THE NEEDLE FISH, SEA HORSES, AND RAG FISH.

The needle fish (*Syngathus acus*) is an extremely slender fish, which sometimes reaches a length of sixty centimeters. Its color is pale brown with dark brown transverse bands. This fish is found on all the eastern coasts of the Atlantic Ocean from Northern Europe to the promontory of the Cape of Good Hope, also in the Mediterranean and Black Seas. Their favorite dwelling places are in the submarine meadows and sea marshes, where the long-leaved sea grass grows luxuriantly. Here they may be seen between these sea weeds, often clinging together in a mass, and in various positions, some with the head upward, others with the head directed downward, some in a horizontal position, and all slowly swimming forward.

The breast and caudal fins are very small, and the curious dorsal fin seems to be the only one that is of any use as an organ of motion. Their food consists of thin shelled crabs, worms, etc.

The manner of propagation was discovered by Erdstrom. The male has a furrow beginning at the tail and running about two-thirds the length of the body; the side walls are a little curved. This furrow is closed by two valves, lying with the edges close to each other. In fall and winter these valves are thin, and fall together in the furrow, but in April, when the spawning season approaches, they enlarge and the sac is filled with mucus. In May the female lays her eggs in the furrow, in a row, the edges close, and the embryo fish remain in it until the end of July. In case of danger the young fish are taken into the furrow.

The flesh of this fish is hard and firm, and agreeable to the taste. In some places the fish are salted.

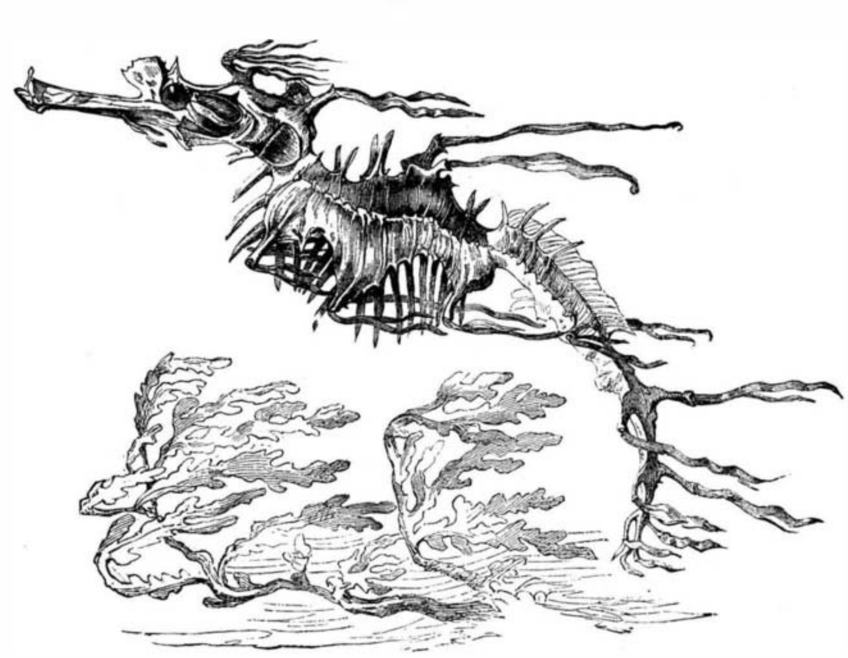
The sea horse (*Hippocampus antiquorum*) resembles greatly the animal from which it takes its name. Its length is from fifteen to eighteen centimeters. Its color is a pale ashen brown, which in certain lights changes into blue and greenish tints.

From the Mediterranean Sea, which is regarded as the true home of the sea horse, it extends in the Atlantic Ocean to the Bay of Biscay, and yet farther north to the shores of Great Britain. Like the needle fish it is only found where the bottom of the sea is covered with a rich growth of plants, for between these plants it seeks and finds its food. Here it may be seen sitting upon the plants almost motionless. Lukis, who has observed their manner of life in captivity, gives a good description of them. He writes: "When swimming they hold themselves in a perpendicular position. They wind their tail around the sea grass, and look carefully around in the water in search of food, rushing after it with great dexterity as soon as perceived. The sea horse, like the chameleon, has the power of moving either eye at will, independently of the other, and this in connection with its changing color makes it a very interesting object to the spectator. Their food consists mainly of very small crabs, invisible to the naked eye, which they pluck off from the leaves of the sea plants. This food can only be obtained for them in sufficient quantity if one lives by the sea, otherwise they die sooner or later from starvation. A good many of them die soon after being caught, and if a thunder shower rises they often all die with one clap."

Propagation takes place in the same way as with the needle fish. Gessner says "Its flesh is poisonous, and induces dangerous illness." It is probable that the ancients had a practical knowledge of this. Gessner writes further that "the flesh dried and pulverized, and taken as a medicine, is a wonderful help to those bitten by a mad dog. A powder of this dried flesh will also alleviate side ache."

In the sea about New Holland there is found a species of fish resembling the sea horse, which we will call the rag fish. They are distinguished by an abundance of thorny points, and ribbon-like appendages, hanging down from all sides of the body, like rags from a garment. The dorsal fin is exclusively upon the tail. The short thorns are strong and pointed, the ribbon-like continuation inflexible, the remaining appendages thin and flexible. The fins, with the exception of the dorsal fin, and the small pectoral fins appear to be stunted, and their place supplied by these appendages, by means of which it attaches itself to the sea plants. Its color when living is red, but when dried it is leather color.

Its habits are not known, but probably they are the same as the other sea horses.—*From Brehm's Animal Life.*



THE RAG FISH.

THE NEEDLE FISH AND SEA HORSES.

