in three volumes. Invaluable in many respects, it exhibited the process as well as the result of biography, and hence threatened to be too long. Mr H. Craik, succeeding to the post vacated by Forster's death, judiciously reduced the scale, and produced in one volume (1882) a work which will long rank as the standard one on the subject. Remarkable monographs on Swift have been produced by Leslie Stephen in the "Men of Letters" series, Dr Johnson in the *Lives of the Poets*, Thackeray in the *English Humourists*. Mr Stephen is anxiously impartial; Johnson's acuteness is perverted by his antipathy; Thackeray, as is natural in a novelist, has dwelt disproportionately on the romantic side of Swift's history, and his pity for Stella and Vanessa forms too large an element in his general judgment. But he has, better than any one else, apprehended the fearfully tragic element in Swift's character and fortunes. Swift's early life has been carefully investigated by Dr Barrett of Trinity College, and the final epoch of his life by Monck Mason and Sir William Wilde. His greatness is exaggerated and his failings are extenuated in two brilliant articles in the *Quarterly Review*, vols. cli. and clvi. Minor points in his life and writings have received much elucidation from numerous inquirers, especially the late Mr Charles Dilke and Colonel F. Grant. Mr Stanley Lane Poole has edited selections from his works and correspondence, with excellent notes and prefaces, and has prepared a valuable bibliography. (R. G.)

SWIMMING AND DIVING. In the case of man the power of swimming is acquired, not natural. As compared with the lower animals, to most of which it comes perfectly easily, he is at a disadvantage in its acquisition, owing not to his greater relative weight so much as to the position of his centre of gravity, along with the fact that in the case of quadrupeds the motions which serve to support and propel them in the water are very similar to those of locomotion on land. No race of mankind, however, can be mentioned to which the art is unknown, and in many barbarous countries it is more widely diffused and carried to greater perfection than amongst the civilized nations of the world.

For learning to swim, a quiet sandy beach is the best place, as sea water is more buoyant than fresh. All artificial aids, such as corks, air belts, cork jackets, inflated bladders, and the like, may be avoided; they raise some parts of the body too high above and so sink others too far below the natural plane of flotation, whereas the first fundamental rule is that the mouth only should be above water, and the legs close to the surface. Belts, &c., are also apt to become misplaced and so cause trouble and annoyance as well as danger. It is best for beginners to take some instruction from a practical teacher, though many have become adepts by merely watching good performers. Confidence in the floating power of the body is the first thing to be acquired. The easiest way of floating is to lie on the back (which should be slightly hollowed), the arms being stretched out beyond the head but not lifted out of the water; this attitude not only facilitates respiration but counterbalances the weight of the lower limbs. The knees may be bent outward, the toes also pointing sideways, the hips rigid, so assisting to keep the legs up as close as possible to the top of the water. By easy breathing one will soon be convinced that, properly balanced and with lungs kept charged, the body will assert its buoyancy.

To further enable him to realize that water is capable of supporting the human body, the learner may adopt the following plan. Walk down the steps of a bath, or along a shelving beach on a calm day, into about 3 feet of water; turn and face the shallow place, and, having taken a breath, stoop down and try to pick an egg or some similar object (a handful of sand will suffice) from the bottom. Repeat this several times leisurely, going farther out at each venture, till the water reaches up to but not higher than the middle of the chest. It will soon be found that the object is not so easy of recovery, and the beginner learns that but little exertion is required to keep the body afloat. When this experience has been gained the novice should commence with the *Breast Stroke*, which is nowadays sometimes unjustly set aside as the "old stroke." It is near, natural, and graceful enough, though necessarily the slowest, from the great resistance of the chest to the water and the fact that part of the arm stroke is negatived by its own movement. Like walking in pedestrianism, however, it forms the groundwork of every other branch of the art, and cannot safely be overlooked. The stroke is commenced by placing the hands with the backs upward, and the wrists bent so that the fingers will point to the front, the insides of the wrist-joints between arm and thumbs touching the breast not lower than 4 inches under water. Begin the stroke by pushing the arms gently forward to their full extent, keeping the palms flat and the fingers closed. Now turn the palms of both hands outward, and make a strong stroke to the right and left by each arm through an angle of 90°; in this part of the stroke the two arms describe a semicircle, of which the head may be termed the centre. It must be most distinctly borne in mind that all depression of the hands will tend to raise the body perpendicularly, whereas the only true position in swimming is the horizontal, which propels it forward. To complete the arm movement, bend the elbows backward and inward, until they come close to (but not necessarily touching) the sides of the body. Carry the hands in a straight line edgeways to the position from which they started in front of the chest. Simultaneously with the stretching of the hands from the front of the body the feet are struck out to the utmost width in a way cleft for them by the toes. As the arms are being brought round in the semicircular motion the lower limbs are stiffened and brought firmly together by grasping the water, so to speak, with the whole of the leg, more especially between the knees, ankles, and soles and toes of the feet. Whilst thus imparting forward motion to the swimmer, they finish in a straight line behind the body. Then, when the arms are bent, and the hands are being brought to the front of the body, the knees are turned outward, heels kept together, toes also turned out, and the feet are carried up to the body and in this position are once more ready for repeating the movements as described. Beginners must be careful not to make the arm movements quicker than those of the legs, and it must be distinctly remembered that the latter are the great propellers. Unison of the movements as mentioned, and regularity in each part of the stroke, are indispensable to perfection. All hurry and excitement must be carefully avoided, and every complete stroke and kick gone about with mechanical precision and neatness. The only part requiring strong muscular exertion being the closing of the legs after they have been spread wide apart,—the one strong propelling element,—every effort is to be made to ensure correctness and power in its performance. The arm movements should be easy and graceful, all jerkiness or suddenness of motion being carefully avoided.

