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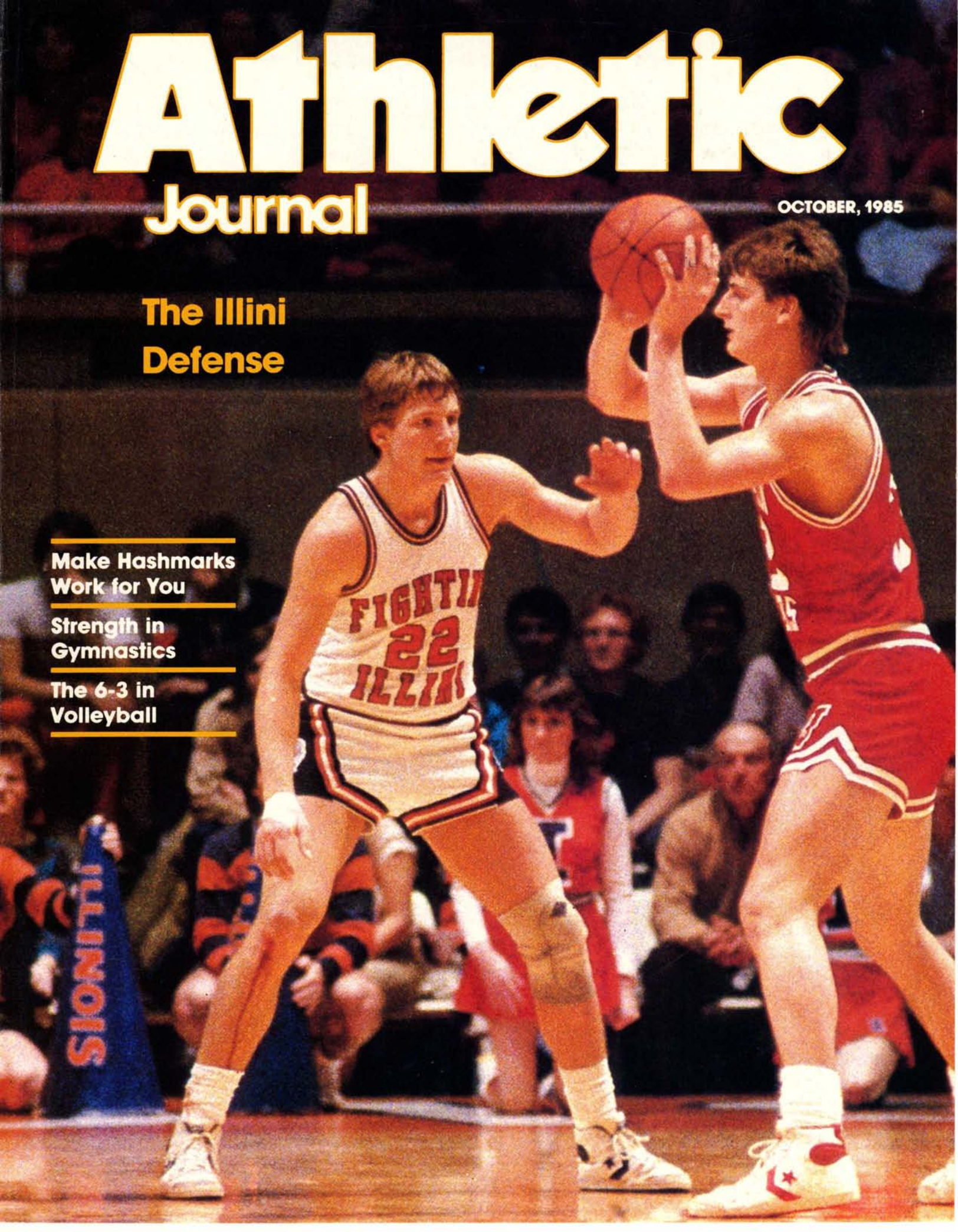

