

# **Nautilus Bulletin #1**

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## The Nautilus Principles

To begin with, why the name "Nautilus"?

Well, according to Webster's, the Nautilus is a type of shell fish with a "smooth, spiral, chambered shell", and since this is almost an exact description of the spiral pulleys (or cams) that we developed for the purpose of regulating the required variations of resistance provided by the new exercise machines, I thought the name was unavoidably appropriate.

1. Anybody who has ever used a barbell is aware that the exercises provided by the use of such a piece of equipment are not "full range" movements; at some points in most barbell exercises, there is no resistance at all – at the start of a curl, at the end of most forms of curling, at the top position in a squat or a press of any kind. If you can "lock out" under the weight in any position, then you do not have full range resistance; in such a case you are providing exercise for only part of the muscles that you are trying to work.

Full range resistance can be provided ONLY by a machine which rotates on a common axis with the body-part that is moved by the muscles being worked; a "rotational" form of resistance must be provided – and it must rotate on the proper plane. When this requirement is met, then it becomes possible to provide a type of exercise that is "full range" for anybody, and that actually exceeds the range-of-movement that is possible for most people.

2. Barbells and other conventional types of training equipment provide resistance in one direction only – unidirectional resistance; but since the involved body-parts rotate, it is thus impossible to provide more than a literally infinitely small range of direct resistance – and in many conventional exercises, there is no direct resistance at all.

Since the "direction of movement" of the involved body-parts is constantly changing, the "direction of resistance" must change in exact accord, automatically, simultaneously, instantly; again, this requirement can only be provided by a rotary form of resistance.

When the bodily "axis of rotation" that is involved in the exercise is rotating exactly in line with the axis of the rotary resistance, then omnidirectional resistance is provided – literally "all directional" resistance. If your hand, for example, is moving straight "up" – then the resistance is straight "down"; if your hand is moving directly towards the east – then the resistance is exerting its force directly towards the west. The resistance is always exactly 180 degrees out-of-phase with your direction of movement; the resistance is always trying to do exactly the opposite of what you are trying to do.

And while the importance of such "direct" resistance may not be immediately obvious to people unversed in at least basic physics, I think that the following example will make this point quite clear. Your car may weigh 4,000 pounds – and you may be able to push it forwards on level ground; but that does not mean that you are capable of "lifting" such a weight. With omnidirectional resistance, you are ALWAYS lifting the weight – regardless of the direction in which you may be exerting force. If your hands are going "up" – the weight is also going up; if your hands are going "down" – the weight is still going up; if your hands are going in a horizontal direction – the weight is being moved up; no matter what you do, so long as you are producing power for the purpose of causing a body-part movement from a position of extension in the direction of a position of contraction – then you are raising the weight.

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The only conventional forms of exercise equipment that come anywhere close to providing this "direct" resistance are thigh-extension machines, thigh-curl machines, so-called "butterfly" machines, and the curling machines built by a man named Clark in San Diego, California; if there are any other types of equipment available that provide this feature, then I am simply not aware of them.

From the above, it should be clear that incorporating a "rotary" form of resistance into an exercise machine provides quite a number of valuable characteristics – full range resistance, direct resistance, and omnidirectional resistance.

**3.** Barbells do not provide variation of resistance – although, because of certain basic laws of physics, some effective variation of resistance will be encountered in most barbell exercises; for example, in a curl with a barbell, there is literally no resistance at the start of the movement, because the moment-arm of the weight is zero in that position – but after the first 90 degrees of movement, the moment-arm has reached its maximum point, and the resistance will feel (and will be) as high as it becomes during that exercise – then, later, as the movement is completed, the moment-arm returns to zero, and again there is no effective resistance.

In that sense, barbells do provide variation of resistance – but such variation is random and does far more to downgrade the exercises than to improve them.

Because of such random variation, you encounter such things as so-called "sticking points" – places where the weight seems far heavier than it does in other places; and you also encounter places where there is no effective resistance at all.

Human muscles are stronger in some positions than they are in other positions – in general, muscles are strongest in their positions of full contraction; and because of the way in which they function, the position of full contraction is the only position in which it is possible to involve all of the fibers of any muscle. Yet, in almost all conventional exercises, there is literally NO resistance in the position of full contraction – in the only position where it is even possible to involve ALL of a muscle, there is no resistance available to require the involvement of the then available fibers; as an unavoidable result in conventional exercises, muscles are worked only in their weakest positions – and are worked not at all in their strongest positions.

There are a few relatively unimportant exceptions to that general rule –but none of very great significance; these are (1) thigh extensions, (2) leg curls, (3) wrist curls with the forearms on a declined surface, so that the wrists are below the elbows, (4) shoulder shrugs, (5) stiff-legged deadlifts (a very, very good conventional exercise, but one which most bodybuilders avoid entirely), (6) side raises with dumbbells, (7) front raises with any sort of resistance, (8) one-legged calf raises, (9) sit-ups on a decline board, and leg-raises on an incline board, (10) side bends with one dumbbell, and a few others.