Breathing should be unrestrained and natural, without gasping, sputtering, or short or sudden heavings. A safe rule is to have a full breath at every stroke, its division being regulated as follows. Blow slowly outward when the first part of the arm movement is being performed, *i.e.*, stretched out in front; inspire as the hands are going outward and round. Then, as the lungs are fully charged, no effort is necessary to suspend respiration while the hands are carried in to the front of the body again. This regularity of breathing is essential to pleasure, comfort, and gracefulness of action. The nostrils and air-passages should always be thoroughly cleared, the mouth cleansed, and the throat gargled before entering the water.

Swimming on the Back is a pleasant and useful branch of the art; the chief requisite for its acquirement is confidence. The tyro should begin practice in water reaching

up to about the upper part of the chest, turn his back shoreward, take a long breath, and lie gently backward in the water, keeping the hands on the waist with the elbows extended outward, the chest being expanded, and the breath held. As one lies well back the feet will be lifted off the ground; they should then be spread outward as far apart as possible, in the same position as when they are opened up in breast swimming. The body and legs are thus lying extended at full length like the letter Y, the legs forming the branches or fork. Now comes the propelling part of the movement. As in the front stroke, the muscles are set, and the legs are by one strong motion brought firmly and closely together. While this is being done the toes, by a slight movement of the ankle, are turned upward, and so, as the movement is finished, the great toes, inner ankles, and inside of the whole leg meet. This motion, strongly but not jerkily executed, sends the body forward, and, when the impetus obtained is nearly—not quite—expended, the legs are bent, so that the feet are drawn close up to the trunk, with the knees outward and heels together. The stroke is renewed by spreading apart, closing again, and so on. The breath is exhaled when spreading and closing the legs, and inhaled as the feet are drawn up to the body. If greater speed is wanted, the hands can be used as sculls by carrying them outward from the body, but at the same time level with it, palms facing downward. When the arms are sufficiently extended to be in a line across from hand to hand, the wrists are turned to allow of the palms of the hands facing toward the feet, thumbs upward. Elbows, wrists, and hands are now firmly braced, and a strong pull towards the legs is made. This is the progressive motion, and should be performed just as the legs are being closed.

Another style is to bend the elbows downward, so as to allow of the hands being carried upward along the sides of the body, thumbs inward, and palms facing the bottom of the water. When the hands have been carried up to the armpits they are spread apart to the full extent of the arms, and the propelling part is performed as in the other method by pulling strongly toward the legs.

A still more powerful stroke, and one used at competitions, is accomplished by carrying the hands up to the armpits, as described in last method; then, turning the wrist so as to allow of the palms of the hands facing upward, point the fingers in the direction of progress, stretch both arms as far as possible in a line with the body and beyond the head, and turn the wrists half round, until the hands are back to back, thumbs upward. The propelling action is now performed by sweeping both hands outward and round until they touch the legs and the arms are once more straight along the sides of the body. There is a double kick in this style, and the action is as follows. When the hands are being carried up to the shoulder one kick is delivered; then as the arms are being carried beyond the head the nether limbs are drawn up in position for another kick, which is delivered as the arms are sweeping down on the stroke. This is no mere ornamental stroke, but combines in its practice grace with power, and enables the swimmer to move through the water at great speed.

Another racing back stroke is performed by lifting hands and arms out of the water at the finish of the pull downward, carrying them in the air, stretching them at full length forward beyond the head, and then dipping them into the water, executing the positive part of the stroke as in the last-described method. In this stroke there is only a single kick to each pull of the arms, the legs being drawn up as the arms are swung up in the air and closed as the arms are pulled through the water. While this movement is much practised by some experts, it is neither so graceful nor so speedy as the other, and there is much splashing, while steering is, in the case of a close race, likely to become rather erratic. Both are at the present time the fastest known methods of swimming on the back, and, with moderately good turning and pushing in a swimming bath, 100 yards should be covered in about 74 seconds, probably less.

Of *treading* as a branch of swimming something should be known by every one. It is the only department of the art that is at all natural; and, if treading were resorted to in cases of accidental immersion, three-fourths of the resulting deaths would be prevented. The essential condition, of course, is that the hands be kept under water. When one falls into water the legs sink and the body assumes a perpendicular position, the water splashes over the face, and, once the eyes become filled or the mouth covered, the inclination of any one unable to swim is to throw the hands up and make an effort as if to creep along on the surface. These efforts only increase the danger of the position. On becoming submerged one should keep perfectly inactive for a brief time; the head will soon rise above the surface, and at this moment one ought to beat downward with both hands alternately, never allowing them to splash or disturb the surface, the head being leaned back so as to keep only the face and nostrils clear. The back of the head and ears may be covered, but this does not matter. The motions of the hands, exactly similar to those of a dog's forepaws when swimming and walking, are to be continued, the feet at the same time striking down—not hurriedly, nor with sudden jerky movement, but easily and gracefully, the ankles moving as if working treadles, so that the soles of the feet act as sustaining and, it may be, propelling surfaces. The movements of hands and feet may be altered by beating downward with both hands at once, or both feet at once, but in cases of accident the former action is to be recommended. Swimmers, when treading at competitions or for display, either fold their arms across their chest or hold hands and arms above the surface. In artistic swimming trials, as much as possible of the body should be shown above the surface, and bobbing up and down ought to be avoided. Treading is of much importance even to a good swimmer, as it allows him to divest himself of upper clothing, and enables him to lay hold of anything, such as a rope or line that does not quite reach the surface; it is also the most comfortable position in which one can partake of refreshment in case of a long swim, and is useful for purposes of conversation.

