leather: Wash in lukewarm water with a little soap, use a wooden-backed brush with short bristles, as used for washing horses; scrape off the dirt and outer skin with a blunt knife. Keep on this treatment till the hide is half saturated; then twist, turn and roll the leather with both hands till all the pores are open, and work them well; if you see small cracks on the surface, good; if the leather splits, it is rotten. While the leather is damp, begin to rub in the oil with a brush as before described; use a little oil at a time and apply four or five times, and work the leather well with the hands after oiling. Set it in a hot sun for half an hour, and then put in a damp place with a wet sack over it. To keep off rats, invert a wooden box over the heap. Oil and work again the next day, and for many days after; and then compare with an old pump valve, and observe the difference."

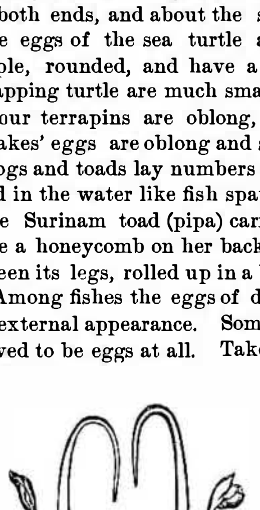
THE WONDERS OF THE EGG.

Professor Agassiz recently delivered a most interesting lecture at the Museum of Comparative Zöology, Harvard University. It was profusely illustrated by specimens from the shelves of the museum. We take the following report from the New York *Tribune*:

The Professor said: The formation and growth of the egg and its fecundation prior to the formation of the new being are among the most mysterious processes of the organic world. The eggs laid by different kinds of animals are themselves so various in size, form and appearance that it is difficult to believe they are all one and the same thing. Look at this huge egg, for which a man's hat would be too small a cup. It is the egg of an extinct bird found at Madagascar (the epiornis), the largest bird's egg known. Compare it with the egg of the humming bird, smaller than a hazel nut, scarcely larger than a small pea. In form and general aspect the difference, even among birds' eggs, is endless. Some are elongated, some are spherical, some are dull on the surface, some are polished, some are dark, others gray or white, others very bright. The number known is large. Ornithologists are acquainted with about 5,000 different kinds of birds' eggs While they differ in detail, the general pattern of birds' eggs seems the same. The outside shell is brittle, and within there is a lining membrane covering the white, while in the center is the yolk, differing in dimensions in different species of birds as much as the eggs themselves. Quite otherwise, seemingly, is the egg of the mammalia. Those which are developed are never laid. As eggs they are microscopically small, and they undergo all their transformations within the mother. Yet their structure at some time or other, in an early stage of their growth, is the same as that of the egg in all other classes of animals.

Among reptiles the eggs exhibit great variety. The eggs of alligators are elongated, almost cylindrical, evenly rounded at both ends, and about the size of an ordinary duck's egg. The eggs of the sea turtle are about as large as a small apple, rounded, and have a flexible shell. Those of the snapping turtle are much smaller, but also rounded. Those of our terrapins are oblong, as are also those of lizards. Snakes' eggs are oblong and sometimes cylindrical in shape. Frogs and toads lay numbers of small eggs. They are dropped in the water like fish spawn, in large clusters or strings. The Surinam toad (pipa) carries her eggs soldered together like a honeycomb on her back. The alytus carries them between its legs, rolled up in a bunch.

Among fishes the eggs of different kinds differ amazingly in external appearance. Some of them would hardly be believed to be eggs at all. Take, for instance, the skate's egg. It looks like a flattened blackish leather bag, with four horns or handles at the four corners. The yolk in such an egg is the size of a walnut, or larger or smaller according to the species. All skates and sharks have eggs like these, though not all lay them, the young in many instances undergoing their development within the mother. The chimera has a still more curious egg. It is like a leaf made out of parchment. In the center is an oblong cavity containing the yolk.

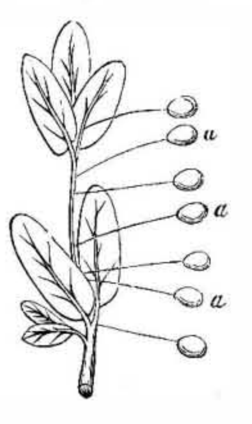


THE SKATE'S EGG.

The number of eggs laid by animals belonging to the same class is again singularly different. The eggs (or, as we call them, the spawn) of some fish are exceedingly small and are laid in large masses. The spawn of a single herring is made up of hundreds of thousands of eggs. Other fishes lay only a few dozen at a time, and in some kinds they are of considerable size. Some fishes let their spawn fall into the water; others make nests for their eggs, and others carry them until the young are fully developed. Some catfish carry their young in the mouth till they can provide for themselves. Certain fishes carry their young along the gills and they go in and out at will through the gill cavity. Some carry them attached to the surface of the belly or under the tail, and among the pipe fishes, strange to say, this office devolves upon the males (syngnathus).

