

The Dolphin Breast Stroke

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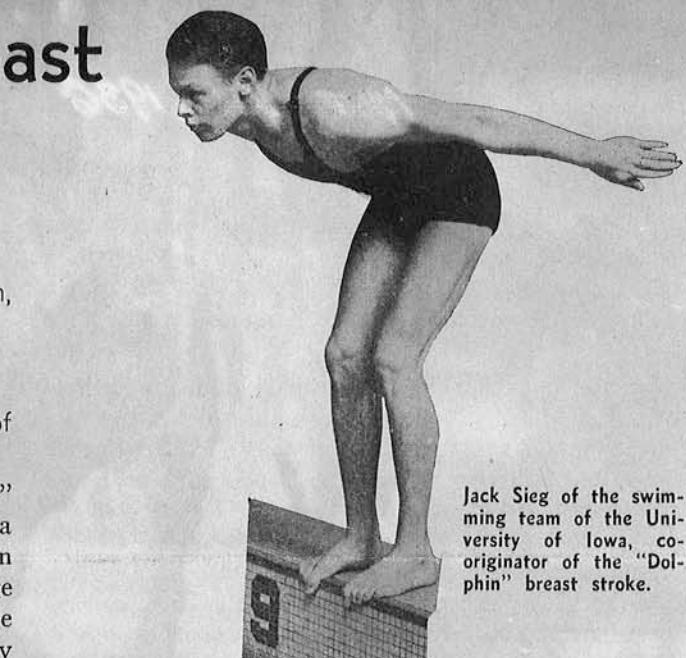
JACK G. SIEG

Member of 1935 Varsity Swimming Team, University of Iowa

A ONE-WORD change from "pushed" to "moved" in the competitive breast-stroke rule, permits a simultaneous over-arm recovery of both arms in the breast stroke. Perhaps this seemingly slight change will have a more far-reaching significance for the future of the breast stroke than was realized or anticipated by the rule makers. The author and the co-originator of this stroke, Jack Sieg, a member of the Varsity Swimming Team of the University of Iowa, believe this new stroke deserving of exploitation.

When this stroke is seen in action in the water there is no resemblance to the old breast stroke except that the swimmer is swimming on his breast and that the arm and leg movements are simultaneous. This is the only fact that keeps it within the present breast-stroke rule. It is our sincere hope that readers who may have an unfavorable bias or prejudgment without due examination of this unique stroke will read this analysis with an open mind. The author as well as Mr. Sieg appreciates the fact that the historical breast stroke is one of the oldest, most useful, and practical of all the utility strokes. It is symmetrical in movement and one of the most beautiful and colorful of strokes in the water. Our purpose is not to discard the old breast stroke as a utility stroke, but merely to offer this new type of stroke for exploitation as a competitive or racing-speed stroke. At present it offers no practical value as a utility stroke. It merely indicates another stage in the advancement of speed by "streamlining" the breast stroke.

Showing body position and arm recovery in the "Dolphin" breast stroke



Jack Sieg of the swimming team of the University of Iowa, co-originator of the "Dolphin" breast stroke.

Some of those who have seen this "Dolphin" (fish-tail) breast stroke in action have been thrilled, while others have remarked "I don't want to see any 'flying fish' strokes or 'butterfly' strokes, for such movements should be eliminated from our competitive strokes." Such remarks are made hastily without consideration or due examination of the merits of the stroke.

The stroke was demonstrated before the National Collegiate Rules Body at Harvard at the time of the N.C.A.A. championships on March 28 and 29. Its future use in racing will largely depend upon the reaction of this committee.

Description of the Stroke

This stroke may best be described as resembling the crawl stroke except that instead of recovering and pulling the arms alternately they are recovered and pulled through the water simultaneously. In the kick, similarly, instead of "fluttering" the legs up and down alternately, they are "fluttered" up and down simultaneously. There are two complete kicks to each arm stroke. The arm recovery which is now generally accepted and used by all breast-stroke swimmers has already many different names, and various techniques are employed in executing this dual rhythm, simultaneous, over-arm recovery.