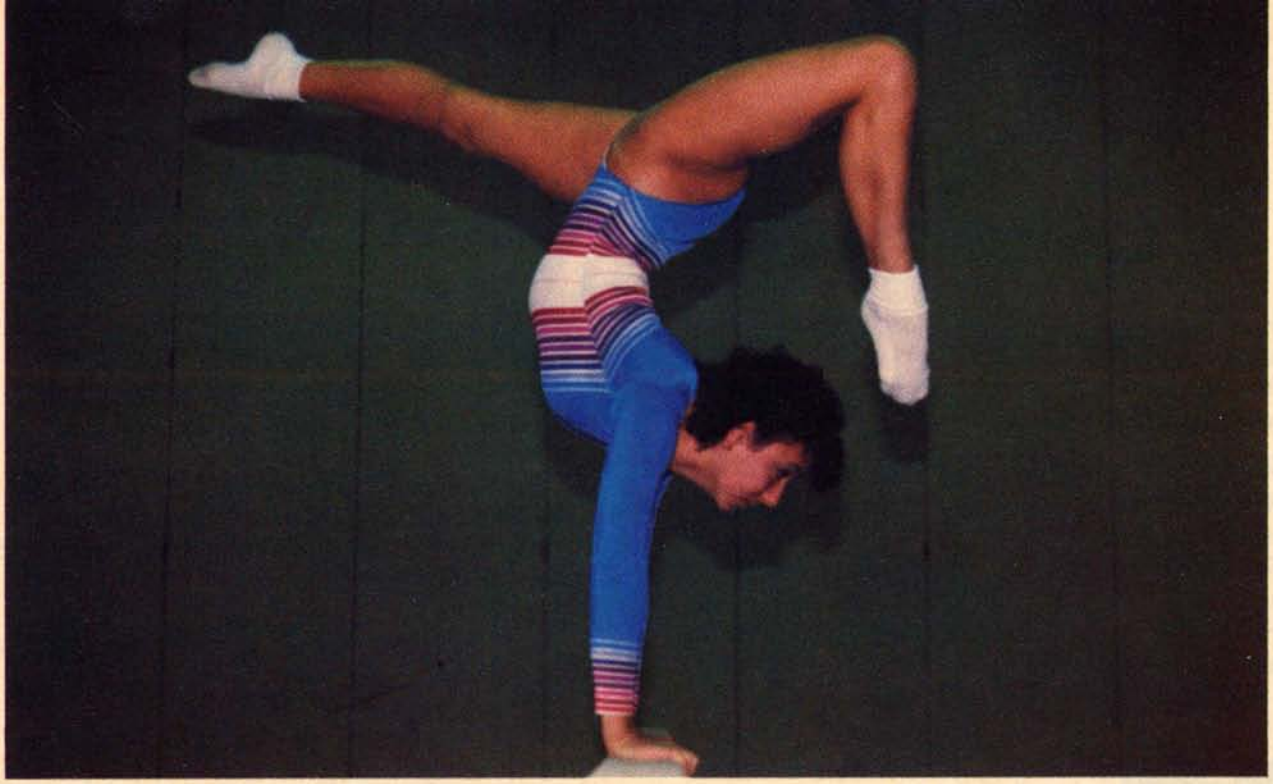

Photo/Matt Brzycki and Al Gomez

Strength Training For Gymnasts

In-season practice alone isn't enough to hold strength gains; "muscle" myths dispelled

By Matt Brzycki

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Photo 1

A coach is considered legally responsible for the physical preparedness of each student-athlete in his charge. Gymnastics is a sport which requires a great deal of muscular strength relative to body weight, muscular endurance, flexibility/joint range of motion, mental toughness and confidence (Photo 1). Additionally, the potential for injury is always present. Through proper strength training, a coach can take preventive measures to ensure the physical readiness of his athletes.

Strength training should not end once the season begins. Coaches often have their athletes perform a strength and conditioning program during the pre-season and post-season, but do not require them to strength train during the season. Yet it is during the season that a gymnast (or any other athlete, for that matter) must be at her strongest in order to maximize her performace. Athletes will lose strength over the course of the season unless their muscular systems are properly stimulated by sessions of high-intensity strength training. Gymnastics practice alone is not sufficient to stimulate gains in strength.

