Correspondence.

The Air Bladder in Fishes.

To the Editor of the Scientific American:

An answer in "Notes and Queries," August 22, may quite profitably be supplemented by a further statement of facts. That the air or swimming bladder plays some important part in the vital economy of the animals which possess is clearly shown by the extent of its development and the rich supply of blood vessels accorded to it. But it is not easy to say what that part may be, because its function is not always the same.

Perhaps the most perplexing feature is, that while the majority of fishes are provided with an air bladder, many are entirely destitute of even a trace of it. For instance, all of that great division comprising the sharks and rays have no swimming bladder, and yet the ganoid fishes, of which the gar-pikes are examples, are as uniformly supplied with it; whereas all of these are grouped together in our systems, constituting one of the great sub-classes of fish.

Among the teleosts, the sub-class which includes almost everything which we commonly know as fishes, the swimming bladders are decidedly variable. Even species of the same genus, otherwise distinguished with difficulty, are in the same state of separation. A familiar instance is the two species of mackerel, *Scomber scombrus* and *Scomber pneumatophorus*. They were for a long time held to be the old and young of the same species, yet *scombrus* has no air bladder, but *pneumatophorus* is supplied with one, taking its specific name from that fact. Evidently, therefore, it is not possible to attach any great importance to the swimming bladder, as affecting any of the functions, either vital or mechanical.

It has been said that fishes regulate their specific gravity, so as to rise or sink, by compression of the air bladder. But there is no muscular provision for such a purpose. The muscular coat to the organ is always very feeble, often so slight as to be detected only with difficulty. Its power is not great enough in any case to raise or lower the fish one-tenth part as much as a single wave of its fins; and we have seen the two mackerels, one with and one without the bladder, and yet they are of equal speed and lightness.

Undoubtedly in its development the air bladder is truly the analogue of the respiratory organs of the higher animals, corresponding quite closely to the lung. Among the ganoids it subserves a purpose in the aeration of the blood. The contained gas is secreted from the blood by its lining membrane, and is similar to our atmosphere; but in deep water fishes the oxygen greatly predominates.

In all the teleosts, however, it is considered certain that the swimming bladder has no respiratory function whatever.

In many fishes the air bladder is a closed sac; in others it has communication with the atmosphere, by an opening into the dorsal surface of the œsophagus, and in a few ganoids, into the ventral surface of the same. It is also often brought by prolongations anteriorly into relations with the auditory cavity, and thus has some bearing on the faculty of hearing.

Economically, this organ is of no small importance, for it supplies all our isinglass. Russian isinglass is prepared from the swimming bladder of various species of sturgeons, while the Brazilian comes mostly from a large catfish, the *Silurus parkerii*.

W. O. AYRES.

New Haven, Aug. 24, 1885.

Contraction of Ice.

To the Editor of the Scientific American:

In March number of your paper, page 178, is an article headed "An Icequake." The writer evidently has not pursued his subject with the eye of an Agassiz. The error is widespread as regards the expansion of ice. The writer has never seen or heard a word relative to the "*contraction*" of ice. We are taught that "water expands in freezing," more commonly that "ice expands in freezing." That is true so far as it goes; but let the cold continue and become more intense, and ice *always contracts*—the greater the cold, the more the contraction.

Who has not heard the rumbling of lakes, ponds, canals, or rivers on intensely cold nights, and seen the cause the next morning in cracks, frozen solid, more or less in width, always crossing the stream or pond at right angles to its length? Why was this? Simply the contraction of the ice under more cold. The latter term is a negative one, meaning only the absence of heat.

