

THE WAVE ACTION BREASTSTROKE

Following the Wave

In studying the complexities of the wave breaststroke it is quite easy to be overcome by information overload, so it's important to concentrate on the most important points of the stroke. (See "Key Points.")

In preparing this section, I discussed the stroke in detail with the stroke's leading protagonist, Mike Barrowman, 1992 Olympic champion and 200-meter breaststroke world-record holder. I also spoke to his two former mentors, Jozsef Nagy, who pioneered the stroke, and Jon Urbanek, Barrowman's coach at the University of Michigan. All three were extremely helpful.

Jon Urbanek said that the stroke had changed somewhat in the last 10 years since *Swimming Technique* featured 3 articles on the "new breaststroke" in 1989. Mark Muckenfuss had interviewed Jozsef Nagy on "Catching the Wave," the first detailed description of the "wave action breaststroke." In the same issue, Nagy ("From a Technical Angle") further expounded on the new technique, while Barrowman described the stroke and how he mastered it ("An Athlete's Perspective").

According to Jozsef Nagy, Hungarian inventor of the wave breaststroke, "The point of the shoulder follows the line of a symmetrical wave." In other words, the wave rises and falls in perfect symmetry, and there is no abrupt drop after the breath is taken. (See Nagy's computer-enhanced diagram on page 58 which shows the ideal wave path followed by the tip of a swimmer's shoulder throughout a complete stroke cycle.)

It's also crucial for the kick to fit in at just the right time to help maintain the upper body's forward surge over the water in what Urbanek calls a catlike lunge.

If the kick comes up too late, the shoulders will drop abruptly creating a sudden trough in the imaginary symmetrical line shown in Nagy's diagram. This is the big difference between the conventional breaststroke and the wave action breaststroke.

Getting the Shoulders Up

A swimmer's first reaction is usually, "How do I get my shoulders and arms up high enough above

the water in order to lunge my hands and forearms forward over the surface?"

I passed this question on to Barrowman. This is what he said: "It's critical that the head remain completely down until the hands have finished their insweep and are about to lunge forward. This is because we want to keep the body streamlined as long as the head is down in the water.

"This is the trick to the wave stroke. In the conventional breaststroke the arm recovery is done deep underwater, causing great resistance. But the hollowing of the back brings the whole resistant part of the body out of the water, and leaves almost only the swim suit and legs below the surface.

"As the hands begin the forward lunge, this is the point at which the back becomes convex or humped. This provides a great force forward when done properly, in coordination with the kick.

"This change in the posture of the back is important. You hollow the back, and you sweep your arms in quickly and powerfully to bring the head and torso high out of the water. But you hump your back in coordination with the kick in order to achieve the forward lunge." (Note that in figs. 4 and 5, the back is hollowed, or concave, in figs. 6 to 8 the back is humped, or convex.)

Coach Urbanek added, "What happens is that the hollowing of the back brings the upper body up high enough so that the swimmer can jump forward. Then the kick comes in."

Center of Gravity

Nagy said, "I discovered that the center of gravity in people who are able to lunge forward remains very constant, four or five inches below the water. It does not go up and down."

Barrowman agreed with Nagy's statement saying, "One thing that's crucial is that throughout the stroke there is very little up-and-down movement of the hips. Certainly some up-and-down movement is unavoidable, but this is the difference between first and fifth place at the Olympics. If the hips move the center of gravity moves and thus creates more work. If you have any access to U.S. Swimming's data, take a look at their analysis of my stroke in comparison with Rozsa's. This is the biggest difference between us, and most likely the difference of one and a half seconds between us. He did more work due to his hips moving up and down more."

A Discussion with Mike Barrowman

Barrowman says, "The first WR I set was in Los Angeles. Unfortunately, my goggles filled up during the swim. I knew I could swim faster. By the fourth week of taper, 16 days later in Tokyo, I'd lost some of my conditioning, but still had enough to go $\frac{1}{100}$ second faster to break the old record, and the time that Nick Gillingham had set only the day before in Bonn.

"What psyched me up for years was that the Americans would break a record only to see it lowered by Europeans a week later at the European games. I wanted my chance to turn the tables. Plus, I felt that the first record was not a real reflection of what I could do. I wanted to show the world I could do better. The real truth didn't come out for a year when I went 2:11.53. This was a more realistic progression after the goggles episode had messed up my swim in Los Angeles a year earlier."