In the higher vertebrates the young are less numerous. A great many mammalia bear but one at a time.

Insect eggs are, as a general thing, too small to be perceptible at a distance. The egg of a day butterfly is attached by a string to a twig. Those of certain water insects are kept floating by string-like appendages. The eggs of the pearl wing fly are fastened by the frailest possible threads to the margins of leaves [*a, a, a,* in diagram]. Those of the seventeen year locust lie side by side in rows in the branches of trees. Those of the so-called soothsayer (mantis) are deposited in large, elongated clusters which might be mistaken for a caterpillar at rest.

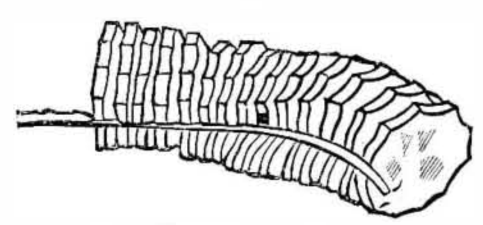


THE EGGS OF THE PEARL WING FLY (CHRYSOPA).

In the two other classes of articulates, in the crustacea, (crabs, lobsters, shrimps, and the like), and in worms, the eggs vary less than in insects. In the crustacea they are always small, and are carried under the tail.

In the type of mollusks we find great variety among the eggs. There are mollusk eggs which might easily be mistaken for birds' eggs, some of which are larger than most birds' eggs. At first sight one would be quite sure that the egg of a bulimus was a humming bird's egg. Others again are very different from the eggs of any animal belonging to other types.

Here, for instance, is the long string of



EGG CASES LAID BY THE PYRULA,

every such case containing from 15 to 20 eggs, and sometimes more. Others lay clusters of eggs surrounded by an egg case. The periwinkle lays an immense mass of eggs, larger than the shell itself. Here are what are called sand saucers formed by the eggs laid by the natica. The mass of eggs is pressed out between the shell and the soft parts of the animal, which at the moment are so expanded and protruded as to cover the whole surface of the shell. The mass of eggs thus laid is molded as it were to the external form of the shell; and being laid while the animal is buried in the sand, the sand accumulates upon them and forms the disk like shape. If you cut such a so-called sand saucer across, you will find minute eggs the size of a pin's head laid side by side throughout it, every egg containing, perhaps, from six to seven individuals.

Among bivalves there is not so great a diversity of eggs as among univalves. They are usually small, like spawn, and generally retained by the mother.

THE CONFIGURATION AND DIMENSIONS OF BLAST FURNACES.

We extract the following description and illustrations from Stölzel's work on metallurgy:

In building a blast furnace, it is usual to make the exterior either in the form of a quadrilateral pyramid, or a truncated cone; sometimes, however, a conical superstructure is placed upon a pyramidal base. The shell, in many furnaces, rests on four corner pillars, the tops of which are connected by arches, or the pillars are surmounted by iron girders set in form of stairs. In other cases, the shell is supported by a ring wall and boshes, with a cast iron crest resting on pillars. In this latter arrangement, commonly used in Scotland, the hearth is free and accessible in all parts. Sometimes the construction is varied by setting only the ring wall and boshes on pillars, the outer shell resting on a solid wall. In the truncated conical furnaces it is often customary, especially in England, to use a sheet iron mantle instead of one of masonry; the mantle then consists of rings or riveted iron plates, and is lined with stone.

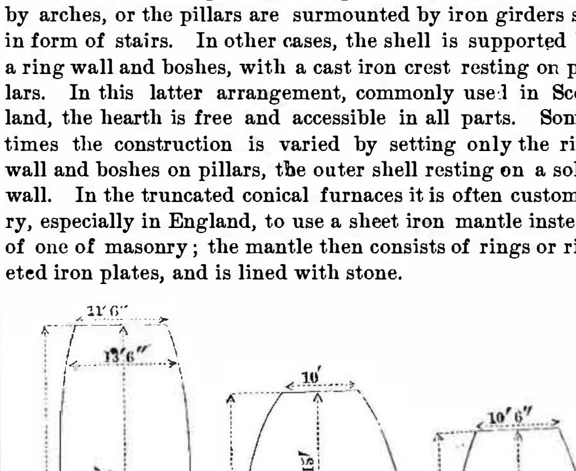


Fig. 1. Capacity 9,300 cubic feet, Schneider, Hannay & Co., Barrow-in-Furness, Lancashire.

Fig. 2. Capacity 8,000 cubic feet. Ebbw Vale, Wales.

Fig. 3. Capacity 6,160 cubic feet. Dowlais, Wales.

But the variations in the form of the interior of the blast furnaces are still more important. The differences which exist in this may be seen in Figs. 1 to 12, in which the sections of various blast furnaces are represented.

Either these changes are made to suit the different processes and the diverse natures of the raw materials, or else the different forms have been brought about by the absence of any well known rules. In some instances the latter deficiency is easily seen; and so various are the forms employed, that we cannot attach much importance to uniformity in these structures.

