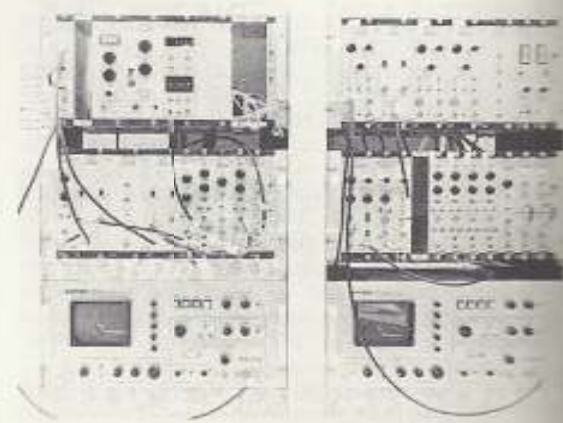
The other, much younger, subject's gains were much greater. During a period of 28 days, as a result of 14 workouts involving a total training-time of 7 hours, 50½ minutes, an average of 33.6 minutes per workout, his gains were as follow . . . an average muscle mass increase of 4.51 pounds per workout . . . or .36 pounds per set . . . an average gain of 8.04 pounds from each hour of training.

But what about strength gains?

Prior to the start of the experiment (approximately an hour before the first workout), initial strength tests to a point of failure were performed on a Universal Machine. And at the end of

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The Colorado State University's "Whole Body Counter" was used to measure the fat content of the subjects before, during and after the Colorado Experiment.





the experiment (three days after the last workout), a final strength test was again performed on a Universal Machine.

During the first test, Viator performed 32 repetitions in the leg-press with 400 pounds . . . 28 days later, having done nothing even close to a leg-press in the meantime, he performed 45 repetitions with 840 pounds. And was forced to quit at that point because of pain, rather than muscular failure.

So his leg-strength more than doubled in the leg-press . . . even though he did not perform that exercise during the experiment. His other strength increases were of a very high order . . . clearly proving that his increased muscular mass was functional.

Flexibility? Near the end of the experiment, at a bodyweight well over 200 pounds, this subject clearly demonstrated a range of movement far in excess of that possible by any member of the Colorado State University wrestling team. In fact, his demonstrated range of movement is so far in excess of "average" range of movement that it literally must be seen to be appreciated . . . clearly proving that great muscular size does not have to limit flexibility, if it is produced by exercises that provide full-range movement.

The "pace" of the workouts was very fast . . . but not continuous throughout the workouts, some brief rest-periods were involved between some exercises. And these rest-periods are INCLUDED in the listed times of the workouts. Times were measured from the start of the workouts to the end of the workouts.

All exercises were carried to a point of momentary failure . . . except in the cases of "negative only" exercises, which were terminated when it was no longer possible to control the downwards movement of the resistance.

In general, approximately ten repetitions were performed in each set; but in all cases, the maximum possible number of repetitions were performed . . . stopping only when it was impossible to perform another repetition in good form.

The "form" or style of performance was as strict as possible, the resistance was moved in a smooth fashion, and was briefly stopped in the position of full muscular contraction. Jerking and sudden movements were totally avoided.

Several members of the Denver

Broncos Professional Football Team trained with Jones and Viator during the Colorado Experiment. In this picture, one member of the Broncos uses a Nautilus Torso-Arm Machine while another Bronco uses a Pullover Machine in the background. In the middle, Casey Viator, seated inside the shielded room of the Whole Body Counter at the start of the Colorado Experiment, ready to be "counted" for a determination of his fat content. At right Casey Viator performing the primary movement in a Nautilus Double Shoulder Machine during the Colorado Experiment.

And while we were training in Colorado, members of several other professional football teams were training at our facility in Florida . . . in an identical fashion, three brief weekly workouts involving only one set of approximately a dozen exercises, with as much emphasis on the "negative" part of the work as possible.