I asked Mike about his subjective feelings when swimming the wave breaststroke, how the stroke felt to him.

Mike said, "Subjective feelings? Hard question. It never felt good until the day before a race. That was the only time I had the strength to do the stroke correctly. Then it felt great and easy."

I asked him about his intensive medicine ball workouts. My guess was that these workouts must have helped him develop tremendous muscular power and strength.

Barrowman replied that his medicine ball workouts were a critical part of his preparation. "My forearms were the weakest part of my stroke before I used medicine-ball conditioning, and the strongest part afterward. They helped me develop muscle speed, quickness, and endurance. It was an extremely difficult workout when done correctly, nonstop for 50 minutes. It was . . . dreaded."

Barrowman, presently living on Grand Cayman Island in the Caribbean, says that he has taken a break from his desk job and speaking engagements while he finishes writing his 500-page sci-fi book. "I'm enjoying life at its best. I teach diving, drive boats, make underwater videos, and am generally having fun down here before I return to the real world."

Side View

Fig. 1 At no stage of the wave breaststroke action is the body forcibly submerged. In this frame the body glides forward with shoulders and hips aligned; arms, legs, and feet extended. The shoulders reach forward as far as possible and the upper arms press against the ears to further streamline the oncoming flow of water along the body. The body is flat and ideally configured to achieve the best possible streamlining. This is the basic position, and it will be achieved again in Figure 9.

Fig. 2 The pull starts with the hands facing outward and slightly upward to best engage the oncoming flow. The entire body position remains the same as in Figure 1. Throughout the stroke, the hip movement should be kept to a minimum to save energy and maintain the swimmer's forward movement.

Fig. 3 The first stage of the arm pull closely resembles the start of the butterfly pull. The hands and forearms are about to change direction inward. The swimmer hollows his back, while concentrating on pulling the body forward and not upward. The knees start to bend and spread sideways, but the front thighs remain almost in a straight line with the body.

Fig. 4 With back still hollowed, the head and upper torso clear the surface as the body continues to slide forward. This phase of the action is the key feature of the wave breaststroke. From a streamlining perspective, it is in marked contrast to the conventional breaststroke where the shoulders, the widest part of the body, remain submerged to present considerable frontal resistance. Important: The overall motion is definitely forward and not upward.

The swimmer inhales as the mouth clears the surface. The hands sweep down under the shoulders and continue forward with the forearms following. Although the elbows bend to about 90 degrees as the hands and forearms point forward, the hands are in control throughout, and at no stage do the elbows lead the action. Says Barrowman, "The forearms, led by the hands, are the motion point, not the elbows." To further improve

streamlining, the shoulders are hunched until they almost touch the ears.

Also important to streamlining: The front thighs are kept well in line with the trunk to permit a smooth passage of water under the body. The feet do not hang downward to cause resistance; the toes of both feet are in the same line as the heels.

Fig. 5 The upper arms do not come close to the side of the chest, but follow the hands in front of the chest to reduce frontal resistance. The torso continues to move forward over the surface as the swimmer performs the lunge, the unique feature of the wave breaststroke which enables the swimmer "to follow the wave," as Nagy describes it. In a radical break from the traditional pull-kick rhythm of the conventional breaststroke, the lunge phase takes place between the pull and the kick, so that the rhythm becomes pull-lunge-kick. In this action, the hands and forearms are thrust forward on and parallel to the surface of the water, not above or below.

The heels start to rise in preparation for the kick which will only start when the lunge is about three-fourths of the way through. The kick does not start the lunge, but rather serves to maintain the lunge and keep the swimmer on the surface. Therefore, the kick must be precisely timed or it will break the rhythm of the stroke.

Fig. 6 In the lunge, the swimmer literally throws the body forward and over into the lunge. In performing the lunge, the posture of the back now quickly changes from its arched (concave) shape to an exactly opposite rounded (or convex) shape. According to Barrowman, it is the convex back posture that enables him to apply great force during the lunge. Note the continuing high position of the upper body, shoulders, and arms. Remember, the hands and forearms are thrust forward at surface level.