Many years ago the writer had occasion to cross the Bay of Quinte, an arm of Lake Ontario, which lies south of the county of Hastings, in the Province of Ontario. The previous night had been a bitter cold one, and a re-enforcement of many that had preceded it. It was in the month of March, and the ice was about 15 inches thick, and free from snow, it having been blown off the smooth surface. I noticed that as I crossed the bay diagonally near its eastern end (it is about 9 miles long and 4 miles wide in its greatest breadth), I passed over several cracks, varying from 1 inch to 18 inches. Each maintained its own width, and continued each way across the bay as far as the eye could reach. I was informed by some of the oldest inhabitants that a sudden cold snap sometimes caused the bay ice to open in a crack 3 feet wide, and some made it 4 feet. I returned a month after, during a rainstorm, and found the ice shoved up like a letter A for miles along the eastern end, in some places 6 to 10 feet high; and I must have passed along that ridge (which was near the shore in some places) at least a mile and a half before I found a spot low enough to admit of my crossing with my horse and cutter, and well do I remember how my arched ice bridge gave way under its extra load, and, as one part slid under the firm ice, came near engulfing myself, horse, and cutter.

Had the shore been sloping, the ice would have slid up on dry land, carrying stones large and small along with it.

The bay is so formed that any contraction or expansion of its ice cover must show itself at the east end, and as there is some nine miles of length to show the effect, it is quite marked. In this case the expansion must have been between ten and fifteen feet, and the thaw had only commenced.

JOHN EASTWOOD.

Tiffin, O., August 29, 1885.

Why the Dram Drinker's Nose is Red.

It is not presumed that many readers of this paper are afflicted in the manner described in the following article from the pen of Dr. J. B. Johnson, in the *Medical and Surgical Reporter*, for the latter are not of the kind likely to be interested in the subjects treated in this paper; but some subscriber may have an acquaintance who is puzzled to know why his nose has become red and lumpy, and to him the information here given may be useful if not gratifying.

It may be reasonably supposed that when the dram drinker looks upon his face in the mirror, and sees that his nose is red, he would be anxious to know the exact cause of such a condition, and why, the more alcohol he drinks, the greater becomes the redness; and also why angry-looking bumps after a while make their appearance on the end and sides of the nose? It may not be out of place to tell him, in a commonplace way, the cause; for he is but little aware, as he looks at his nose, that, as it is reddened and congested by an unnatural supply of blood, so all the respective organs of his body are kept in a state of unnatural redness and congestion by the habitual use of alcohol. If he could see his brain, stomach, liver, lungs, heart, and kidneys in his mirror, as he sees his nose, he would find each of those organs in precisely the same condition as that presented by his nose; and this congestion of the vital organs explains to him the uncomfortable manner in which their functions are performed.

When in perfect health, the functions of the organs of the body are so quietly performed that a man forgets that he has lungs and heart. In fact, his general condition is so good that he never thinks about his internal organs; but this is not so with the habitual drinker of alcoholic compounds. The alcohol which he drinks keeps his organs in the same reddened and congested condition as his nose, and he is always complaining that his head aches, or feels hot, foolish, and confused, that he does not sleep well, and has startings and jerkings of his limbs in his sleep; his appetite is capricious, his kidneys do not act well, and he has pains in his limbs and back, or his heart feels uneasy and has spells of palpitation, and his lungs do not perform their duty in a manner to make him feel at ease. He is nervous, tremulous, and easily startled; his liver is disordered, he has a bad taste in his mouth, and his tongue is coated with a thick, white fur, accompanied by feverish and thirsty sensations about his throat. When the dram drinker presents or complains of these symptoms, he may, without the slightest mistake, conclude that the alcohol has irritated his whole system, and that every organ of his body is in the same reddened and unnatural condition as that presented by his nose.

THE EXPLANATION.

The heart is a double organ, constituting within the body a force pump, the duty of which is to receive two streams of blood, and to act upon them in a manner which necessitates the duty of sending two streams of blood in different directions. It has, likewise, two sets of vessels. The duty of one set of vessels is to carry the blood *from* the heart throughout the entire body, while the duty of the other set of vessels is to carry the blood back from the entire body *to* the heart, to be sent to the lungs to meet with the air, by which it is purified. This explains how it is that the dram drinker's breath always smells of alcohol. The alcohol when taken into the stomach passes in a pure state into the blood, and when the blood, thus mixed with alcohol, is sent by the action of the heart to the lungs, the alcohol is there taken up by the air in the lungs, and breathed out on the air by the act of breathing. Sometimes the breath is so loaded with alcohol that the breath, as it escapes, will appear luminous, and can be plainly seen to be luminous when the long practiced dram drinker breathes in the dark.