Results?

One member of a Canadian professional team became so strong in the pullover exercise that he was using 675 pounds for several repetitions in good form . . . having started two months earlier with 275 pounds.

Lou Ross of the Buffalo Bills added 20 pounds to his 6 foot, 7 inch frame . . . cut a full two-tenths from his already fast time in the 40 yard dash . . . added five and one-half inches to his high jump . . . and doubled his strength in many areas of movement. These figures having been provided by the Buffalo Bills coaching staff, who tested Lou before and after a two month Nautilus training program in Florida.

Mercury Morris of the World Champion Dolphins weighed-in 7 pounds above his previous highest weight and still ran the fastest 40 yards of his life when he was tested . . . following two months of Nautilus high-intensity training.

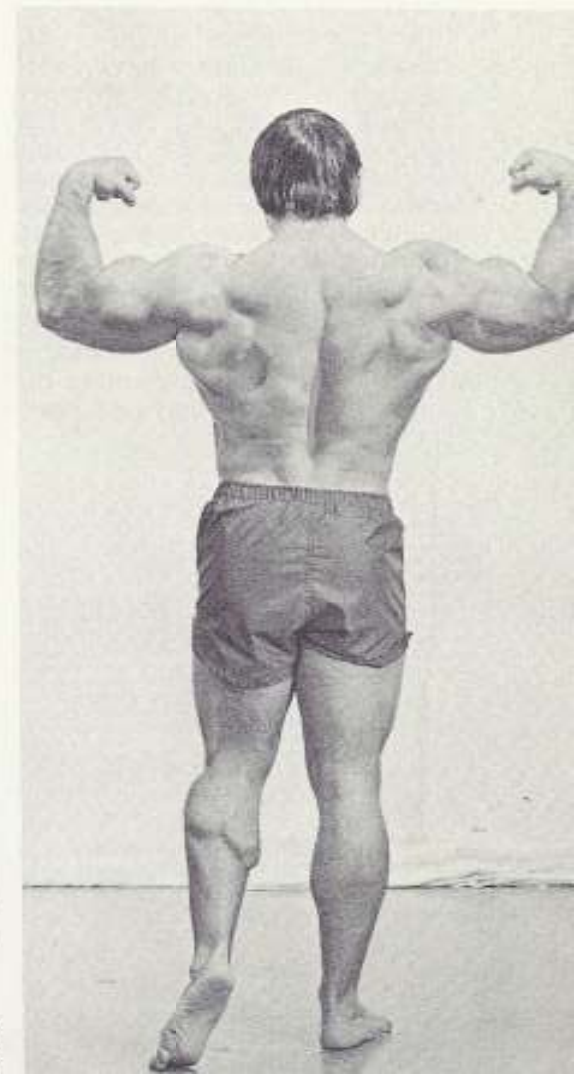
Dick Butkus of the Chicago Bears visited us in Colorado during the experiment, trained with us several days there . . . and then trained on Nautilus equipment in Deland for a month before reporting to training camp and signing a five-year contract with the Bears.

