

line through the holes in each end, and putting on the cover nicked it so that the shot could not escape; and after tying a knot in the line at the required distance from the hook, the "thumper" was pronounced complete. By this time we had drifted into deep water, and after a few strokes of the oars the "thumper" was dropped overboard. Down it went to the depth of about fifty feet, and immediately we started on a direct line down the middle of the lake with a slow but steady stroke. Yet our party was doomed to disappointment, the "thumper" soon began to thump the bottom when at the other end of the lake, so we gave orders to "about ship" and try it once again.

We had nearly arrived at our starting point once more, feeling rather disappointed, when the man at the line shouted out to hold up a bit, as we had fastened to a rock or something on bottom. A moment afterward he exclaimed, "What a whopper!" and sure enough we had hooked a fish, and a game one at that, for he began to sink slowly although we tried to induce him to rise. After his Lordship had taken down about fifty feet of line he thought it best to move on, and then the fun began in dead earnest. First it was down, then up, and in all kind of ways did that fish try to get away, but it was of no use, for our lines would have held a shark. Presently he made a dart at the boat and then there ensued a scramble to pull in the slack, when, suddenly making a dive, he sent the line whirling out again; then up he came almost to the surface on the other side of the boat. The water being as clear as glass, we could see him as he lay perfectly motionless, excepting a slight quivering of the fins and tail. It was a sight to make the heart of any sportsman thump against his ribs to behold that muscalonge as he lay there, looking as large as a good-sized shark, and if anything a bit more savage. Taking hold of the line anew to give him another pull he darted off in a circle around the boat, a fatal mistake, for a good steady pull now brought him directly under the stern with his head just breaking the water, while the captain taking advantage of position, drove the gaff hook (in a most sportsmanlike manner) through his back about amidships. Now began the tug of war between the captain and the fish; but as yours truly held the captain fast by the legs, it was evident that the fish must give up, which he presently did from pure exhaustion, and was triumphantly pulled into the boat. No doubt, our prize would have torn himself loose had not the gaff hook gone in under the backbone, thus making it impossible for him to tear it out. It was a sight, that fresh-water shark lying helpless in the bottom of the boat, and after all hands had recovered from the excitement, we made for shore, feeling very proud of our game.

On reaching terra firma our prize fish was weighed first, and found to tip the beam at nineteen and one-half pounds. The smaller fish weighed together one hundred and three pounds, which, with the big fellow, made the grand total of 122½ pounds to show for one day's fishing, not to mention the smaller fish thrown overboard, of which we kept no count. Then hitching up the team, repacking our traps, we started on the return trip, reaching home in time for a late supper, and all hands very tired, but willing to sit up all night to swear that Dakota cannot be beaten for the size and quantity of her fish.

In closing, let me state to parties who contemplate a trip to the waters of that country, that good tackle can be had in all country stores at Eastern prices, and to those who have not fished there, let me say that a good, stout bluefish line about one hundred yards long with the largest size Skinner spoon is the thing. A large spoon prevents the small fish from getting caught to any great extent. SCIPIO.

AGASSIZ AND ANGLING.

ON the 28th of last May, the seventy-eighth anniversary of the birth of Louis Agassiz, the Cincinnati Society of Natural History held a memorial service. The paper, "In Memoriam—Louis Agassiz," read on that occasion by Dr. James A. Henshall, has been printed in the Journal of the Society. It is a review of the life and work of the great naturalist, written by one whose veneration for the subject of his paper is manifest on every page. Speaking of the young Agassiz's taste for angling and studying the habits of fishes, Dr. Henshall says:

"Another writer says: 'Before he left school (at Biemme), he began to collect and study into the habits of fishes.' Now, the love of angling once firmly implanted in a boy's heart, it follows him through life, never to be wholly eradicated, but oftener to grow stronger with the accumulation of years, and not seldom influencing the whole course of his life. I know many men whose interest in natural history, and especially in biology, dates from the days of earliest childhood, when, with pin-hook and willow wand, they first essayed the gentle art, and produced consternation dire among the chubs and shiners of the brook. We, of the gentle craft, can readily imagine how eagerly young Agassiz turned from the wearisome school-room to the bright rippling waters of Lake Biemme, or to the foaming trout brook of the Jura, and can fully appreciate the happy transition from the dusty books of classic authors to the fair, bright pages of Nature's book. It seems to me that these early impressions, and this first love, must have had the greatest influence in shaping his subsequent career, as we may presently see.

