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move the most inveterate Cases. I am with all Respect, Sir,

Your most obedient and humble Servant,

Tho. Shaw.

II. *A brief Account of some of the Effects and Properties of Damps, in a Letter to William Rutty, M. D. R. S. Sec. from Mr. Isaac Greenwood, Professor of Mathematicks at Cambridge, New England.*

S I R,

YOUR obliging Letter I received not till about Half a Year after the Date thereof; and have been lead on to so long and criminal a Delay of my Answer, in Hopes of procuring something that might be worthy of your Notice.

I have now sent you inclosed, a brief Account of two Instances of the deadly Effect of vitiated Air upon Animal Life.

If such Experiments as I have made on the Damp therein mentioned, be of any Importance in the Discovery of the true Cause of this wonderful *Phænomenon*, I shall have attained my End. I take the Liberty to write my self,

Your most obedient humble Servant,

Cambridge, New England,
Howard Colledge, May
10. 1729.

Isaac Greenwood.

Mr.

Boston, July 19. 1729.

MR. *Adams* and his Servant being employed to repair a Pump in this Place, about six o' Clock this Afternoon uncovered the Well ; upon which he immediately attempted to go down, by Means only of a single Rope ; but had not descended above five or six Feet, before he was rendered incapable of sustaining his Weight, and without speaking, or any Signals of Distress, slipped down suddenly to the upper Part of the Joint of the Pump ; where being supported about a Minute, fetching his Breath in a very distress'd Manner, he fell to the Bottom, which was about eight or ten Feet lower, and covered with but a very few Inches of Water, without discovering any Signs of Life. Hereupon his Servant (*Thomas Reardon*) with great Precipitation took the Rope in his Hand, in order to descend to the Relief of his Master ; but at the same Distance from the Top, met with the same fatal Interruption ; and without discovering any Signs of Distress, was heard to fall to the Bottom.

The Workmen above prepared a *Third* with a Tackle about his Waste. Upon his Descent he was rendered Speechless, and made no Signs at all, though he had agreed to it ; whereupon being raised from the Well, he was found to have the Image of Death impress'd upon him ; but upon the Use of proper Means was soon recovered, without remembering any thing particularly that had passed.

Some Hours after this the other Bodies were taken up ; but, as we had before been well assured

it would be, with all the Marks of a violent Death upon them.

There was nothing particular relating to this Well, excepting that it was nearly situated to the Town-Dock, the *Reservoir* of all the Dregs of the Neighbouring Streets; and is about 30 Feet deep, which in this Place is so considerable, that it is lower than the Surface of the Water at the greatest Ebb. There had not been an *Air-Tube*, or Passage for the external Air to communicate with it for some considerable Time.

This Evening several Trials were made on *descending Lights*; particularly, by letting down *lighted Candles* uncovered, others inclosed in Lanthorns, and others with the Lanthorn placed in a Pail; but in all these Endeavours it was observed, that whatsoever the Circumstances of the descending Light were, it never reach'd above six Feet.

July 20. I repeated this Evening such Experiments in the *Damp* as related to *Flame*, and found the Effect much the same as before; *viz.* in about 6 Feet below the Top of the Well, the Flame would grow dim, and if not immediately raised, would change to a bluish Colour, and become more and more contracted or diminished, till in about a Minute's Time it would be totally extinguished, without any Remains or Stench accompanying the Wick. In these Experiments I particularly observed, that the *Flame* in all its Changes still continued its Pyramidical Figure; nor did a quicker or slower Descent make any Alteration in these Circumstances. One Experiment was very particular, relating to the Flame of a Candle.

ble. We took a common Pail, and having fix'd a Candle to the Bottom thereof, erect, about 8 Inches long, we poured as much hot Water into the Pail as reach'd within a quarter of an Inch of the Blaze of the Candle. Then having carefully lowered the Pail down the Well, the Flame, notwithstanding it was defended by the reeking Steams of the hot Water, went out at the same Depth, and in the same Time as it did before. After this we immers'd burning Coals, flaming Brimstone, and lighted Matches, all which were extinguished with very little Difference as to the Time, or other Circumstances.

Two Experiments were made relating to *Animal Life*. A large *Kitling* was very much affected in about a Minute's Time; and after 3 Minutes was rendered so weak, that after she was taken out, she could not sustain her Weight on her Legs. Being at length pretty well recovered, we carefully bound her up in a Silk Handkerchief, that she might be the more easily suspended; and having let her down about 16 or 18 Feet, in three Minutes she was affected in the like Manner as before, making a very distress'd Noise, and in about five Minutes was in such extraordinary Convulsions as rendered the Sight not a little disagreeable; but in these Throws she disengaged herself from the Handkerchief, falling to the Bottom, without making any Efforts to swim; whence we concluded they were the last Struggles for Life, in which she broke loose.

We tried the same fatal Experiment upon a small Bird, which being suspended in the *Damp* about three Minutes, was found entirely senseless, and ac-

ording to all Appearance past Recovery. Upon taking it in my Hand, I found it was very cold, nor had it the least Motion that I could discover ; however, keeping of it close between my Hands, which were pretty warm, in about a Minute I felt a small Palpitation, which presently increased to a stronger Pulse, till in about six or seven Minutes the Bird was restored to a perfect and uninterrupted Respiration. About half an Hour after this, we again put the Bird into the *Damp*, and continued it there about five Minutes, after which we found it past Recovery.