With the Nautilus machines, the required variations in resistance are properly provided; the resistance changes throughout the movements – in general, resistance is lowest at the start of an exercise, increases as the movement progresses, and decreases slightly near the end of an exercise. The actual rate of increase varies – depending on a number of factors. But in all cases, the resistance is exactly what it should be in all positions throughout the movements; when a set of an exercise is performed on such a machine, and when the set is carried to a point of momentary failure, then almost literally 100% of the individual muscle fibers contained in the muscles being worked are involved in the exercise – as opposed to less than 18% of the total number of available muscle fibers which are involved in most forms of conventional exercise, and as few as two or three percent of the total number of fibers in some conventional exercises.

**4.** Balanced resistance occurs in only one position in most conventional exercises; for example, in a barbell curl the resistance is balanced (exactly right) only in the so-called "sticking point" that is encountered about halfway through the movement – if the resistance is higher than the amount that can be handled at the sticking-point, then it is impossible to pass that point in the performance of a repetition using good form, but once the sticking-point has been passed, then the resistance is too low, and before reaching the sticking-point, the resistance is also too low. Thus, in fact, the resistance is "right" – can only be right – at one point throughout the movement.

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The Nautilus machines provide perfectly balanced resistance – it is never too high and never too low; there are no sticking-points and no points of little or no resistance – when you might fail in such an exercise, you may fail at any point, instead of always failing at or before the sticking-point, as usually happens in conventional exercises. To a new trainee, however, the "resistance curve" of such a machine might not – probably would not – feel perfectly smooth; while there would be no real sticking-points, it is probable that the resistance would feel heavier towards the end of a repetition than it did at the start – but this is to be expected, because the "resistance curve" is balanced to exactly match the "strength curve" of an individual with balanced development, perfectly proportionate development, and since a man that has been training with conventional equipment has been training only part of his muscular structures (and the weakest part, at that) it is only natural that he would not be as strong as he should be in all areas.

Eventually, however, after the machine has been used properly for a reasonable period of time, the movements will start to feel perfectly smooth – the resistance will feel exactly the same in all positions. While in fact, the resistance will be constantly changing – in many cases more than doubling as the movement progresses from a starting position of full extension to a finishing position of full contraction.

5. "Total" exercise cannot be provided by conventional exercise equipment for reasons which should now (following the above explanation) be obvious; conventional exercises involve only a small part of the total number of available muscle fibers – Nautilus machines involve almost all of the available fibers.

6. Rotary resistance is not provided by conventional exercise equipment – since such equipment offers resistance that is reciprocal in nature, moving back and forth, usually up and down but in almost all cases confined to a single direction of movement. But body-parts rotate and it is obvious that a reciprocal form of resistance cannot provide constant resistance against a rotary form of movement.

Nautilus equipment provides the required rotary form of resistance – and again, this requirement should now be clearly understood from the above description.

7. "Directness of resistance" is not provided by conventional forms of exercise; in this sense, the term "direct" refers to the point of application of the resistance – in most conventional exercises, the resistance is imposed against several muscular structures simultaneously, which would be a decided advantage if all of these involved muscles were of equal strength. But in many cases, it happens that some relatively small and weak muscles become involved in the exercises as "weak links" – and it is then literally impossible to work the larger, stronger muscles as heavily as they must be worked for the production of best-possible results.

Several such examples have been mentioned in preceding chapters, so I will limit my examples to only one; in conventional exercises intended for the development of the latissimus muscles, the weak link is provided by the arms – a point-of-failure is reached when the arms are exhausted, long before much of anything in the way of growth stimulation has been provided for the latissimus muscles.

Nautilus equipment overcomes this obvious shortcoming of conventional exercises by directing the resistance against the "prime" body part – rather than attempting to filter the resistance through a weaker, related body-part structure. For example, the latissimus muscles are attached to – and move – the upper arms; what happens to the hands and forearms is of no importance – the resistance is provided against the upper arms, at the elbows, as it must be in order to directly oppose movements powered by the latissimus muscles.

When a point of failure is reached in such exercises, it will be because the latissimus muscles are exhausted – not because the arms were too weak to continue.

The above points should serve as a basic primer of the features incorporated into the new Nautilus training equipment; at a later date, detailed brochures of several types of such equipment will be mailed to each purchaser of this bulletin – these brochures will contain pictures, drawings, charts, diagrams and other types of illustrations that will clearly explain the basic principles involved.

Properly used, such equipment is valuable primarily because it enormously reduces previous requirements in the way of training time, both overall training time and weekly training time; and to an as yet unknown degree, it makes greater degrees of final results possible.