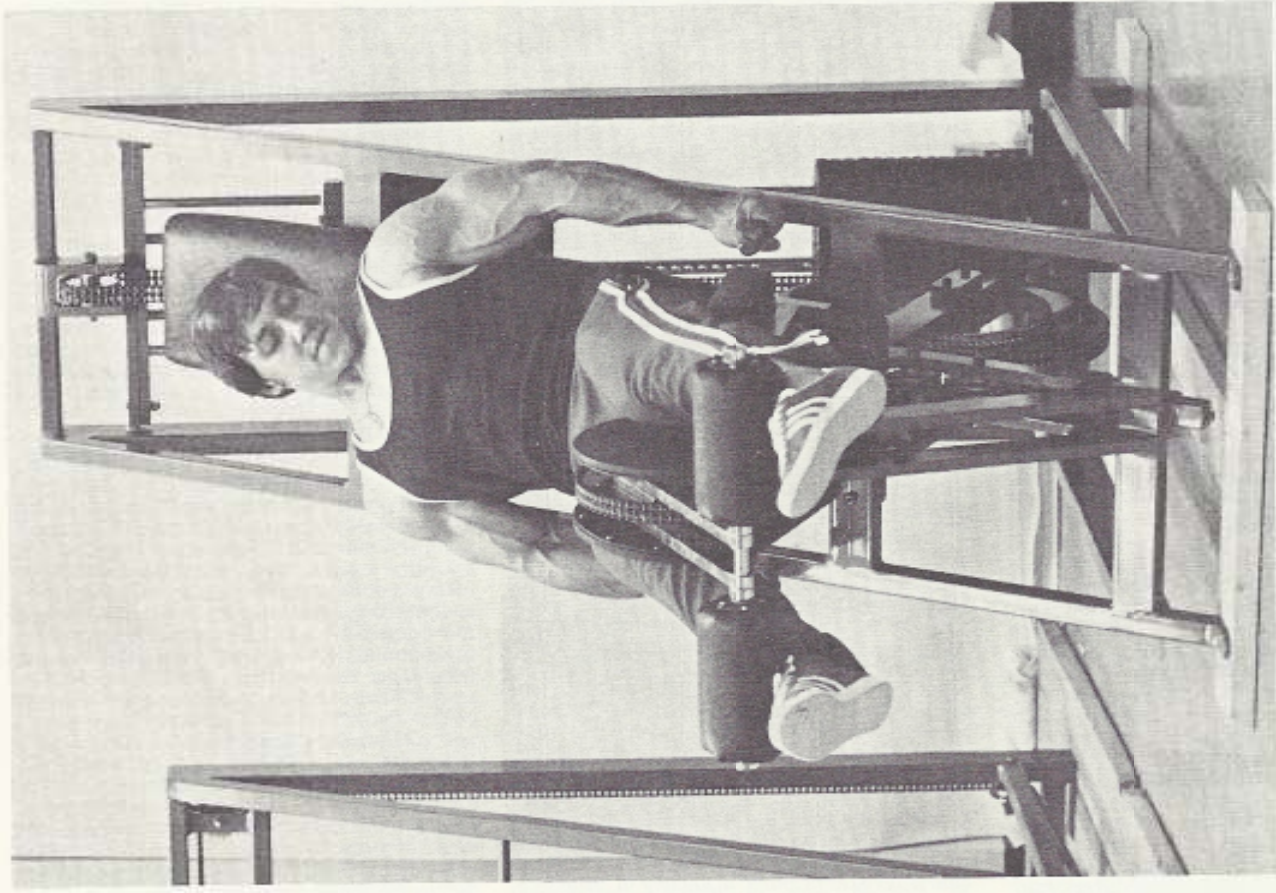
Altogether, twelve professional football teams and hundreds of professional athletes are now training with Nautilus equipment . . . having learned that they can produce far better results from much less training.

But I repeat . . . the secret, if there is one, is HIGH-INTENSITY; and when you are actually training with high-intensity, you don't need a large amount of training.