"When the boy Agassiz began collecting and studying the habits of fishes, the cell theory was unknown, but there was, no minnow too small to escape his observation, and no part of that minnow too insignificant for his closest scrutiny and study. In this way he was the first to separate and properly define the most difficult group of fishes, the *Cyprinidae*, as a family, by the form, number and arrangement of their pharyngeal teeth; and any one who has ever examined the minute teeth in the throat of a minnow, can appreciate, somewhat, the amount of careful study and observation involved in his investigations.

"In his study of the salmon, trout and grayling species, he exhibited the same careful and characteristic mode of inquiry. Of this family Günther says: 'As much time and patience are required for the investigation of a single species as in other fishes for that of a whole family. * * * The almost infinite variations of these fishes are dependent on age, sex and sexual development, food and the properties of the water.' In consequence of these variations and peculiarities, many species had been predicated upon coloration alone. Agassiz showed the fallacy of this, for he found that fish in clear, sunny waters, with gravelly bottoms, were highly and brightly colored; while those in shady streams, or where the bottom was dark or muddy, and the water not so clear, were correspondingly dusky in hue; and that bright fish taken from waters of the former character and placed in those of the latter would begin to fade in a few hours, and in a few

days or weeks would become entirely changed in hue. He found that the color of brook trout of neighboring streams was influenced by the color and quantity of the water, and that even trout of the same stream differed in color as they frequented the shady or sunny side.

"Now, while most persons are capable of admiring the general result of a long series of observations or experiments, many can not appreciate, or may even be disposed to make light of, some of the seemingly trivial preliminary steps leading to that result. And a person of this character coming upon Agassiz beside a trout stream, studying the changes in coloration of the brook trout—thau which there is no lovelier object on God's footstool—might have thought it a sad waste of time, or at least, a subject unworthy the notice of so wise a man."

ROD DIMENSIONS.—Casselton, D. T.—*Editor Forest and Stream*: In reply to the request of "Hollow Rib," in your issue of the 13th, I gladly give the dimensions of my bethabara rod: The butt, of ash, is 18in. in length; butt-cap, ¾in.; then swell for ¾in. in length to a diameter of 1in.; then taper ¾in. to ¾in.; making hand-grasp 7in. in length and 1in. greatest diameter. Reel-seat, 4in.; uniform diameter, ¾in.; straight taper for 4in. to 1¼in., then sudden concave taper for the ferrule. Joint, 4½in.; bethabara tip, 38in.; lancewood tip, 40in. Ferrules—¾in. and ¾in.—Nos. 0 and 7 of Chubb's catalogue. Extremity of tip, ¾in. Total length of rod with bethabara tip, 8ft. 2in.; with lancewood tip, 8ft. 4in. Weight, with either tip, 6½oz. If "Hollow Rib" intends to make a bethabara rod, he will save time, trouble and temptation to profanity by sending his wood to Thos. H. Chubb (see advertisement in FOREST AND STREAM) and have it turned to suit him. By the way, I am glad to add my mite of commendation to this firm for the fair dealing and prompt attention to orders which has characterized their transactions. I have during the past four years ordered material from them for over a dozen rods, and in every case have received just what I wanted, with but one exception, when I probably did not make my wants clear, but when I called their attention to it the mistake was promptly and cheerfully rectified. In marked contrast was the treatment I received from a celebrated Chicago and New York firm, to whom I sent, some three months ago, for a 1¼in. screw, flat-bottom butt cap, inclosing money for same. In reply I received a ¾in. round-bottom solid cap, which I returned, repeating my previous order. I haven't heard a word from them since then, although I have written them three times, asking them either to send what I want or refund my money. The amount of the latter is so small that I am glad to charge it to profit and loss, as the price paid for the knowledge that I had better have nothing to do with such a house in the future. "Mirofer," as my friend Sandy Graeme says, I would advise "Hollow Rib" to use the "patent anti-friction tie-guides," as they save a world of vexation, caused by the wet line sticking to the rod, as it is sure to do with the ordinary guides. If I can be of the slightest help to him or any other amateur rod makers, I shall be glad to partially pay the debt of gratitude which I owe to those brothers of the gentle craft who have so generously imparted to me their stores of information on many and sundry points.—H. P. UFFORD.