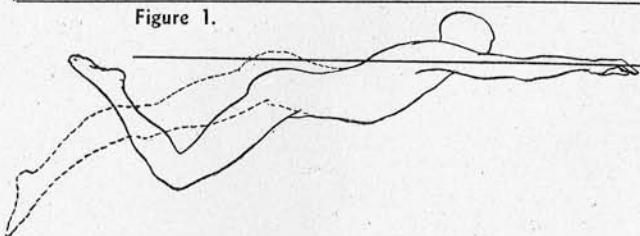
Factors Leading up to the Discovery of This Stroke

A number of factors influenced the coordinating of various situations as they presented themselves over a period of years, and resulted in this new stroke. In 1916 the writer gave a swimming exhibition and, among some of the stunts in the water, imitations were given of various animals. George Corsan, Sr., one of my early instructors, gave an exhibition at one time of a "butterfly" by swimming the breast-stroke kick and fluttering the hands at the sides on the surface. Later while giving the above exhibition the thought occurred to me of imitating a hydroplane by fluttering the hands on surface at the



Figures 1 through 5 show the progressions in swimming the "Dolphin" breast stroke. Detailed explanations of the diagrams will be found in column one on the opposite page. These line drawings have been made from moving pictures of swimmers in action.

Figure 1.



sides and fluttering the legs behind, leaving a path of boiling bubbles. Another boy on the side of the pool jumped in and said "you have demonstrated the English over, the Australian crawl, the American crawl, now watch me demonstrate the Italian crawl." He used the double over-arm with the breast-stroke kick. It has always since been used in our exhibitions. Last year a New York City school boy startled the swimming world by swimming 100 yards breast stroke (double over-arm) in 1:05 seconds. This performance led to its wide use and caused much controversy in America last year as to its legality as a breast stroke. Mr. Kiphuth cabled Mr. Donath, the A.A.U. International Secretary, as to its legality. They passed upon it favorably last August at the international convention. Upon the strength of this decision the N.R.C.A. Rules Committee changed one word in the present Rule IX Section 1—the word "pushed" in the first line has been changed to "moved."

This change permitted a swimmer to legally recover the arms above the surface of the water. This one-word change was revolutionary in scope, not only as to the arm stroke but as to the kick itself. To recover the arms above water brought into play an entire new body and leg action. We found when we used the over-arm recovery, that as the arms were pressed downward and backward in the pull, the body lifted high to permit both arms to swing or move forward above the surface, thus causing the body to lift during arm pull and depressing the hips and causing a bending at the knees. As the arms moved forward, the body lowered into the water, causing knees to straighten out quickly giving the appearance of a flip, which was a natural movement for preserving the balance during the arm recovery. This same knee bend and quick thrust has been used by one of our breast strokers, Wilbur Wehmeyer, after a push off and at the first arm pull.

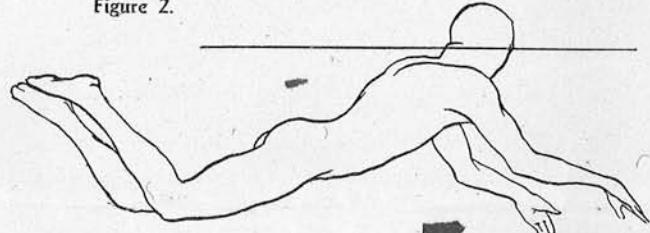
Now let us go back about three years. One day in a moment of relaxation and play, the writer saw Jack Sieg go under water, lie on his side, with his arms trailing at the sides, imitating a fish, imitating the undulating movement with his head. I have often seen boys do this in water but never saw anyone derive the speed that Sieg was able to attain from it. We then tried it with the body face down, and the result was even greater. We then had him do it for speed against some of our best flutter-crawl kickers—no one could beat him. This was very impressive, to say the least. He then tried the double over-arm recovery of the breast stroke using this

kick with it for several strokes. The leg rhythm was a natural movement and adapted itself perfectly to the rhythm of the double over-arm recovery. We then started to train for longer distances and adjust the breathing in order to cover one hundred yards. Several weeks practice brought results of greater speed, but at the cost of greater energy output. The stroke is an exhausting one.