The *Side Stroke* may be said to hold in swimming a position somewhat similar to that of running in pedestrianism; as it becomes better known, the advantages of this style of aquatic progression are becoming more and more appreciated. The practice of it, however, ought not to be begun until complete proficiency has been attained in the primary stroke. Its main recommendations are apparent almost at a glance. A good average side movement will carry the swimmer a stroke in two seconds, each stroke covering a distance of fully six feet. The method is said by some to have been introduced by George Pewters about the year 1850. The body is turned on either side, but preferably with the right side downward, as thereby the legs act more freely and naturally and the heart has no weight on it to impede its action. The head is more immersed and thereby reduced in weight, being supported by the water and not by any muscular exertion of the neck or shoulder, and the lower extremities are less immersed than in the breast stroke. If one is lying on the right side, the right arm is thrown boldly out in front, with the palm of the hand downward and on a level with the lower side of the head. When pushed out to the utmost it is kept rigid, brought downward through the water in one strong movement, without any bending of either wrist or elbow,

and this, the positive action, is finished when the hand has reached the legs, and comes between these limbs at full stretch. It is then carried up along the body to the chin, and the stroke renewed. The left hand is formed into a scoop, turned outward by the wrist at right angles to the fore-arm. The left arm, with the elbow bent, is then directed outward, and makes a straight pulling (not circular nor swinging) stroke to the left hip. When one arm is performing the negative the other is at the positive part of the stroke. The action of the legs should be long and vigorous, and they should never cross each other, but should work in unison with the arms and shoulders. The left knee is brought up in front of the body, with the foot in front of and at right angles to the body. Put the foot in a line with the front of the leg, and bring it round to meet the other in a line with the body. Meanwhile stretch the right or lower leg as far away as possible from the body toward the back and then bring it down to meet the other by a powerful plain stroke. The legs are then returned upward to the body, the heels touching, the knees apart, the toes of the left foot forward and of the right foot downward. To learn this graceful and useful side stroke some persons need long and steady practice; others acquire it comparatively quickly. The swimmer steers with his left or right hand and arm as the direction demands. The head and neck must be held in one position, not raised nor turned at any part of the stroke. Bearings should be taken from what can be seen in the line of vision away from and in front of the body, and only very seldom indeed should the head be turned to look in advance Breath is inhaled as the under hand is pulling downward, and exhalation should take place while the mouth is immersed, which is when the uppermost hand is performing the stroke along the body.

The coincident movement of arms and legs may be thus described. As the legs are bent up to the body the upper or left hand has been stretched in front and the right or lower arm has just finished the pull. As the top arm pulls downward the legs are opened wide and almost in the same motion swung round and closed. It will be apparent that the legs are returned upward with knees bent as the downward pull is being performed with the lower arm. No effort is to be made to sink the head, neither is it to be held up in any way. The turn of the body by the power of the strokes will be quite enough to allow of the lips being sufficiently clear of the water for the purpose of inspiration. There should be no sudden pull at any part whatever of this complete stroke.

The *Overhand Stroke*, when properly practised and acquired, is the most useful and easy of all styles of swimming. Beginners, however, should beware of acquiring it before they are thorough adepts with the side stroke, otherwise they lose all power of speed and good appearance. Harry Gurr is sometimes said to have been the inventor of this stroke in 1863, but Harry Gardener, in August of the year previous, when he won the 500 yards championship in Manchester, used the overhand or over-arm stroke. The only movements of the side stroke which differ from those of the overhand are those of the left or upper arm and hand. By carrying this arm in the air a lengthened reach is obtained above the surface. As in the side stroke, the head lies as far as possible into the water, the body, legs, and feet in a straight line level with and close to the surface. The left arm is carried forward and stretched as far as possible out of the water in a line with the face and in advance of the head. The arm and hand re-enter the water, and are pulled through it with the strongest propelling stroke. The limb out of water should be carried through the air quietly, gracefully, and evenly till dipped for the stroke, not swung uselessly round from the shoulder in a half circle. The left arm and hand being in the air, the head lies deeper in the water than in the side stroke, and it is reduced in weight. The legs work simultaneously with the left arm; that is, they are drawn up as this arm reaches in front, and are at their nearest wide stretch by the time it is in position for the pull; they are then pulled strongly together as the upper arm is performing its strong movement. At no time when the upper arm is being carried forward above the water should the hand be higher than a very few (say about three) inches above the surface. The elbow alone is elevated, and is the highest part of the arm. In fact, the hand is so close to the surface that, on being lifted upward after the delivery of the stroke, the wrist has to be bent; otherwise the fingers would actually touch the water. Once, however, the hand comes opposite the eyes it is straightened in a line with the fore-arm and in this position carried to the dipping point. Breathing is regulated in precisely the same way as when swimming by means of the side stroke.