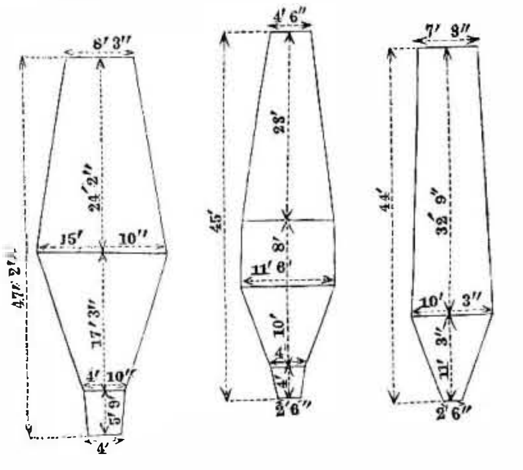


Fig. 4. Capacity 4,540 cubic feet. Nithsdale, Scotland.

Fig. 5. Capacity 2,600 cubic feet. Madeley Wood, Shropshire, Eng.

Fig. 6. Capacity 2,300 cubic feet. Low Moor, Yorkshire, England.

The hight of the shaft is, in charcoal furnaces, from thirty to forty feet, and in stone coal and coke furnaces, from forty to fifty feet, rarely more or less. Higher shafts are especially suitable for fuel (with the exception of anthracite) requiring a strong blast, for uncalcined and refractory ores and for unburned limestone; this is owing to the fact that the heat is better utilized in a tall furnace. Yet there is a certain limit to the hight, because (1) the materials forming the lower courses would be weakened by the superincumbent weight, and (2) on account of the resistance which a high column offers to the passage of blast and gases, a sort of

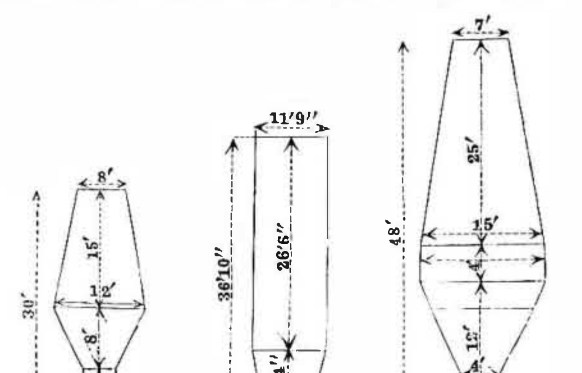


Fig. 7. Capacity 3,440 cubic feet. Muirkirk, Scotland.

Fig. 8. Capacity 4,211 cubic feet. Königshütte, Upper Silesia.

Fig. 9. Capacity 1,720 cubic feet. Watney's anthracite furnace, South Wales.

back pressure. Hence, in order to increase the capacity of a furnace, it is preferable to increase the width rather than the hight. The diameter of the furnace at its belly, or widest part, is from one fifth to one third of the entire hight of the stack; in charcoal furnaces it is from five to eight feet, in coke furnaces, from ten to sixteen feet, or even more; and the belly is set higher or deeper in the length of the shaft according to the time which the materials require to be subjected to heat before smelting, and according to the pressure of the blast. In recent times, the belly or largest part has often been constructed in a cylindrical form, or in a slightly bent curve.

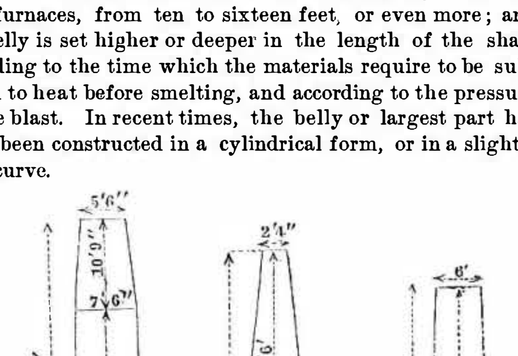


Fig. 10. Capacity 1,384 cubic feet. Charcoal blast furnace, Kärns, Sweden.

Fig. 11. Capacity 1,000 cubic feet. Charcoal blast furnace, Eisenerz, Styria.

Fig. 12. Capacity 1,067 cubic feet. Charcoal furnace, Rothehütte, Hartz Mountains.

The diameter of the stack at the top varies from one third to three fourths of the diameter at the belly. In small charcoal furnaces, it is often not more than three feet, while in coke furnaces, it may be twelve feet or more, In general, it is considered advantageous to use wider tops than was formerly the practice; in the Hartz and in Sweden, the change has done excellent service. By narrowing the tops, the rate of outflow, as well as the tension, of the ascending gases is increased, and the heat is also drawn more to the point of exit; in consequence thereof, a part of the fuel is consumed where it is entirely wasted, and ores as well as fuel are not sufficiently prepared. This is especially objectionable where