The Mechanics of the Stroke

To facilitate the mechanical analysis of this stroke slow-motion pictures were taken, both from a window below the surface of the water and from above the sur-

Figure 2.



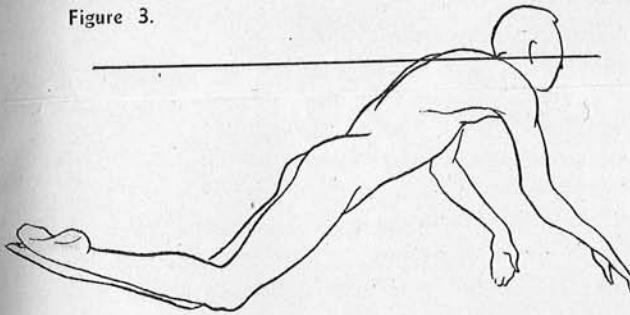
face. The stroke is clearly dominated by the kick. This kick resembles the tail movement of the flat-tailed dolphin. Mr. Sieg has very limber legs, feet, and ankles. On the up stroke his knees slightly hyper-extend at the beginning and the soles of his feet are slanted downward and backward at about the same angle as that usual in the up stroke of the crawl. At the end of this up stroke he bends his knees somewhat and then in the extreme end of the upward movement relaxes his feet just before beginning the down stroke. At the beginning of the down stroke he turns the toes inward and the metatarsal part of his foot, together with the toes, hyper-extends so much that on the down stroke the backs of his feet angle upward about 40° from the horizontal. He moves the whole leg downward keeping the knees somewhat bent until almost the end of the down kick, when he straightens the knees to the original hyper-extended position. In this way the feet press backward and at an angle against the water on both upward and downward strokes exactly as in the case with the tail of a flat-tailed fish, or as would be the case with a fish swimming on its side.

Mr. Sieg makes two complete leg strokes to each complete arm stroke, and since the leg stroke dominates the picture, the reaction of the leg movement appears very strikingly in the rest of the body. As the legs move upward, the hips sink slightly and the head and shoulders rise, and when the legs move downward, the hips rise and the head and shoulders move downward.

The stroke should probably be described and analyzed separately for the two leg kicks. The first kick begins with the entrance of the arms into the water in front of the body. At the moment the legs have reached the bottom of one kick the knees are slightly hyper-extended. (See position of dotted line in Figure 1). The arms remain in this position with the face in the water and the top of the head just showing above the water while the legs make one complete stroke. As the legs move upward (to the position shown in solid lines in Figure 1) the hips sink slightly and the head rises. The feet then kick downward as described above, completing this one

first stroke. At the beginning of the second upward stroke the hands and arms begin to pull through to keep the body moving almost straight forward. The arms begin their pull in an outward direction, very much as in the orthodox breast stroke (Figure 2). Immediately the legs begin their down stroke and, since this down stroke would raise the hips and sink the head, the arms change the direction of the pull and move in toward one another so that the arms are then parallel and pulling downward and backward (Figure 3). The arms finish almost by the side together with the completion of the downward leg kick (Figure 4). Immediately the up stroke of the legs takes place. This upward action of the legs depresses the hips but raises the shoulders. Mr. Sieg emphasizes this part of the leg stroke in order to raise his shoulders far enough to get his arms out of the water

Figure 3.



from just along side of the hips. They now swing out over the water and enter parallel to one another in front of the shoulders. This coincides with the beginning of the down kick and completes the cycle of this description. It is the reaction from the legs and trunk which raises the head and permits of his swinging the arms forward and ahead.