THE Missouri River, which forms a new bed for itself somewhere with every freshet, is threatening to make Leavenworth an insular city.

Riveted Joints.

The literature of the strength of riveted joints is already extensive; we have no intention of augmenting it. What we are about to say concerning them at present bears relation to workmanship, and not to proportions. No doubt workmanship affects the strength of structures joined by means of rivets; but the fact is not taken too much note of by those who carry out experiments and tabulate results for the benefit of engineers. It is very commonly assumed that a riveted joint is a riveted joint, and that suffices. As a matter of fact, however, there are wide differences in the qualities of riveted joints, and more attention should be paid than is paid to the circumstance. Thus it is very commonly assumed that a single riveted joint properly proportioned has a strength of 56 per cent of that of the solid plate.

We have ourselves seen machine riveted seams tested, which broke with less than 30 per cent of the strength of the plate, albeit that externally the seam was to all appearance a good and well made seam; and we believe that in practice seams with a strength equal to that given for them in text books such as Fairbairn's are rarely met with except in the very best class of work. Attention has been called to the subject by more than one correspondent; and the discussion now being carried on in our correspondence columns by practical men may be expected to elicit some information which will usefully supplement that acquired with the testing machine. Our purpose in writing this article is to direct the discussion in question, and to call to the minds of our readers those points which most deserve consideration. Riveted work may be classed under three heads: First, work such as suffices for bridges and girders, the joints of which need not be water or steam tight; second, a superior kind of riveting, such as that employed in iron ship building; and third, boiler riveting, which ought to be as good as possible.

Now as regards the first, there appears to be a general consensus of opinion that nothing can be better for it than the hydraulic riveter, but it does not appear that the machine can be used with sufficient facility in the actual erection of iron structures to enable hand riveting to be wholly dispensed with. No doubt many of our readers have used the hydraulic system, and can tell exactly what percentage of work can be done under it, and what percentage must be done by hand; and to simplify matters, and so keep discussion as useful as possible, we would suggest that a typical bridge be had in mind—let us say a railway bridge, with one span of 180 feet, and two spans of 75 feet each, plain lattice girders, the larger 16 feet deep and the shorter 7 feet, the whole to be floored with flat iron plates, the rails to be carried on longitudinal timbers supported by cross girders.

What proportion of machine riveting is possible on such a bridge, if put up in England, say, ten miles from a town? Concerning ship work there can be no doubt that the use of the machine system is rapidly extending, and there is now hardly a hole or corner in a ship's hull into which the machine will not find its way. Dispatch is the great object had in view in this class of work; but no one has yet supplied much information concerning the places where hand riveting can be done as well and more quickly than machine riveting. It seems to be tolerably plain that such do exist, and that there are places where a couple or three men can begin and finish a seam of rivets in the time that would be occupied in fixing a machine in place. No doubt there will be differences of opinion on this point—the advocates of machine riveting holding one thesis, and the supporters of the old system another. It is more than probable that the truth lies between the two. The results of practical experience can alone be relied on to settle the point.

When we come to deal with boilers we get on very delicate ground. It is not to be denied that many men who are very particular about the workmanship of their boilers will not have machine riveting at any price. They rely entirely on skilled labor, and no doubt a thoroughly well made locomotive boiler is the most beautiful and perfect specimen of hand riveted work that can be had. Such boilers as made in this country require no calking. The workmanship is exquisite, and one result is that the strength in the seams in locomotive boilers is often in excess of that laid down in text books, the 75 per cent for a double riveted seam rising to as much as 78 per cent, or a little more. It is urged that machine riveting cannot produce such results; it is far too inflexible; it takes no account of the heat of a rivet, or its quality, whereas an experienced man knows exactly what to do with a rivet, and feels his way, so to speak, along a seam in a way that the machine cannot do.

As bearing on this point, we may say that cold riveting has been extensively practiced in the United States. The high pressure boilers used on the muddy rivers consist of wrought iron tubes, seldom more than 3 feet in diameter, ⅜ inch thick, and about 30 feet long. These are arranged side by side, with a large furnace at one end, and in many cases a flash flue running straight to the chimney. Such boilers will work with water far too dirty to be used in a tubular boiler. They carry pressures of about 150 pounds, and the seams are made up with cold rivets of a peculiarly soft and ductile iron. It is said that these joints stand far better than any hot riveted joint that could be made, and we have no reason to doubt that this is true of the very thin plates used. Going to the other end of the scale, we have the modern marine boiler, with plates 1⅛ inch thick and rivets 1¼ inch. It is asserted by one party that such rivets cannot be closed by hand in a satisfactory fashion, and that the aid of machinery must be called in; but, on the other side, it is pointed out that boiler fronts have always to be put in by hand, and that this hand riveting is quite as good as the machine work, and it is also contended that machine riveting is so far from securing tightness that every rivet head has to be calked inside the boiler, to make certain that it will not leak.

Many able engineers hold views entirely opposed to these, and assert that the best kind of boiler work cannot be produced at all without the aid of machinery. The arguments they urge in favor of machine riveting, as a matter of workmanship, are that it compels the rivets to fill the holes, and effectively closes the plates on each other. The arguments against it are that split heads are apt to be produced, and that the rivets not only fill the holes, but now and then burst the plate; and that in most cases, unless unusual care and vigilance are employed, the iron will be severely strained, and a bad instead of a good boiler produced. On none of the points we have stated as open to discussion do we express any opinion; that diverse views are held by experienced practical men is, however, indisputable, and we must beg our readers, no matter which side they take, to bear in mind that there is another side, and that impartial men will like to hear both before arriving at a conclusion.—*The Engineer.*