EELS.—*Editor Forest and Stream*: I want reliable information how to catch and dress eels for market with information how to make and use the different wire traps, etc., for tide-water brooks and ponds, and where the most likely places to look for them to spear after they have bedded for the winter. In short, I want to know all about them, their habits, usual time of ascending the brooks to bed, which they are supposed to do here on the island of Grand Manan, but I can find no one that knows anything for certain about them.—PHILIP NEWTON. [There is no book which gives the information required. Beside accidental captures with hook and line, eels are taken in winter by spearing them through holes in the ice, and this requires a local knowledge of their beds, which can only be obtained by examination and trial. In the spring they are taken in eel-pots, which are usually made of elm splints or willow. These are for sale in New York and other cities, and are about three feet long and a foot or more in diameter, with a movable cap at one end and a funnel in the other, like some rat traps. Pots are baited with minnows or fish offal, and anchored and marked by a buoy. In summer eels are speared at night from a boat with a bright light in the bow, which shows them plainly in two to six feet of water. They are also fished for at night with "bobs" made by stringing very large angle worms their entire length on three yards of linen thread until the thread is full, when it is wound round the hand and tied through the middle. The bob is used over the side of a boat, and if in a tideway or current, a sinker is needed. It is kept a few inches from the bottom and when a bite is felt is slowly raised to the surface and the eel quickly thrown into the boat, when it drops off, the only hold being that of the eel's teeth in the thread. Eels move from fresh to salt water in October in the State of New York, some, however, remaining in the mill ponds all winter. A fair size for salt-water eels is from half a pound to two pounds, but they seldom exceed four pounds except in fresh waters, where they grow to six or more pounds. Of their breeding habits but little is known except that they are found to contain eggs in the winter and the young are seen in great numbers in the spring. Our correspondent will have to make himself familiar with their feeding grounds and the localities where they bed.]

BARNEGAT, Aug. 21.—The fishing, all things taken into consideration, is very poor. Occasionally a good string of weakfish is caught, but only in exceptional cases is this so, and then it is all laid to the credit of a "streak of good luck." The menhaden boats on this coast are blamed for the scarcity of fish, and a good many oburgations are indulged in by the people along shore at the mere mention of the menhaden folks. At Beach Haven, it is reported; the fishermen on the beach recently indulged in a little rifle practice, using the crew of the menhaden boat for targets. It resulted in some lively dodging behind masts, smoke-stacks, rigging, etc., by the members of the crew of that particular boat. The latest returns fail to report the number of killed, wounded or missing in this engagement, and the last seen of the craft she was putting out to sea under a full head of steam. This rifle practice is reported as having accomplished one desirable object, in driving the menhaden boats off that coast for a while. The writer counted eleven of the black piratical craft off Harvey Cedars in one day last week, engaged in their calling, and was informed that it was not much of a day for menhaden boats either.—WOODHUTCK.

NEW JERSEY COAST FISHING.—Philadelphia, Aug. 22.—Weakfish are still extremely scarce at Barnegat and Tuckerton bays, and few are being brought in. Small sea bass are, however, plentiful, and sheephead have been taken throughout the entire season in numbers great enough to amply supply all the hotels on Long Beach, which have been continually crowded with guests. During the past week good squidding for bluefish was enjoyed by sailing parties near both Barnegat and Little Egg Harbor inlets. None upward of one to two pounds were boated.—HOMO.

BLUEFISH IN SOUTH BAY.—Up to last week the fishing has been poor on Great South Bay, Long Island. The schools have lately struck in, and there has been good fishing. Last week one boat took 173 fish, and another took 150, while the lowest catches were from twenty to thirty to each boat. The fish averaged from three to three and a half pounds each, and from twenty to thirty boats have been fishing daily. The best points are Sayville, Bay Shore and Babylon.

NEWPORT BASS.—Newport, Aug. 17.—Bass are unusually plenty. They struck here about two weeks ago. I took twenty last week, weight from 2½ to 16½. I should be pleased to answer any inquiries in regard to striped bass fishing in this neighborhood.—W. M. HUGHES (P. O. Box 56).

THOUSAND ISLANDS.—Cape Vincent, N. Y., Aug. 18.—The fishing is first-class at this point now; plenty of bass and pickerel. The sportsmen from down the river and Alexandria Bay are all turning this way.—W. P.

Fishculture.

Address all communications to the Forest and Stream Publishing Co.

PROTECTIVE CONTRIVANCES FOR EGGS.

[Read before the American Fisheries Society.]

BY PROF. JOHN A. RYDER.