At the present time Mr. Sieg has to raise his shoulders so high out of the water to swing the arms forward that he presents his chest to the water at too obtuse an angle. The result is a slight checking of his forward speed. Greater speed will come from this stroke when the arms are moved upward at a greater angle to the horizontal in going forward, so as to minimize the change of position of the trunk. This will cut down the bow wave and the general head-on resistance.

The greatest mechanical advantages of this stroke are as follows:

1. There is no contra-resistance of the thighs as there is in the regulation frog kick.
2. There is no waste return motion such as is found, for example, in an automobile where the stroke is effective on only one-half a round trip out of two, and such as is found in the crawl kick down stroke where the back of the foot is flat and not hyper-extended.
3. There is no contra-propulsive reaction due to non-productive motion in the direction of progress. For example, the frog kick has a sort of reciprocating engine-jerk so that when one kicks backwards the kick ends with a jerk due to the backward momentum of the feet.
4. There is practically a continuous application of force on both the upward and the downward motion of the legs, and the slight reaction of the arms contrary to the direction of the swim that comes from the forward

motion of the arms is rendered as innocuous as possible due to the fact that the return is made through the air.

Relationship to Speed of Old Breast Stroke

In the historical breast-stroke kick, one unit of force is exerted intermittently, while in the Dolphin (fish-tail) kick, force is being exerted continuously, with no lost efficiency of effort or movement in relation to propelling force. This kick is really stream-lining the legs in the breast-stroke kick. The result of this kick is amazing and tremendous speed. A comparison of the times recorded over various distances will substantiate the above statement. The speed trials were made by Jack Sieg, the co-originator of this kick.

	Regular breast-stroke kick	Fish-tail kick
40 yards	:21.3	:23.5
100 yards.....	1:04.1	1:09.0
100 yards.....	1:02.2 (medley Relay)	
200 yards	2:29 (using fish-tail 3 strokes per length)	2:37
	18 feet (kick only) :03.5 Crawl kick only :04.1	

The world's record for 100 yards breast stroke is about 1:05 seconds. The world's record for 100 yards back stroke is 1:01.5. Just recently a Chicago school boy swam 100 yards back stroke in :59.8, the first boy

Figure 4.

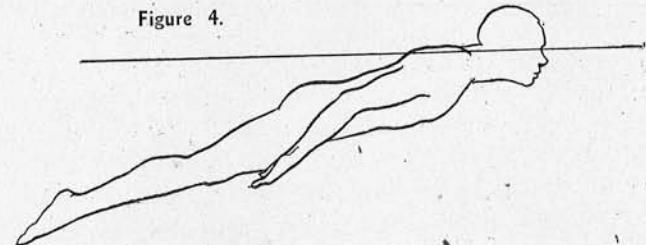


Figure 5.



ever to break one minute in the back stroke. This breast stroke is now as fast as the best back crawlers in the country. If a boy really trained himself in this stroke and carefully worked out the breathing element, it is easily possible that we may see him swim 100 yards breast stroke under one minute. This would then speed up the slow breast stroke and attract more boys to swimming it in the competition events. Many boys pass up the breast stroke for the crawl strokes because it seems too slow.

Its Relationship to the Rules

The writer has already met with considerable difficulty as to the legality of this kick according to the national collegiate breast-stroke rules. The N.C.A.A. Rules



Front view of body position and arm recovery.