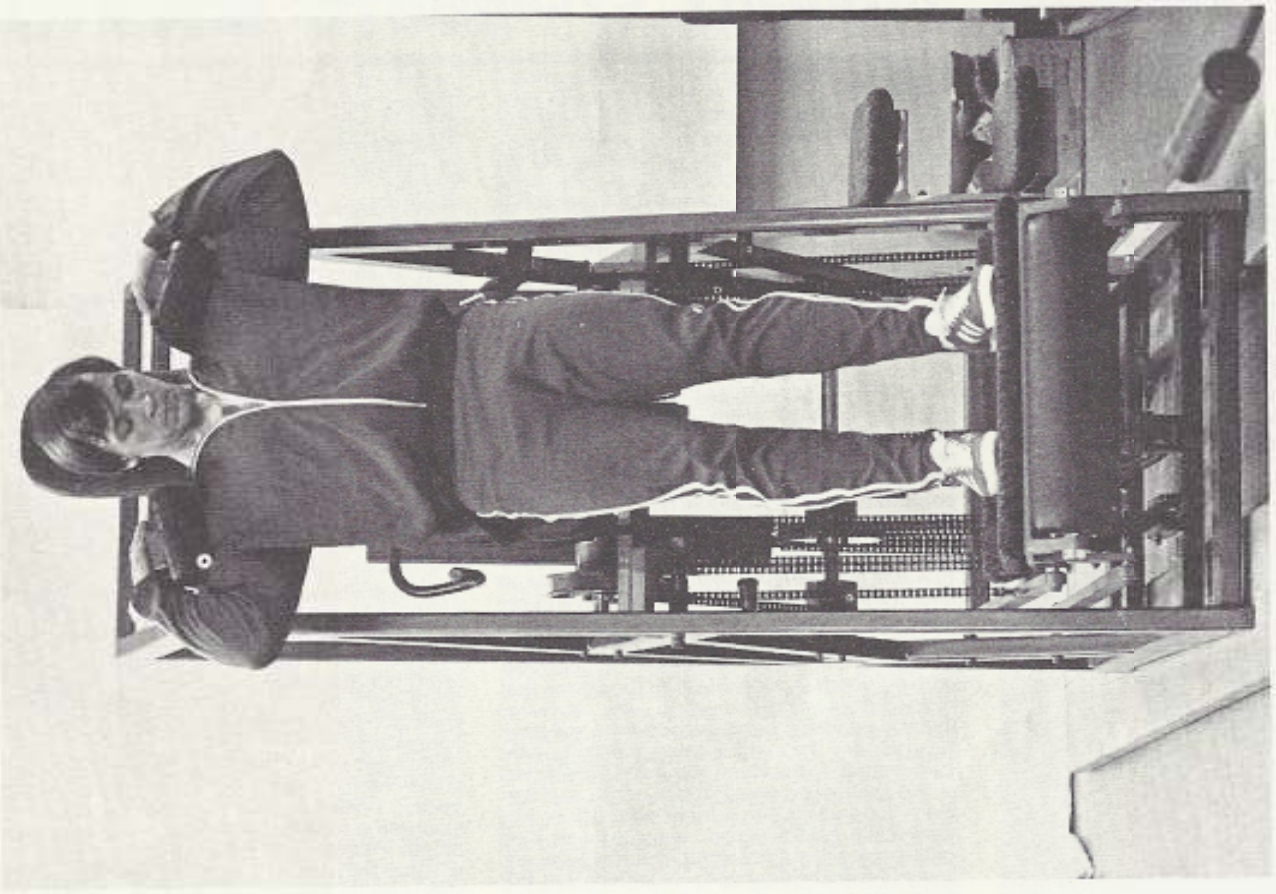
Casey Viator's back at the end of the 28 day experiment. He weighed 212.15. He looks very massive even under this very

Several members of the Denver Broncos Professional Football Team trained with Jones and Viator during the Colorado Experiment. In this picture, one member of the Broncos uses a Nautilus Torso-Arm Machine while another Bronco uses a Pullover Machine in the background. In the middle, Casey Viator, seated inside the shielded room of the Whole Body Counter at the start of the Colorado Experiment, ready to be "counted" for a determination of his fat content. At right Casey Viator performing the primary movement in a Nautilus Double Shoulder Machine during the Colorado Experiment.





Casey Viator in a Nautilus Leg-Extension Machine near the end of the Colorado Experiment. Note the extreme degree of vascularity that was obvious even after such a rapid and massive bodyweight increase.



Casey Viator in the extended position while doing squats in a new Nautilus Squat Machine during the Colorado Experiment.