Accurate timing of the kick is vital to the forward lunge. At the start of the kick, the degree of hip joint flexion is approximately 35 degrees, with the lower leg at almost 90 degrees to the surface.

The feet, barely an inch below surface, are dorsiflexed (everted or turned outward) at approximately 90 degrees to the shin. In this posture they are able to catch the water perfectly. The position of the front thighs in relation to the front of the torso is an important aid to streamlining. A very slight lowering of the hips has helped the swimmer to assume this relative position of the lower legs, thighs, and trunk.

Figs. 7 and 8 The humped, dolphin-like posture of the back, together with a powerful directly backward kick, enables the swimmer to keep moving over the water with shoulders and arms at the surface. There is no downward component at all to the kick.

The feet remain turned outward until just before the kick closes, at which point the ankles and feet are extended to give a final snap to the kick as water is thrust directly backward. The swimmer looks straight down at the bottom of the pool to maintain streamlining during this most powerful stage of the overall action.

Fig. 9 The body, perfectly streamlined, slides forward at the surface. In this position, care should be taken not to permit the legs to drop as this may be considered to be a dolphin kick for which the swimmer could be disqualified.



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6

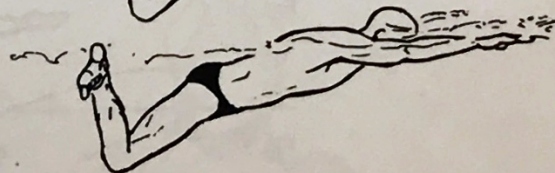


Fig. 7

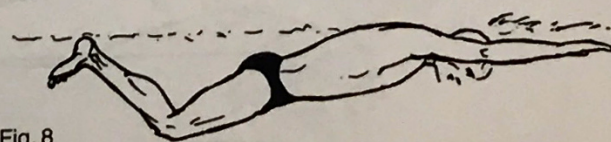


Fig. 8

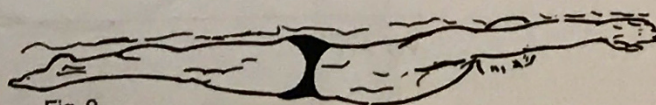
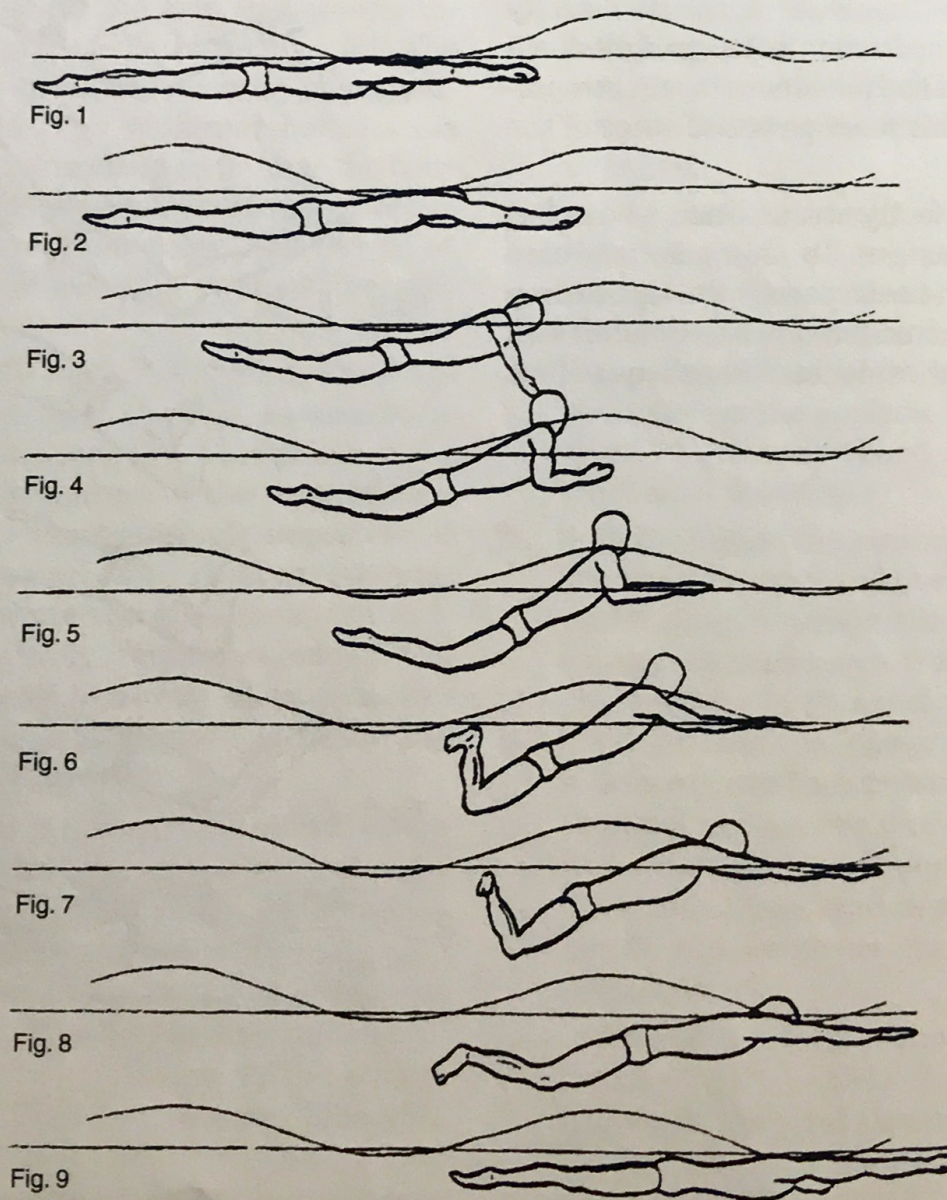