Our in-season strength and conditioning program begins approximately three weeks before the first meet and ends at the con-

Gymnasts' Workout Regimen

(Repetition ranges in parentheses)

NAUTILUS	UNIVERSAL	FREE WEIGHT
Hip and Back (15-20)	Leg Press (15-20)	★Leg Press (15-20)
Leg Curl (10-15)	Leg Extension (10-15)	★Leg Extension (10-15)
Leg Extension (19-15)	Leg Curl (10-15)	★Leg Curl (10-15)
Leg Press (1k5-20)	★Bent Arm Fly (6-12)	Bent Arm Fly (6-12)
Arm Cross (6-12)	Bench Press (6-12)	Bench Press (6-12)
Arm Cross (6-12)	Bench Press (6-12)	Bench Press (6-12)
Decline Press (6-12)	Lat Pulldown or Chins (6-12)	Chins (6-12)
Pullover (6-12)	★Lateral Raise (6-12)	Lateral Raise (612)
Torso Arm or Chins (6-12)	Shoulder Press (6-12)	Shoulder Press (6-12)
Lateral Raise (6-12)	Bicep Curl (6-12)	Bicep Curl (6-12)
Shoulder Press (6-12	Dips (6-12)	Dips (6-12)
Bicep Curl (6-12)	Situps (6-12)	Forearm Curl (6-12)
Tricep Extension or Dips (6-12)		★Situps (6-12)
Forearm Curl (6-12)	★ Done manually	
★Situps (6-12)		

Fig. 1

clusion of the Atlantic 10 Championships. The objective of our in-season program is to continue to increase (or at least maintain) the gymnasts' level of conditioning and intensity throughout the season, peaking at tournament time.

Dispelling Myths

Unfortunately, strength and conditioning programs for female athletes have not yet been fully accepted. Although women have the same potential as men for strength development and general body composition changes, females probably have more to gain than their male counterparts for the simple reason that strength training has been discouraged.

Generally speaking, strength training for women has been misunderstood by coaches and athletes alike. Fears of decreased flexibility, bulging muscles and masculinizing effects abound. For the most part, These fears are not only unsubstantiated but practically impossible.

Flexibility is considered a major prerequisite for success in gymnastics and a properly conducted strength and conditioning program will not reduce joint range of motion. In fact, exercising throughout a full range of movement against a resistance will improve flexibility, thereby decreasing the risk of injury.

Gains in muscular strength are almost always accompanied by an increase in the size of individual muscle fibers (hypertrophy). Although this is true for both the male and female, it is much less pronounced in the female. Two factors are necesary in order to build large muscles: (1) an adequate amount of testosterone (a male sex hormone) must be present in the bloodstream and (2) an individual must have relatively long muscle bellies and concomitantly short tendon attachments. Compared with men, most women have only a small fraction of testosterone in their blood. Furthermore, few men have a favorable muscle length to tendon attachment ratio; it occurs even less frequently in women. Finally, the fact that females possess greater subcutaneous fat stores and less muscle mass than males makes it even less likely that unsightly muscles will develop.

A very small percentage of females do inherit above avarage length muscles and, at the same time, have untypically high levels of testosterone in their system. These women,

Photo 2

Photo 3

Photo 4

Photo 5

therfore, have a greater potential for increasing muscular size (and strength) beyond that of the average female, but certainly not to the extent to that of a man. In conclusion, it is physiologically improbable for a women to develop bulky muscles.

Strength Training Guidelines

At Rutgers we require our athletes to adhere to certain guidelines when strength training. These guidelines are as follows:

1. Our girls always train with a partner. One partner (the spotter) takes the other (the lifter) through the entire routine. Upon completion of the workout, the partners switch roles. Our athletes are paired in this manner because you can always train more intensely when encouraged and supervised.