Touching and Turning.—The methods of "touch and turn" were brought into vogue by the now numerous swimming races in baths. Whether the baths be long or short, from 10 to 15 feet in the push-off is gained at each end of every length by all competitors. Assuming that the swimmer is using the side or over-hand stroke and going on the right side, the method to be adopted is as follows. When within 3 feet of the end wall of the bath the left or upper hand quits its propelling movement, and reaches in front of the head till it touches the wall just above water-mark. The palm of the hand is then placed horizontally on the wall, the fingers to the right, which is the direction to which one is turning; the little finger is uppermost and thumb undermost. The knees are bent, and the body, now close to the wall, is turned to the right on its own axis by the left hand, after which the feet press against the wall under the hand. As in diving and plunging, the body, arms, and hands are in a straight line, and the head between the biceps, all under water. The thighs are doubled up under the loins, the calves of the legs touching the back of the thighs, and the soles of the feet pressing hard against the wall. A strong push-off is made by the feet and legs, and the swimmer resumes his ordinary stroke and course for a new length.

Ocean Swimming.—Persons having from any cause to swim in the heavy rolling breakers of mid ocean should use the side stroke when available. No attempt should be made to breast or mount the waves. By taking their direction a side-stroke swimmer is carried an unexpectedly long distance. The large dangerous rollers come almost in regular succession after an interval of small waves. The swimmer soon notices them, fills his lungs, swims into them, ducking the head, and quickly emerges when the wave has passed. Then a fresh supply of breath is inhaled.

Plunging.—In this the performer enters the water in somewhat the same manner as when diving (see below), but at a flat angle, and from the moment of doing so makes no active muscular movement whatever of any part of the body under water. Plunging came into vogue as the most graceful and practical method of starting in swimming races. From 3 to 5 feet above the water-level makes the best springing point, whether from bank, board, or rock. The knees should be kept together and slightly bent, with the weight on the balls of the feet and the lungs fully charged. The spring forward at the signal to start is given with all muscular power available. A swing of the arms from behind is taken, and, as the feet quit their support, the arms are swung forward so as to rise up to and straight beyond the head. The body is shot into mid air as far as possible, and, before touching the water, the head falls between the arms till the chin just touches the chest and the ear grazes the inside of the biceps. The body now glides gracefully and almost noiselessly into the water, with the chest slightly hollowed, the shoulders contracted, and the arms rigidly braced out straight. The hands are now laid flat and the thumbs locked, while the hips and ankles are kept in one rigid straight line, with the soles of the feet turned upward and level with the surface, the toes pointing straight behind. The forward motion from the spring continues as long as the body will float and the air in the lungs can be held, when the feet, followed by the arms, begin to sink, and the plunger ends his performance by merely raising his head. Adepts in this branch have saved themselves from a sinking vessel by a long plunge from the ship's side, and so by one effort have got clear out of the vortex that is caused by her settling down and sinking.

Diving.—The rule in diving, as distinguished from plunging, is most explicit. In diving alone are the limbs allowed to make muscular movements under water. When properly performed it is a most graceful feat to the eye, and a good swimmer is, as a rule, known by the way in which he enters the water. The height of the end of the board from the surface of the water may be from 3 to 20 feet. If the water is taken properly a clean dive or header is made, but some swimmers are careless and will flop into the water with the body contracted like a ball, instead of straightened out like an arrow. The descent of good divers into the water varies from 3 to 4 feet, of clumsy performers from 7 to 8 feet. The dive may be a standing or running one. The feet and legs are kept together, with the chest inflated, the arms slightly swung to and fro twice or so, and the body and legs bent towards the water. The lungs are charged, and the dive is made immediately before the arms and hands are raised forward into the air above the bent head. The feet are used with all the power possible in springing off. When in mid air the diver straightens himself out from finger tips to toes. The shoot downwards is made by declining the arms so as to enclose the head, the chest is momentarily contracted, and the water is gracefully and noiselessly entered fingers first. The instant the body is covered, throw up the head and arms so as to reach the surface. The eyes instinctively close as they enter the water; if it were otherwise, the force with which the surface is struck might cause injury, especially in the case of high diving. As soon as the water is entered the eyes should be opened, as swimming under water with them closed may be attended with danger. The best method for novices is to begin from a board 3 feet high; and, as confidence and a good style are acquired, the height may be raised 1 or 1½ feet at a time. Running headers are accomplished by running 10 or 12 paces before springing off, and the diver endeavours to clear as long a distance as possible before entering the water. Muscles and weight have nothing whatever to do with perfection in diving. Slim youths and heavy middle-aged men and women have alike excelled in this branch of aquatics. The important requisites are courage and strength of nerve, combined with experimental knowledge of the behaviour of the body while in air and water. Do not enter the water feet first. This is only done by those who have not the courage to dive in the proper manner, and it sometimes causes harm to the respiratory organs, while one may lose balance and so come on to the water quite flat and be seriously injured in the stomach, ribs, or spine.

Object Diving.—Some divers move over the bottom in straight lines, and others search on no plan at all. The best way is to strike to the right or left on the circumference of the circle surrounding the objects and work spirally inwards to the centre of the circle. If the face be kept close to the bottom and the eyes brought well into use success will reward one's efforts, and no object ought to be missed. For object diving the drawers should have a pocket easily accessible to one hand, in order to receive the objects raised. These are collected by swimming on the breast as quickly as possible. All movements under water ought to be gone about with the utmost alacrity, but at the same time without undue haste or flurry, otherwise the heart's action will be increased, the breath will suffer, and the stay under water will be shortened.

