Correspondence.

"Mortality among Fishes."

To the Editor of the Scientific American:

In your paper of February 23 you print an article with this title, in which you give a series of statements from Mr. Charles Hallock. His theory and his assertions are sufficiently correct, but taken as a whole they convey an impression which is not correct, that is, if he means to imply that ice is a chief cause of the mortality, and that is certainly the way it reads.

The causes of death among fishes are many and varied, and some of them are quite imperfectly understood. Cold, however, is not prominent among these causes, nor the failure of aeration in the water from the freezing of its surface. They can be frozen perfectly stiff and solid and transported to any distance, without their vitality being destroyed, and yet the experiment may fail of success if the degree of cold is extreme.

I placed a small gold fish in a saucer of water and set him out during a winter night. In the morning the contents of the saucer were one solid cake, which was placed in a tub of cold water until it had slowly thawed, and in the tub was the little gold fish swimming about as merrily as though freezing was the nicest fun in the world. A few days later, when the temperature was below zero, I put him out again. He froze up so absolutely that the crystalline lens had become white, as when a fish is put into strong alcohol. He was thawed out in the same manner as before, but showed no signs of life; the extreme cold had been fatal.

At the same time I had a large gold fish in a tub of water in my barn. The tub was frozen over for weeks, and so nearly solid that while a small space directly surrounding the fish remained liquid there was not sufficient fluid in it to allow of his floating in his ordinary position, but the ice had crowded him down, and he lay on his side. I could see through the ice his fins moving now and then, and eventually I cut the block around the sides, and poured in water so as to float it. The gold fish at once celebrated his release by cruising around all parts of the tub below the ice.

The fact is that, while the water is so cold that the surface is frozen, the amount of oxygen required by the fish is so small that they can live almost indefinitely, and it has never been my experience to find dead fish floating on the breaking up of the ice.

On the contrary, I have seen them in great numbers in ponds and lakes wherever the water has become heated, during a long and hot summer; and that ice, by covering the surface of the water, is not a chief cause of mortality is manifest from the fact that the most wholesale destruction of which we are ever cognizant takes place in the open waters of the ocean or its bays. About four years ago a most remarkable and doubtless an extremely valuable fish was brought to our knowledge in the explorations of the United States Fish Commission, on the borders of the Gulf Stream, about the 100 fathom line, south of Martha's Vineyard. It was of a new type altogether, both genus and species new; it was named *Lopholatilus chamæleonticeps*, the fishermen calling it *tile fish*. Being in size like cod fish, and taking the bait on the trawl lines freely, while its table qualities were pronounced excellent, it bade fair to become a new product of national importance, perhaps even to rival the cod in amount. During the first season it was caught in abundance, and great preparations were made for the catch of 1882. But in March and April vessels coming across and along the Gulf Stream reported passing enormous quantities of dead fish of great size, sailing through them for many hours in succession. It was soon ascertained that these were tile fish; and the matter was deemed of so much importance that the Commission dispatched a fishing smack, the Josie Reeves, under the command of Captain J. W. Collins, to explore thoroughly the localities where the tile fish had been previously found in such abundance. This exploration was made in September, 1882, and showed very conclusively that the destruction of the species in that locality had been absolute or very nearly so. Captain Collins says that his investigation "continued uninterruptedly for three days, and 50 miles along the edge of the ground . . . with not the slightest indication of the presence of the tile fish."

To what we can attribute such a complete and widely extended destruction is not apparent. A storm of very great violence had preceded the presence of the dead fish at the surface, and in the absence of any other assignable cause it is very natural to attribute to the storm the injury done. But this is mere conjecture; other storms of probably equal violence have come and gone, and produced no such effects, nor is it easy to see how the surface movements due to the action of the wind could destroy the fish at the depth of 100 fathoms. It has been suggested that the agitation produced such an amount of intermingling of the cold water below with the warmer currents above as to kill the fish. This is possible, but no more.

Volcanic eruptions often destroy fish in great numbers, but there was no reason to suspect any such action in the matter of the *Lopholatilus*.

It has been decided to furnish the London police with whistles, instead of the antiquated rattle. An order for 7,000 has been given. The whistle is of an improved make, and is said to be unusually shrill.

Utilizing Old Files.