2. As always, intensity is the cornerstone of a properly conducted strength and conditioning program. The quickest way to achieve maximum results is through high-intensity exercise. And since time and intensity are inversely proportional, the program must be brief. In fact, we rarely train longer than 30 minutes. Contrary to popular belief, women can train just as intensely as men (Photo 2).

3. We perform one set of each prescribed exercise to the point of momentary muscular failure. Momentary muscular failure can best be defined as occurring at that instant when it is literally impossible for the lifter to execute another repetition in good form through a full range of movement, not when the athlete thinks she cannot do another repetition.

4. Good form or technique consists of raising the weight without momentum, pausing distinctly in the contracted position and lowering the weight at a slower speed than it was lifted. This will ensure that the muscle is raising the weight (rather than momentum) and the chances of incurring an injury while strength training are minimized. Generally, we prefer our athletes to raise the weight in about two seconds and lower it in about four seconds, but this depends upon the range of motion of each particular exercise. This applies to all modes of strength training-Nautilus, Universal, free weights, manual resistance, etc.

5. We always perform each exercise through its full range of movement. Done properly, this will increase flexibility, again reducing the risk of sustaining an injury.

6. We perform approximately 6-12 repetitions per set for each upper body exercise and usually 10-15 repetitions per set for each lower body exercise. Immediately after the lifter reaches momentary muscular failure (within the repetition range), the spotter assists the lifter in performing an additional 2-4 repetitions by helping the lifter raise the weight. The lifter should lower the weight by herself while the spotter provides additional resistance.

Actually, the important concern is the amount of time each muscle is being excercised, not the number of repetitions performed. An upper body exercise done for fewer than about 40 seconds does little to develop muscular endurance; likewise an exercise carried out longer than about 70 seconds will gradually reach a point where it becomes an aerobic activity and will not produce significant strength gains. Best results for the lower body musculature are produced

(Continued on Page 62)

Photo 6

Photo 7

Photo 8

Strength Training

(Continued from Page 18)

by exercise of slightly longer duration: roughly 60-90 seconds per set for the quadricips, hamstrings and calves and 90-120 seconds for the gluteals.

Therefore, if each repetition requires two seconds to raise the weight and four seconds to lower the weight (six seconds per repetition), simple mathematics reveal that a guideline of 6-12 repetitions equal 36-72 seconds, 10-15 repetitions equal 69-90 seconds and 15-20 repetitions equal 90-120 seconds. In most cases (especially in the weight room) we prefer to count repetitions, since it is not always practical to time each exercise.

7. Once the lifter is able to execute the maximum number of prescribed repetitions by herself in good form, the weight has become too light for her to stimulate optimal strength gains and must be increased for her next workout. The lifter should never sacrifice good form or technique for the sake of increasing the weight. Best results are produced by how you lift the weight, not by how much weight you lift.

8. We rest as little as possible between sets. This will keep the heart rate elevated, thereby promoting a cardiovascular training effect. Additionally, it will enhance mental toughness and confidence, both of which are important to a gymnast.

In-Season Program

Our gymnasts perform two sessions of strength training per week during the season. (Three sessions of strength training per week are done during the pre-season and post-season.) One workout is performed using resistance machines and the other is done manually (with a partner supplying the resistance). And more than two workouts per week during the season will be counterproductive in that additional recovery time is required.

Our resistance machine workout comes the day after a meet and is performed in the weight room with Nautilus equipment. Since all schools do not have access to Nautilus machines, examples of workouts using Nautilus, Universal and free weight and provided in Figure 1. Although it is not within the scope of this article to cover the correct use of all machines and free weight exercises, our manual resistance exercises will be described in detail.

Our gymnasts perform their manual resistance workout no sooner than 72 hours before a meet. Consequently, if a meet is on a Saturday, the manual resistance workout is done in the gymnastics room immediately following Wednesday's practice.

The workout consists of six exercises which concentrate on every major muscle group in the upper torso. These muscles are generally weak in females since the opportunity for their use seldom arises. Lower body exercises for this mid-week workout are optional, but can be performed in the weight room if desired.