Plate Swimming.—This is a most interesting and enjoyable branch of the art. From a very early period we find references to mechanical appliances as aids to progression and support in the water, these helps generally taking the form of large flat surfaces made of wood, tin, leather, waterproof fabrics, or other similar materials. Sometimes they were flat, in other instances slightly concave. Some were made banded like the covers of a book, or hinged, others opened and closed with umbrella-like action, while quite a large number were made web-like, to resemble a duck's foot; nearly all were more or less collapsible. From what can be gleaned of the style of these articles it is evident that the inventors cannot have been familiar with the principles of swimming, or aquatic propulsive action, and so, while a number of the contrivances were undoubtedly the outcome of much thought and ingenuity, they could not be regarded as in any way improving on the ordinary or primitive swimming movements; and, while greater surface than is offered by hands and feet was always given, with the evident intention of reducing "slip," much resistance took place at the neutral or negative part of the stroke. The one good effect in most of these inventions was thus more than nullified by this "drag," which, besides being objectionable in itself, had the additional disadvantage of bringing into requisition muscles of legs and arms the development of which was antagonistic to perfection of swimming. In 1876 Mr R. H. Wallace-Dunlop, C.B., announced that he had invented swimming plates which afforded increased speed without causing undue straining of the muscles; and these claims have been justified by subsequent experience. The arrangements for a lateral movement of the heels in the footboards or plates, with freedom of the ankles, showed at once that Mr Dunlop had fully studied the details of the art of swimming, with the effect of greatly reducing "slip" in the positive and altogether doing away with "drag" in the negative parts of the leg stroke. Slow swimmers, by the use of the new appliances, move quickly and easily through the water, whilst moderately fast swimmers have their speed increased to an almost wonderful extent. To swim 100 yards in 70 seconds without artificial aid is regarded as a good performance; there are not half a dozen living swimmers who can reduce this time by so much as five seconds. Yet about ten years ago a London swimmer, not by any means the fastest, with the assistance of the plates covered the distance of 100 yards in 60 seconds. It will thus be apparent that the invention marks an important advance in the art of swimming. These plates are made of wood —mahogany or American bass,—and are in shape somewhat like an artist's palette, with this difference, that the bay or indentation of the edge runs in to where the thumb-hole would be. The straps are made of leather, and all buckles and metal should be of bronzed or lacquered brass; the woodwork ought to be kept well polished or varnished. The hand plates are at the thickest part ⅜ of an inch thick, but those for the feet must be much stronger, as the whole weight of the body is upon them while one is standing at or walking to the water's edge. In learning to use them, let the swimmer begin by lying flat on the water, straightening the arms out about 24 inches apart. Spread the feet and legs well outward; then so place the feet that the plates shall be vertical, and thus offer the soles as resisting surfaces to the water; close the legs in such a way that the flat parts will meet when the legs come together. The return of the feet to the body is the same as in natural or unaided swimming, *i.e.*, by bringing them heels first so that the plates are carried up edge ways. Next, turn the ankles so as to allow of the soles facing outward, this being in plate swimming the point from which the positive or propelling part of the stroke actually starts. Now press outward and round until the plates meet as before, and repeat. Practise slowly and steadily until sure that in the recovery there is no drag, and that when spreading apart and closing the resisting surfaces are squared so as to reduce slip to its minimum. The hands are moved as in ordinary swimming, with this difference, that they are all the time lying flat; on their return to the body after the propelling movement no motion of wrist is to be made, great care being taken to keep the hand plates perfectly parallel with the surface of the water, as the slightest deviation from this rule, at any one part of the arm stroke, will sink or raise the head and chest, and so alter the natural and correct plane of the whole body. As the plates are lighter than the water the feet will tend to come close to the surface, if not indeed sometimes above it, causing splashing unless care be taken to avoid this. Floating in any position is easy and comfortable with plates on, and diving, sculling, and back swimming are all facilitated. The length of stroke in plate-swimming is nearly double that of ordinary water movements. The recommendations of the invention, especially in sea and long-distance swims, may be summed up in four words—safety, power, endurance, speed.

Long Immersions.—It is on record that on October 6, 1835, Samuel Brock, a Yarmouth fisherman, after being capsized, remained in the water for 7½ hours before he was picked up. As a long-distance swimmer in ocean and tidal waters no one has ever approached Matthew Webb (1848–83), of the British mercantile marine service. His first great feat was plunging (April 23, 1873) off the Cunard S.S. "Russia" into a heavy sea in the unsuccessful endeavour to save a young sailor who had fallen overboard, when he passed 37 minutes in the sea before the lifeboat relieved him. He received the silver medal from the Royal Humane Society of London, the Stanhope gold medal, and a £100 purse subscribed by the passengers of the "Russia." In June 1874 he swam from Dover to the north-east Varne buoy (9½ sea miles). On July 3, 1875, he went from Blackwall Pier to Gravesend Town Pier on an ebb tide (18½ miles) in 4 h. 52 m. 44 s., and on July 19, 1875, from Dover to Ramsgate (15 sea miles) in 8¾ h. An unsuccessful attempt to swim from Dover to Calais (17½ sea miles) in the narrowest part of Dover Straits took place on August 12, 1875. He afterwards successfully accomplished the feat on August 24–25, 1875, after 21 h. 44 m. 55 s. immersion, the distance swum having been as nearly as possible 39½ statute miles. A foolhardy attempt to swim the whirlpool rapids of Niagara cost Webb his life on July 24, 1883. On September 15, 1875, F. Cavil swam on the ebb of a strong spring tide from Putney to Blackwall (13 miles 3 furlongs) in 3 hr. 50 m. Miss Agnes Beckwith, of London, on the 17th July 1878, swam 20 miles in the Thames, without any assistance whatever, in 6 hours 25 minutes. Horace Davenport, of London, for years amateur champion of Great Britain, on 2d September 1884, swam from Southsea, Portsmouth, to Ryde, Isle of Wight, and back again in 5 h. 25 m.