HOW THE ORGANS ARE DISEASED.

The vessels which carry the blood *from* the heart throughout the body are called *arteries:* those that bring it *back* to the heart are called *veins*. The veins collect the blood from the organs and remote parts of the body as rapidly as the arteries send the blood to such organs and remote parts of the body. If the heart, therefore, sends the blood to the different organs and parts of the body more rapidly than the veins can collect it, then more work is put upon the veins than they can perform, and the result is a stagnation or congestion of the amount of blood sent in excess by the arteries for the veins to gather. Hence, as the dram drinker's heart beats about thirteen times oftener in the minute than the heart of one who does not drink alcohol, the arteries in consequence of the increased action of the heart carry the blood to the dram drinker's nose more rapidly than the veins carry it back, and the blood remains congested in the overfilled vessels, and gives the nose, face, and neck of the dram drinker an habitual redness. So stagnant is the blood thus congested in the overfilled vessels, that when the nose, face, and neck of the dram drinker suddenly meet a current of cold air, they immediately turn purple, and retain the hue until the warm air again restores them to their unhealthy redness. The blood thus stagnant in the dram drinker's nose not only causes its redness, but produces disease of the skin, and this disease of the skin causes red pimples to sprout out. In medicine, these pimples are known as *acne*, but in common language they are called *grog blossoms*, and these grog blossoms never get well so long as the continuous use of alcoholic compounds is kept up.

THE INEVITABLE RESULT.

It is a medical fact that as the influence of alcohol reddens the dram drinker's nose, and changes its appearance, so the alcohol reddens and changes the appearance of every organ of the body; and as the nose thus affected is not either in a natural or healthy condition, so every organ of his body, like his nose, is changed from a natural and healthy condition to an unnatural and diseased condition; and as the skin of the nose takes on unhealthy action, so the substance and covering of the internal organs take on diseased action, which results in a short time in the full development of incurable diseases, such as insanity of the brain, diseases of the heart, Bright's disease of the kidneys, hobnail liver, and slow inflammation of the stomach. All these diseases exist at the same time in the dram drinker; but the organ most diseased is apt to take the lead in the process of morbid action; and the other organs being also in a state of advanced disease, the law of destruction soon exerts its power, and the dram drinker passes anon from untimely disease into a premature grave.

Mechanical Uses for Natural Gas.

At many of the wells near Pittsburg, and in that vicinity, the natural gas issues with an initial pressure of 200 pounds to the square inch, or even more, and before it can be used as fuel or illuminant must have this pressure considerably reduced. Where the pipe lines are of any great length, the friction of the gas against the sides and angles is sufficient to accomplish the purpose; but where the fuel is used directly from the well, or where the transit is but short, mechanical devices become necessary. It is now proposed, however, to make use of the force thus stored up in the compressed gas, instead of wasting it as heretofore, or making provision for its dispersion. One plan suggested utilizes the pressure for blowing blast furnaces, thus dispensing with the enormous engines now employed for that purpose. Sufficient air would of course have to be introduced along with the gas to furnish the oxygen necessary for its combustion, and for so much of the solid fuel in the furnace charge as was not oxidized in the reduction of the ore, or combined in the resulting pig iron. Should this plan prove practicable, it would also lessen to a great extent the amount of solid fuel in the burden, and would be a preliminary step in the solution of the problem of a gas blast furnace.

Another proposition is to make use of the gas in working engines similar to those using compressed air. This plan appears feasible. The gas, after giving up its stored mechanical energy, would be equally available for the production of light or heat, and its entire power would be utilized. If the supply of natural gas proves at all permanent, it promises to become daily more valuable.

Mr. Andrew Carnegie, in his description of the Pittsburg field, mentions one well, in the Murraysville district, which yielded 30,000,000 cubic feet of gas in twenty-four hours. Though this is exceptional, there are many which have a daily output of half this amount, and within a radius of fifteen to twenty miles around Pittsburg there are four distinct gas-producing districts. It is quite possible, therefore, that the city might not only be supplied with a natural fuel, but lighted as well by electricity generated by the utilization of its stored mechanical energy.