Body last year changed the arm-stroke rule of the breast stroke in order to permit the swimmer to recover his arms above the surface. However, when boys used this new arm action a semi-flutter of both legs was present. This is true of Leonard Spence, who for years has thrown his arms out of the water to the wall for a turn and has made world's records with it, but has never been rejected on this ground. These boys all use a kick similar to the kick presented here—however, in some cases it is less modified than in others. But nowhere can a line be sharply drawn, because it is almost humanly impossible to lift both arms out of water by the hips without bending the knees to some extent, whether slightly or excessively. Therefore, if a boy is permitted to do it intermittently, between the old breast-stroke kick, why should he not be permitted to use it continuously without a spreading of the knees and a sweeping together of the legs? As the breast-stroke kick rule now reads, in the 1935 N.C.A.A. rules, there is nothing by which it may be disqualified. What the rule makers wanted in that stroke, just as in the back stroke, was to keep the swimmer on the breast, with shoulders parallel with the surface and one arm and one leg doing at the same time what the other arm and leg were doing. That is exactly how that rule may be interpreted. If one had never seen the orthodox breast stroke before and were told to design a breast stroke, keeping within the limits of the present N.C.A.A. rules, this new kick and arm stroke would be accepted without a question. There are no limitations in the back stroke as to what type of stroke a competitor may use as long as he remains on his back while swimming.

If this kick is to be rejected as not within the present breast-stroke rules, then the rules committee will have to do one of three things. First, also reject the over-arm recovery; because it cannot be done without bending the knees to some extent, however slight; or second, revise the rules to permit the over-arm recovery permitting a modified knee bend (and if this is permitted there will always be difficulty as to where to draw the line as to how far they may be bent); third, eliminate the over-arm stroke entirely as well as the flutter kick and place a new stroke in the competitive field as introduced here by the writer.

General Discussion

It may be stated by some that this stroke is of no practical value except as a competitive stroke. However, it must be remembered that this same statement was generally made after the crawl stroke was adopted. It was stated that no one could ever swim any distance with it. Then Gertrude Ederle, using the crawl stroke, successfully conquered the English Channel and set a world's record, surpassing that of any man. There is no one who would now suggest that we eliminate the crawl stroke because of its lack of utility.

This over-arm stroke with a continuous and simultaneous dual rhythm is new and is worthy of our time and consideration as teachers and coaches to develop it to its fullest extent. It may lead to great possibilities. Already some of our boys have tried it on the back as well as on the crawl, that is with an alternate arm action, but in the latter there is no natural balance or rhythm to be obtained. On the back there are possibilities for development. With the double over-arm stroke, if the rules body accepts it as being within the limits of the breast stroke, it will stimulate interest and attract more boys to swimming it in competition and will take the breast stroke out of the category of being termed merely a "girl's stroke" by many of our American boys. It will be fast enough to compete with the crawl and back-crawl strokes. We need only call your attention to the fact that our American boys have never defeated a European breast stoker except one, Bob Skelton in 1928.

Summary and Conclusion

A change in the N.C.A.A. rules of the breast stroke permitting an over-water arm recovery has made it possible to use this kick, because when the over-arm recovery is employed, an entirely different body action is used in the lower trunk as well as the legs, departing from the former kick—that of bending or spreading the knees outward and closing them with a rounded sweep. Furthermore, the present N.C.A.A. rules state that (Rule IX, Sec. 2) "the drive of the legs *may* be made with a rounded and outward sweep, a whip from the knees, *or* a thrust." This fish-tail kick may come within either of the last two terms. There are no terms used in the explanatory foot note of this rule under which it may be disqualified or rejected.

The mechanical technique of the stroke is a natural rhythm such as is derived from either of the crawl strokes. It is an undulating body and leg action with its origin in the head and shoulders.

The amazing speed derived from this stroke over that of the historical breast stroke is that the whole stroke is "stream-lined," i.e. both arm and leg actions are designed to eliminate water resistance. The arms are recovered out of the water and not underneath. In the kick there is no recovery phase at all, but there is a continuous simultaneous action in the vertical plane. It is through this continuous application of propelling power that the greatest factor of speed is derived.

The dolphin breast-stroke already has proved interesting from the standpoint of both recreational and competitive speed swimming, and has been a popular feature with spectators in the meets where it has been demonstrated.