Remarkable and Best Swimming Records.—The great majority of these have been achieved in England, but accurate statistics cannot be said to be plentiful. The following are some of the authentically recorded results.

Best Records in Open and Still Water:—100 yards, 1 m. 5⅘ s.; 220 yards, 2 m. 54½ s.; 300 yards, 4 m. 57 s.; 500 yards, 7 m. 58 s.; half-mile, 14 m. 17½ s.; 1000 yards, 15 m. 6½ s.; 1 mile, 28 m. 19⅘ s.; 3 miles, 1 h. 53 m. 30 s.

Bath Swimming.—Of the innumerable enclosed swimming baths in Great Britain not many are exactly similar in measurement as regards length and breadth. The shorter the bath the faster becomes the time test of speed by the aid of each turn. The Lambeth bath, where the greatest number of championship and other celebrated bath races in the kingdom have been decided, is 40 yards long. The following are the best Lambeth records:—40 yards, 23½ s.; 80

yards, 32½ s.; 100 yards, 1 m. 7½ s.; 120 yards, 1 m. 28½ s.; 160 yards, 2 m. 2 s.; 200 yards, 2 m. 41½ s.; 220 yards, 2 m. 59½ s.; 400 yards, 5 m. 44½ s.; ½ mile, 6 m. 21½ s.; 500 yards, 7 m. 19½ s.; 600 yards, 8 m. 46½ s.; 800 yards, 11 m. 46½ s.; ¾ mile (21 turns), 13 m. ½ s.; 1000 yards, 14 m. 56½ s.; 1200 yards, 18 m. 5½ s.; ¾ mile, 20 m. ½ s.; 1400 yards, 21 m. 17½ s.; 1 mile (43 turns), 27 m. 3½ s. The records of other baths include:—500 yards, 6 m. 55 s. (Oldham Baths); 100 yards, 1 m. 4½ s. (Blackburn Baths); 1 mile, 26 m. 21 s. (Westminster Aquarium) (80 turns).

Longest Time under Water, in Glass Tank.—4 m. 29½ s.

Longest Dives.—109 yards 2 feet 6 inches, and 113 yards 1 foot.

Longest Plunges.—From a springboard 5 feet above the level surface of the water, 73 feet 1 inch; from a fixed board, 3 feet 6 inches above the water level, 76 feet 3 inches.

For baths and bathing, see BATHS, vol. iii. p. 434. For drowning and rescuing life, see DROWNING, vol. vii. p. 475. There are two societies with headquarters in London which consist of delegates from nearly all the swimming clubs in the metropolis. These have framed rules and regulations for the conduct of clubs, races, and other performances included under "swimming." The Professional Swimming Association was successfully floated by Mr Robert Watson on July 5, 1881. The Amateur Swimming Association was reinaugurated in 1886 by the amalgamation of the Swimming Association of Great Britain and the Amateur Swimming Union. There are annual competitions for the amateur championships at 500 yards, ½ mile, 1 mile in still water, and 5½ miles in the Thames. There are also the Associated Swimming Clubs of Glasgow and the Associated Clubs of Dundee, each similar in its objects and composition to the Amateur Swimming Association.

The literature of the subject of swimming is considerable, and the following works may be mentioned. Thevenot, *The Art of Swimming*, transl. from the French, London, 1789; *Swimming*, two letters by Benjamin Franklin, Bungay, 1791; Walker's *Manly Sports*, art. "Swimming," London, 1836; G. H. Cliss, *Gymnastics and Swimming*, London, 1840; W. H. Leveral, *Swimming and Swimmers*, London, 1861; S. W. Hikgenson, "Swimming," in *The American and Continental Monthly*, May 1870; "Piscator," *How to Swim*, London, 1872; Charles Steedman, *Manual of Swimming*, London, 1873; Leahy, *Swimming in the Elon Style*, Nottingham, 1875; J. Bell Pettigrew, *Animal Locomotion*, London, 1874; W. Wilson, *Swimming, Diving, and How to Save Life*, Glasgow, 1876; Torkington, *Swimming Drill*, London, 1876; R. H. W. Dunlop, *Plate Swimming*, London, 1877; Menstery, *New Manual of Swimming*, New York, 1878; W. Wilson, *The Swimming Instructor*, 1883; J. H. Walsh, art. "Swimming," *British Rural Sports*, London, 1886.

(H. F. W.—W. WI.)