Worn-out files appear to be one of the few discarded articles in a machine shop for which no extensive use can be found. And yet files are made of the best of cast steel and are in handy form for many purposes. The principal difficulty in the way of their economic utilization is that it costs more to remove the tooth marks and their consequences than the value of the resultant steel. It is quite futile to attempt the reforging of an old file so long as the chisel marks are left in; the steel will be "rotten." And it is not usually enough to barely remove the chisel cuts from sight, for the effect of the chisel cuts and hammer blows extends below their apparent bottom. It is evident, however, that there is a core of clean, useful steel below this corrugated surface.

In a shop recently visited a very inexpensive process of removing the tooth marks of old files was noticed. A belt led from a small pulley on the axle of the grindstone to a horizontal shaft near the floor, and as far forward as the front of the grindstone. This shaft carried a bevel gear that engaged with another on an upright shaft at the side of the grindstone frame, on the top of which was a slotted disk carrying a stud that could be secured at any point in the slot, thus forming a crank of differing radius. To this stud was attached a pitman that gave a reciprocating motion to a slide that received a file held at point and tang, the slide or its box being kept against the face of the stone by a spring. Thus the file was passed back and forth against the face of the stone, not only gradually losing its tooth corrugations, but keeping the stone razed to an even face. No attention was necessary, but an occasional turning of the file from one side or edge to another, and its removal and replacement by another file.

These smooth file blanks were then useful for a variety of purposes—scrapers for finishing, cutters for boring bars, flat reamers, etc.

The Brouardel Gas Lamp.

Among the high power gas burners used in France, the Brouardel system is favorably spoken of. This comprises two distinct parts—a special burner in a completely closed lantern, and a lighting cock permitting of the ignition of the gas at the burner from the outside, the latter being applicable to any form of burner. The Brouardel burner consists of an Argand, with a circular slit, the body of the burner being prolonged downward below the bottom of the lantern by a cylindrical tube; so that the air supply is restricted to this central tube. Above the center of the flame is a circular dished plate, sustained by a rod, which has the effect of directing the up-rushing current of air sideways against the internal surface of the flame.

The light is described as being of good shape and perfectly steady, showing an economy of about 40 per cent in comparison with the ordinary batswing. The lighting arrangement consists of a lantern cock with a hollow plug, having sideway openings so disposed that when turned at a certain angle gas escapes into the plug, and is continued through a vertical pipe to the level of the burner. The lamplighter's torch is then applied, and the mixture flashes up through the tube, burning until a further turn of the cock sends gas into the burner, and at the same time cuts off the temporary lighting flash. The action is so timed that as soon as the burner is alight the temporary supply ceases. It is claimed for this arrangement that it permits of the use of closed public lanterns, while at the same time dispensing with the pilot light, which may be extinguished by the wind, or by work done to the mains, in which case there would be the risk of explosion upon the introduction of a light into the lantern in the ordinary way.

A Theory of Light, Radiant Heat, Electricity and Magnetism.

The author of this pamphlet, Mr. I. E. Craig, of Ohio, proposes a new theory to explain the phenomena of radiant forces in nature. Not content with the existing theory of propagation by wave motion through the ether, he seeks to demonstrate that all the various radiant forces are functions of gravity, in other words, that Newton's great law of mutual attraction or gravitation applies equally as well to the molecules of bodies; and, while not denying, in a certain restricted sense, the wave-like character of these excitements, he seeks to demonstrate that they pass from molecule to molecule by reason of a disturbance of the equilibrium of their attractions. In conformity with his theory of the non-existence of the ether, he says that the interplanetary spaces are not voids, but filled with gaseous matter at the measure of attenuation corresponding to the temperature and pressure at which it exists, and this furnishes the material basis for the transmission of light and heat across cosmical spaces.

Tin found in Canned Asparagus.

In Germany a singular case occurred where several persons were taken ill after partaking of asparagus put up in tin cans or boxes. Unger and Bodlaender investigated the subject, and found that in the box where the tin had been removed the liquid contained no dissolved tin. This agreed with the former investigation of Wachendorff. An analysis of the suspended particles in the juice did not detect any tin in suspension, but in the vegetable itself there was found from 0·0331 to 0·0404 per cent of tin. This would indicate that the tin had been dissolved by the juices, and had subsequently entered into combination with some constituent of the asparagus, forming a solid insoluble substance which remained within the vegetable.