Fig. 9

Key Points

- Unlike the pull-kick rhythm of conventional breaststroke, the wave stroke rhythm is pull-lunge-kick. The lunge is the unique feature of the wave breaststroke. The lunge occurs between the pull and the kick; the hands and forearms are thrust forward on and parallel to the surface of the water.
- The back is hollowed (concave shaped) during the pull and first part of arm recovery (figs. 3, 4, and 5) but arched (convex shaped) during the lunge (figs. 6, 7, and 8).
- In marked contrast to the conventional breaststroke, the head and upper torso clear the surface as the body continues to slide forward. The shoulders, the widest part of the body, clear the surface for better streamlining (figs. 4, 5, and 6). To further improve streamlining, the shoulders are hunched until they almost touch the ears (figs. 4, 5, and 6).
- The swimmer literally throws the body forward and over into the lunge. According to Mike Barrowman, the leading exponent of the wave breaststroke, it is the convex back posture that enables him to apply great force during the lunge.
- The timing of the kick is critical; it only starts when the lunge is about three-fourths of the way through (fig. 6). The kick is directly backward with no downward component (fig. 8).
- Throughout the stroke, the hip movement is kept to a minimum to save energy and preserve the swimmer's momentum (Figs. 1 to 9).



Front View

Fig. 1 The body is outstretched and streamlined with head down and arms about to pull.

Fig. 2 The pull begins as the hands scull sideways and downward. The swimmer keeps the head down to preserve the body's streamlined position.

Fig. 3 The hands reach the widest point of their sculling action. From here the elbows will start to bend.

Fig. 4 The elbow bend increases as the hands sweep down and inward in a continuing movement that will change direction forward.

Fig. 5 As the hands join, the upper arms and elbows do not come close to the side of the chest. Instead, they follow the hands and forearms forward of the chest to reduce the body's frontal resistance. The swimmer inhales as the mouth clears the surface. The legs and feet are drawn up preparatory to the kick.

Fig. 6 Two important points in streamlining: The shoulders—the widest part of the body—are clear of the surface, and the arms are in front of the chest. The swimmer starts the forward lunge of the arms. The legs are ready to kick, and the feet are turned outward.

Fig. 7 The kick occurs three-fourths of the way into the lunge, thus helping the swimmer to stay up on the surface instead of sinking suddenly. The kick is kept directly backward with no downward component.

Fig. 8 As the legs close, the ankles and feet are extended to provide a final backward thrust on the water. The head is down. The arms and shoulders reach forward as far as possible.

Fig. 9 With arms and legs outstretched, the body is once more in perfect alignment as it slides forward, parallel to the surface.