MR. PRESIDENT AND GENTLEMEN: A discussion of the apparatuses by means of which the ova of fishes are protected will, I think, be of interest to the members of this Society. I will roughly classify the eggs of fishes into four divisions, and call one of these groups "buoyant eggs," another "adhesive eggs," another "suspended eggs," and the fourth "transported eggs," the latter class embracing such as are hatched in the mouth or in receptacles especially developed on the outside of the abdomen or under the tail of the parent fish—usually the male; in nests built by the males, or viviparously developed in the ovary or the oviduct of the mother.

The egg of the cod will serve as the type of the first group. It is without an oil-drop, but is buoyant notwithstanding. There is another type of buoyant egg similar to that of the cod, but with an oil-drop opposite the germinal pole, where the embryo develops, consequently the egg is rendered buoyant. That type is represented by the eggs of the Spanish mackerel, of the bonito in the Chesapeake Bay, and of the cusk and a number of other marine fishes.

The second group, which I have called adhesive, is represented very well by the eggs of the goldfish, which adhere singly to plants and weeds. Other species whose eggs are similar to those of the goldfish, are the blennies, which lay eggs in radiating adherent groups. The gobies have a curiously shaped oval egg, almost conical at either end, with tufts at one of their tips. These tufts seem to be made up of small filaments. In other species, too, the eggs are adherent, as is the case with those of the cunning little *Gobiosoa*. In other cases the eggs are held together in enormously extended bands or membranes which float, as in the case of the goosefish or fishing frog. Yet other eggs are held together in narrow strips, and adhere together by means of an exterior mucous or sticky envelope, just within which again is a very thick, elastic, perforated membrane, as the eggs of the yellow perch. This sticky substance glues the round eggs together at their points of contact, leaving spaces between the ova, enabling the water to pass directly through the openings which are thus left in the bands of eggs. This form of band of adherent eggs is found in the yellow perch, in contrast to which may be cited the white perch, whose eggs adhere by a mucous secretion which seems to glide down on one side to the point where the attachment takes place, and where this mucous substance hardens under water, firmly fixing the egg to the foreign bodies.

The eggs of the slime-eels or hags, which are parasitic upon the cod and on sharks, are also peculiar. These eggs are supplied with a bundle of hooks at each end. I am not sure of the special function of these hooks, but it is probably for suspending the eggs in some way. There are other cases in which adherent eggs are held together in large masses as thick as a man's hand, or they may be spread out over a flat surface. This is the case with the eggs of the catfish; in these, however, we find a contrivance which is peculiarly adapted for protecting the eggs against the violent motions made by the male who aerates, attends and incubates the eggs. In these eggs there is an inner true egg membrane, and an exterior mucous adhesive layer, separated from the inner one by elastic pillars placed at intervals, so that the resulting arrangement is an extremely elastic one, and yields readily to the motions made by the male with his fins. In this case the eggs adhere together in masses very much in the same way as in the eggs of the frogs.

There is yet another singular contrivance which was first described by Professor Jeffries Wyman, of Boston. This is found in a species of the armored catfish of South America. In this case (*Aspredo*) the male fish is provided with a numerous series of little stalks formed on the under surface of the abdomen, and the cup-like extremities of the stalks into which the eggs are received are supplied with capillary vessels, an arrangement being thus developed which constitutes not only a supporting stalk but also a kind of placenta. It is said—although I am not sure that the evidence is very trustworthy—that one species of the gar lays its eggs in strings in a single row, like the common loach. There are other cases in which the ova are uncovered and directly adherent to the abdomen or under side of the tail, as in the case of some of the pipe fishes of Europe. In some of our American species of pipe fishes the eggs adhere beneath the tail in a couple of rows, but are covered by expanded folds of the skin. There are other cases in which the eggs are carried into a pouch formed by the ventral fins. In other species there exists an abdominal or rather caudal pouch which opens just behind the vent of the male, and into which the eggs are received and incubated. In one instance a fish of this class (*Hippocampus*) hatched out under my observation about 150 ova; the drove of embryo sea horses which were finally set free in the aquarium were an interesting study.

Then the number of species which suspend their eggs is quite considerable. The black, leathery case of the common oviparous ray has four filamentous horns, one at each corner, which wind around plants and suspend the eggs to weeds, so that as the tide sweeps by these horns, which have openings in them, fresh water is carried into the case to aerate the embryo and favor its incubation. This peculiar egg case is formed in the end of the oviduct, which is different from the egg membrane