The major advantage in our manual resistance workout is that it is time efficient; half the team exercises while the other half spots. After all six exercises are completed, the partners switch roles. Since each exercise is performed for 72 seconds, we can train the entire team in less than 20 minutes!

The six upper body exercises which comprise our manual resistance workout are bent arm flys, dips, chins, lateral raise, shoulder press and situps. These six exercises should be performed as follows:

Bent Army Flys: The lifter lies supine in one corner of a 12-inch crash mat with her fingers interlocked behind her head. Her elbows should be off the edge of the mat, but her head should remain on the mat throughout the exercise. The spotter stands behind the lift, places her hands on the inside of the lifter's elbows and gives her partner a slight stretch. The lifter brings her elbows

together in front of her face while the spotter offers resistance evenly throughout the full range of movement. She should now pause briefly in the contracted position (Photo 3) before returning slowly to the starting/stretched position against her partner's resistance.

Dips: This exercise can be performed by placing two balance beams parallel to one another about shoulder width apart. The lifter should place on hand on each beam and bend her knees in order to assume a stretched position. She now raises her body by extending her arms but should not allow her elbows to lock. The lifter should pause briefly in the contracted position (Photo 4) before returning slowly to the starting/stretched position. The spotter can stand behind the lifter and provide additional resistance on her partner's hips if necessary. Also, once the lifter reaches momentary muscular failure, she can prolong the exercise by stepping up onto a folded Panelite mat and continue to lower her bodyweight.

Chins: This exercise requires the use of the uneven bars. The lifter should grasp the high bar with her hands slightly farther than shoulder width apart and her palms facing up (Photo 5). This puts the biceps at a mechanical advantage and also allows for a greater range of motion. The lifter should pull her chin over the bar and rotate her arms to the rear at the top of the movement. She now pauses briefly in the contracted position before returning slowly to the starting/stretched position. The spotter can stand behind the lifter and provide additional resistance on her partner's hips if necessary. Again, once the lifter reaches momentary muscular failure, she can prolong the exercise by stepping up onto two 12-inch crash mats and continue to lower her bodyweight.

Lateral Raise: The lifter should stand erect with her arms hanging straight down and her palms open. The spotter stands behind the lifter and places her hands on her partner's wrists. The lifter should raise her arms until they are parallel to the floor while the spotter provides resistance evenly throughout the full range of movement. She should now pause briefly in the contracted position (Photo 6) before returning slowly to the starting/stretched position against the spotter's resistance.

Shoulder Press: The lifter should sit down with her knees bent and her feet flat on the floor. The spotter stands behind the lifter and places her leg against her partner's back in order to provide support. The lifter should place her hands at shoulder level with her palms facing up. The spotter now places her palms on the lifter's palms and they interlock thumbs. The lifter should extend her arms straight up, but not lock her elbows, while the spotter applies resistance evenly throughout the full range of movement. She now pauses briefly in the contracted position (Photo 7) before returning slowly to the starting/stretched position against her partner's resistance.

Situps: The lifter lies supine on a one-inch landing mat with her knees bent, chin tucked in and fingers interlocked behind her head. Bending the knees and tucking in the chin will reduce the strain on the lower back. The spotter kneels between the lifter's legs, and they interlock ankles. The lifter should now sit up while the spotter provides resistance evenly throughout the full range of movement against her partner's elbows. She should now pause briefly in the contracted position (Photo 8) before returning slowly to the starting/stretched position against the spotter's resistance.

Summary

The addition of an in-season strength training program will maintain your gymnasts' levels of muscular strength, muscular endurance, flexibility, mental toughness, confidence and intensity throughout the course of the season. Although we could never avoid injuries altogether, a strength training program can lessen the frequency and severity of those injuries which are normally attributed to fatigue. Furthermore, the recovery time of an injured gymnast will be reduced. In short, a strength and conditioning program should be used by coaches who wish to improve the performance of their female athletes during the season. □

Matt Brzycki is a graduate of Penn State where he was a powerlifter in the 165-pound class. He served on the health/fitness staff at Princeton until September, 1984, when he became assistant strength coach at Rutgers.