SWINDON. The towns of Old and New Swindon, in Wiltshire, England, are situated on several railway lines, about 77 miles west of London and 30 east-north-east of Bath. The old town is built on an eminence commanding fine views of the surrounding country. It received a charter for a fair from Charles I., and has weekly markets for corn and cattle. The church was erected in 1851, from the designs of Sir Gilbert Scott. There is a town-hall and a corn exchange. Swindon New Town, to the north from Old Swindon, has grown up since the construction of the Great Western Railway, which has its principal works there. There is a market-house for meat, fish, and vegetables. Connected with the Great Western Railway mechanics' institution there is a library of about 14,000 volumes. The combined areas of Old and New Swindon, which form separate urban sanitary districts, amount to 2524 acres, with a population in 1881 of 22,374. Old Swindon (area 1214 acres) had a population in 1871 of 4092 and in 1881 of 4696, and New Swindon (area 1310 acres) a population in 1881 of 17,678.

SWINE. The oldest known even-toed or Artiodactyle Ungulates (see MAMMALIA, vol. xv. p. 429) were neither Oxen, Antelopes, Deer, Camels, nor Pigs, but presented a generalized type, which by modification in various directions has given rise to all these very diverse forms. They were mostly of small size, and had invariably the full number of teeth of the typical mammalian heterodont dentition, viz., 44, of which the incisors were $\frac{3}{3}$ on each side, the canines $\frac{1}{1}$, the premolars $\frac{4}{4}$, and the true molars $\frac{3}{3}$. The molars were short and square, crowned with blunt, rounded cusps, and the canines were not remarkably developed. All the feet terminated in four toes, the two middle ones (the third and fourth of the complete typical mammalian extremity) of nearly equal size, the outer ones (second and fifth) smaller, and also equal. The five-toed ancestor of these forms has not yet been discovered. They had no special weapons, as horns or antlers, on their foreheads. Such was the condition of all the hitherto discovered animals of this division at the commencement of the Tertiary period. Very early a change took place in the characters of the molar teeth in certain members of the group: the rounded tubercles became sharp ridges curved in a crescentic form, and better adapted for a purely herbivorous diet, especially for cutting and bruising the comparatively dry and hard blades of grass which grow in open plains. The animals thus separated from the rest—the Selenodont (crescent-toothed) Artiodactyles—have undergone various further modifications of teeth, feet, and other parts, and constitute the diverse forms of ruminating animals mentioned above. Those whose molar teeth retained more of the primitive tuberculated (bunodont) form, were the ancestors of the present family of Swine, some of which, looking upon their organization as a whole, have undergone less change since the Eocene period than almost any other mammals.

Remains of very generalized swine-like animals have been abundantly found in Eocene and early Miocene formations both in America and Europe. In the former continent they never (as far as present evidence indicates) underwent any great diversity of modification, but gradually dwindled away and almost died out, being only represented in the actual fauna by the two closely-allied species of peccary, among the smallest and most insignificant members of the group, which have existed almost unchanged since the Miocene age at least, if the evidence of teeth alone can be trusted. In the Old World, on the other hand, the swine have played a more important part in recent times, having become widely distributed, and throwing off some curiously specialized forms. At the present time, though not very numerous in species, they range through the greater part of the Old World except within or near the Arctic Circle, although, in common with all the other members of the great Ungulate order, they were completely absent from the whole of the Australian region until introduced by man in very recent times.

The existing swine-like animals may be divided naturally into three families:—I. *Hippopotamidæ*; II. *Suidæ* or true Pigs; III. *Dicotylidæ*, or Peccaries.

I. FAMILY HIPPOPOTAMIDÆ.

Muzzle very broad and rounded. Feet short and broad, with four subequal toes, with short rounded hoofs, all reaching the ground in walking. Incisors not rooted but continuously growing; those of the upper jaw curved and directed downwards; those of the lower straight and procumbent. Canines very large, curved, continuously growing; upper ones directed downwards. Premolars $\frac{4}{4}$; molars $\frac{3}{3}$. Stomach complex. No cæcum.

This appears to be an exclusively Old-World form,—no animals belonging to it, either recent or fossil, having been found in America. The family has been divided into three genera, according to the number of the incisor teeth. (1) *Hexaprotodon*, incisors $\frac{3}{3}$, a type which comes nearest to the generalized or ancestral form of the group, is now extinct, being only known from the early Pliocene formations of the Sub-Himalayan range. (2) *Hippopotamus* proper, incisors $\frac{2}{2}$, contains the one well-known species *H. amphibius*, now confined to the rivers and lakes of Africa, but formerly (in the Pliocene period) abundantly distributed, under various minor modifications, in Europe, as far north as England. Remains of an allied form have been found in the island of Madagascar, where it is now extinct. (3) *Chœropsis*, incisors reduced to $\frac{2}{3}$, contains one very small and still little known species, from rivers of Liberia, West Africa, *C. liberiensis*. See HIPPOPOTAMUS.

II. FAMILY SUIDÆ.

An elongated mobile snout, with an expanded, truncated, nearly naked, flat, oval terminal surface in which the nostrils are placed. Feet narrow; four completely developed toes on each. Hoofs of the two middle toes with their contiguous surfaces flattened. The outer (second and fifth) digits not reaching to the ground in the ordinary walking position. Teeth variable in number, owing to the suppression in some forms of an upper incisor and one or more premolars.

Incisors rooted. Upper canines curving more or less outwards or upwards. Stomach simple, except for a more or less developed pouch near the cardiac orifice. A cæcum. Colon spirally coiled. Confined to the Old World.

Sus.—Dentition: $i\frac{3}{3}$, $c\frac{1}{1}$, $p\frac{4}{4}$, $m\frac{3}{3}$; total 44. Upper incisors diminishing rapidly in size from the first to the third. Lower incisors long, narrow, closely approximated, and almost horizontal in position, their apices inclining towards the middle line; the second slightly larger than the first, the third much smaller.