July 21. I repeated several of the Experiments relating to Lights and Flame, which succeeded with very little, if any Alteration, as before ; which we looked upon as an undoubted Confirmation of the Continuance of the *Damp*. Whereupon we proceeded ; first, to examine the Elasticity of the Air in the Well, by letting down a small Bell, the Sound of which was as distinct and loud, as in any ordinary Well of the same Depth.

Then to discover the Degree of Moisture, we took a large Sponge a little wet, which with the *Silk String*, whereby we let it down, weigh'd 278 Grains. This being suspended in the *Damp*, upwards of five Minutes, and then raised, was carefully weigh'd, and found to be of the same Weight precisely. After this we dried the *Sponge*, which then weigh'd but 261 Grains, and having applied it to the *Damp* for the Space of ten Minutes, we found also, that it had not gained the least Part that could be perceived in its Weight. Also, a large Bundle of *Cat-gut*,

gut, weighing two Ounces fifteen Penny-weight ten Grains, acquired not the least Augmentation thereto, by being suspended for a very considerable Time.

To these Experiments we added one upon the *Hydrostatical Ballance*, in order to determine whether there was any extraordinary Difference as to the Density, or Specifick Gravity of common, and this *vitiating Air*. The *Ballance* we made use of was very large, and accurately poiz'd, and the *Solid*, which was a Globe, was four Inches eight tenths in Diameter. This with its String weigh'd in the Air seven Ounces six Penny-weight. And after we had immers'd it in the *Damp*, it lost nothing of its Weight, being then in *Æquilibrio* to so great a Degree of Exactness, that half a Grain would over-ponderate on either Side.

This *Damp* abated more and more by being exposed to the Air, till on *July* the 25th, Persons were let down to the Bottom without any Inconvenience.

The other Instance is of a very sudden Subterraneous Vapour, on *May* 9, 1729, in a Well in *School-house-Street, Boston*.

This Well had been opened for some considerable Time; and not only enlarged in its Diameter, but sunk fourteen or fifteen Feet deeper. Hereupon Mr. *Rennief*, and a young Man whose Name was *Russel*, undertook to lay the Stones. They had been employ'd all the Day, till about six o'Clock in the Afternoon, when *Rennief* perceived a very unusual Stench, of which he first upbraided his Partner as an Act of Indecency, till by the extraordinary
Increase

Increase thereof, he was apprehensive of some greater Danger. *Russel* was hitherto unsensible thereof, but perceiving his Partner's Visage to change to a very uncommon Degree, call'd up for Relief; at which Instant, as he afterwards expressed himself, *He first perceived a very strong noisome Smell, resembling rotten Fish, which on a sudden seized his Senses, and rendered him unable to sustain his Weight.* *Rennief* had immediately closed his Mouth and Nostrils with his Hand; and when the Bucket was lowered with a *third* Person for their Relief, assisted in getting *Russel* into it. As the Bucket was raising, *Russel* was taken with very unusual and extraordinary Fits; and when he was laid upon the Ground, till *Rennief* was taken out, could scarce be kept still by the united Strength of three or four Persons; but bounding and writhing his Body, like a Fish newly taken from the Water. *Rennief* was affected only with fainting Fits. After three Hours *Russel* recovered of these extraordinary Convulsions, but was disordered in his Brain during the whole Night; and though *Rennief* was sooner relieved of his Fits, he continued extremely disordered for a longer Time. It was thought remarkable, that neither of them was affected with either Vomiting or Purging.

This Accident happened on *Friday*, and on the *Monday* they were both restored to perfect Health. The Well continued infected for a very little while, and when on the *Monday* following some other *Workmen* renewed the Work, there was nothing Noisome that could be perceived.

I can.

I cannot call to Mind, that there is any Instance of such a transient Vapour or Damp recorded in the *Royal Transactions*; and must confess I am at a Loss how to account for it. Should there be Subterraneous Exhalations which, like the Clouds or Wind in the Atmosphere, shifted from one Place to another, it might be of great Importance to observe the Particulars thereof, especially such as are *Malignant*, as this was. The Passage of this Vapour was about 25 Feet below the Surface; a Depth too great for it to affect Cellars or Vaults.

I had forgot to note, that this Part of the Town lies very high; and the Ground for about ten Feet, hard Clay, and the rest a coarse Sand and Gravel.

III. *A Letter from the King's Officers at Sheerneys and Chatham, to the Honourable the Commissioners of the Navy, giving an Account of what they met with in opening an antient Well near Queenborough in Kent, communicated by Mr. Peter Collison, F. R. S. on January 8, 1729.*

Chatham-Dock, Octob. 9. 1723.

Right Honourable,

IN Obedience to your Honours Warrant of the 16th of September last, we met at the Well near *Queenborough*, where the Castle formerly stood, on *Tuesday* the 24th *ditto*, and finding but very little Water