An analysis of canned apricots and strawberries gave similar results. There was no tin in the sirups, but there was some in the fruit; in apricots from 0·0185 to 0·0245 per cent, and in strawberries 0·0175 per cent of tin.

They have also proved that this tin is in part absorbed during digestion, and that when canned fruits and vegetables are consumed for a long time the tin may prove injurious to the health.

Type Blocks from Line Drawings and Half Tone Subjects.

At a recent meeting of the Society of Arts, London, Mr. Bolas said that phototypography and photolithography were almost the same thing—by the latter the proof being pulled off a prepared surface direct, while by the other the surface of a piece of zinc or other metal was etched into relief. It was probable that for every one picture produced by either process at the period of his last series of lectures there were ten produced now.

The production of these blocks is very easy when the subject is a line one, but not by any means so when the picture is in half tone. It might, however, be said that the problem was now solved. The basis of most transfers for line subjects was now, the lecturer said, as it had been before, a surface covered with gelatine and albumen sensitized with bichromate of potassium. He wished to illustrate the improvement brought about by the introduction of the velvet roller.

A piece of paper sensitized in the way described was exposed under a negative, and was inked over in the old manner with a fatty ink—that is to say, the whole surface was covered with a thin film of ink. The whole was then placed in warm water, when the gelatine which had not been acted upon by light swelled up and became repellent of the greasy ink, which was easily removed, none remaining except such as was over those parts which had been acted upon by light, and which, consequently, did not swell. This image was used to transfer on to a lithographic stone for lithographic working direct, or on to a zinc plate to be etched with acid.

With the velvet roller the process was quite different. Instead of the whole surface of the bichromated film being covered with ink the roller was passed gently over it several times, when the ink took on the exposed parts representing the lines at the end, and a beautifully delicate transfer was the result. A copy of the American *Patent Journal* was handed round to show examples of this kind of work. At this stage the lecturer passed around a couple of prints to illustrate the influence which photography had had upon the art illustrations of popular journals. One was an engraving in a London illustrated paper of 1851, and showed the conventional outlines of the wooden frames; the other was from *Harper's Magazine*, and showed a half tone picture which was as like an idealized photograph as anything could be.

Glass had been used for blocks, being etched with hydrofluoric acid. It was said that there was less undercutting in the case of glass than of metals. The fact was that photolithography had for long failed to make that progress which it might—not because there was anything wanting in the process, but because lithographic machinery had not been worked with very great success. To Messrs. Sprague & Company was, in great measure, due the credit of having put photolithographic machinery on a commercial basis.

In any half tone process it was necessary to get an image in lines, dots, or stipple. A stipple could be got, as was well known, on the gelatine direct, simply by the reticulation of a bichromated gelatine surface. This could be used as a transfer. This process had been worked by Herr Pretsch, in 1860, and he (Mr. Bolas) thought that some of the results obtained by him then had scarcely been surpassed. It was marvelous how the reticulations would at times follow the outlines of trellis work and such like.

Mr. Bolas warned his audience that in judging the merits of various works shown on the walls of the room it was most necessary to take into consideration the amount of care spent in the printing. Thus, some of the roughest there might in reality exhibit the most merit, inasmuch as no great care had been bestowed on the printing.

The method of getting a transfer by the use of a network was mentioned, and it was remarked that Meisenbach had, among other things, claimed as a novelty the adoption of slight motion of this network during exposure.

In 1873 Mr. W. B. Woodbury patented a method of reducing his gelatine relief into stipple, which promised well.

The Ives process was then described and illustrated. A Woodbury relief was inked and was brought into contact with grained paper. By this means, where the image was high the pyramids forming the grain of the paper were depressed, and a large dot resulted. Where the image was low the tips of the pyramids were merely touched, and a very small dot was produced. The image thus got was used as a transfer or, better, as a means of getting a negative in stipple. If a transfer was taken direct, the small spots were liable to spread out to some extent and to give a blurred effect.

Zuccato's process was then explained. A block of type metal is planed in very fine grooves. The block is now inked, a piece of paper is placed behind it, and behind that is placed the Woodbury relief. Pressure flattened the ridges of the type metal to different degrees and produced lines of different widths. A beautifully defined transfer was thus obtained.