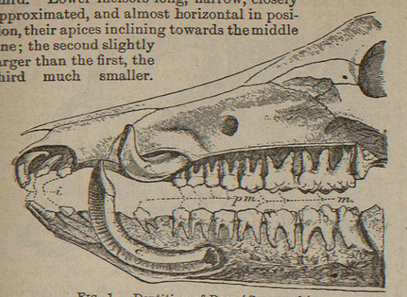

FIG. 1.—Dentition of Boar (*Sus scrofa*).

Canines strongly developed and with persistent roots and partial enamel covering, those of the upper jaw not having the usual downward direction, but curving strongly outwards, upwards, and finally inwards, while those of the lower jaw are directed upwards and outwards with a gentle backward curve, their hinder edges working and wearing against the front edges of the upper canines.[1] They appear externally to the mouth as tusks, the form of the upper lip being modified to allow of their protrusion, but are much less developed in the females than in the males. The teeth of the molar series gradually increase in size and complexity from first to last, and are arranged in contiguous series, except that the first lower premolar is separated by an interval from the second. First and second upper premolars with compressed crowns and two roots. The third and fourth have an inner lobe developed on the crown, and an additional pair of roots. The first and second true molars have quadrate crowns, with four principal obtuse conical cusps, around which numerous accessory cusps are clustered. The crown of the third molar is nearly as long (antero-posteriorly) as those of the first and second together, having, in addition to the four principal lobes, a large posterior talon or heel, composed of numerous clustered conical cusps, and supported by several additional roots. The lower molar teeth resemble generally those of the upper jaw, but are narrower. Milk dentition: $i\frac{3}{3}$, $c\frac{1}{1}$, $m\frac{3}{3}$; total 28,—the first permanent premolar having no predecessor in this series. The third incisor, in both upper and lower jaw, is large, developed before the others, and has much the size, form, and direction of the canine. Vertebræ: C 7, D 13–14, L 6, S 4, C 20–24. The hairy covering of the body varies much under different conditions of climate, but when best developed, as in the European wild boar, consists of long stiff bristles, mostly abundant on the back and sides, and of a close softer curling under-coat.

[1] If from any accidental circumstances these teeth are not constantly worn down by friction, they grow into a complete circle, the point penetrating the bone of the jaw close to the root of the tooth. The natives of the Fiji Islands avail themselves of this circumstance to produce one of their most valued ornaments—a circular boar's tusk: the upper canines being extracted, the lower ones are allowed to grow to the desired form.

This genus occurs at present under three principal modifications or subgenera.

A. *Sus* proper comprises a number of animals found in a wild state throughout the greater part of Europe (except where exterminated by human agency), the north of Africa, southern continental Asia, and the great islands of the Malayan archipelago, Formosa, and Japan. The following among others have been admitted by zoologists as distinct species:—*Sus scrofa*, the wild boar of Europe, Asia Minor, and North Africa, once common throughout the British Isles; *S. sennaarensis*, North-East Africa; *S. cristatus*, Hindustan; *S. vittatus*, Java, Borneo, Amboyna, Batchian; *S. barbatus*, Borneo; *S. papuensis*, New Guinea; *S. timorensis*, Timor and Rotti; *S. andamanensis*, Andaman Islands; *S. celebensis*, Celebes; *S. taivanus*, Formosa; *S. leucomystax*, Japan; *S. verrucosus*, Java, Borneo, Ceram. This list will give some idea of the geographical distribution of wild pigs, but it must be borne in mind that through the whole of this region, and in fact now throughout the greater part of the habitable world, pigs are kept by man in a domesticated state, and it is still an open question whether some of the wild pigs of the islands named above may not be local races derived originally from imported domestic specimens. In New Zealand a wild or rather "feral" race is already established, the origin of which is of course quite recent, as it is well ascertained that no animal of the kind ever lived upon the island until after its settlement by Europeans. Whether the various breeds of domestic pigs have been derived from one or several sources is still unknown. As in so many similar cases there is no historic evidence upon the subject, and the researches of naturalists, as Nathusius, Rutimeyer, Rolleston, and others, who have endeavoured to settle the question on anatomical evidence, have not led to satisfactory conclusions. It is, however, tolerably certain that all the species or forms of wild pigs enumerated above and all the domestic races are closely allied, and it is probable (though of this there has been no opportunity of proof)

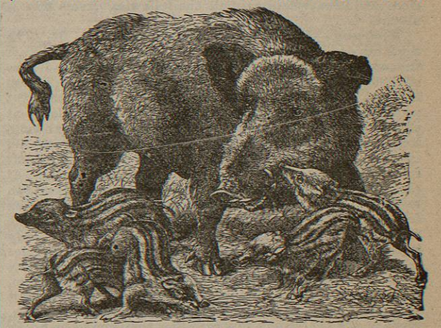

FIG. 2.—Wild Boar and Young.

will breed freely together. It is a curious circumstance that the young of all the wild kinds of pigs (as far as is known at present) present a uniform coloration, being dark brown with longitudinal stripes of a paler colour, a character which completely disappears after the first few months. On the other hand, this peculiar marking is rarely seen in domestic pigs in any part of the world, although it has been occasionally observed. It is stated by Darwin that the pigs which have run wild in Jamaica