

MEDICINE

Laughing Gas

"A Classic of Science"

Davy Proved Nitrous Oxide Harmless Anesthetic, Using Famous Poets and Scientists as Experimental Animals

THE COLLECTED WORKS OF SIR HUMPHRY DAVY, Edited by his brother, John Davy. Vol. III. Researches, Chiefly Concerning Nitrous Oxide. (First published in 1800). London: Smith, Elder and Co. Cornhill. 1839. This is an exact reprint of extracts from the original publication.

A SHORT TIME after I began the study of Chemistry, in March 1798, my attention was directed to the dephlogisticated nitrous gas of Priestley, by Dr. Mitchill's Theory of Contagion.*

The fallacy of this theory was soon demonstrated, by a few coarse experiments made on small quantities of the gas procured from zinc and diluted nitrous acid. Wounds were exposed to its action, the bodies of animals were immersed in it without injury; and I breathed it mingled in small quantities with common air, without remarkable effects. An inability to procure it in sufficient quantities, prevented me at this time from pursuing the experiments to any greater extent. I communicated an account of them to Dr. Beddoes.

In 1799, my situation in the Medical Pneumatic Institution, made it my duty to investigate the physiological effects of the æriform fluids, the properties of which presented a chance of useful agency. At this period I recommenced the investigation.

A considerable time elapsed before I was able to procure the gas in a state of purity, and my first experiments were made on the mixtures of nitrous oxide, nitrogen and nitrous gas, which are produced during metallic solutions.

In the beginning of March, I prepared a large quantity of impure nitrous oxide from the nitrous solution of zinc. Of this I often breathed the quantities

*Dr. Mitchill attempted to prove from some phenomenon connected with contagious diseases, that dephlogisticated nitrous gas which he called oxide of septon, was the principle of contagion, and capable of producing the most terrible effects when respired by animals in the minutest quantities, or even when applied to the skin or muscular fibre.

of a quart and two quarts generally mingled with more than equal parts of oxygen or common air. In the most decisive of those trials, its effects appeared to be depressing, and I imagined that it produced a tendency to fainting: the pulse was certainly rendered slower under its operation.

At this time, Mr. Southey respired it in an highly diluted state; it occasioned a slight degree of giddiness, and considerably diminished the quickness of his pulse.

Mr. C. Coates likewise respired it highly diluted, with similar effects.

In April, I obtained nitrous oxide in a state of purity and ascertained many of its chemical properties. Reflections upon these properties and upon the former trials, made me resolve to endeavour to inspire it in its pure form, for I saw no other way in which its respirability or powers could be determined.

I was aware of the danger of this experiment. It certainly would never have been made if the hypothesis of Dr. Mitchill had in the least influenced my mind. I thought that the effects might be possibly depressing and painful, but there were many reasons which induced me to believe that a single inspiration of a gas apparently possessing no immediate action on the irritable fibre, could neither destroy nor immediately injure the powers of life.

On April 11th, I made the first inspiration of pure nitrous oxide; it passed into the bronchia without stimulating the glottis, and produced no uneasy feeling in the lungs.

The result of this experiment proved that the gas was respirable, and induced me to believe that a farther trial of its effects might be made without danger.

On April 16th, Dr. Kinglake being accidentally present, I breathed three quarts of nitrous oxide from and into a silk bag for more than half a minute, without previously closing my nose or exhausting my lungs.



SIR HUMPHRY DAVY, 1778-1829

The first inspirations occasioned a slight degree of giddiness. This was succeeded by an uncommon sense of fullness of the head, accompanied with loss of distinct sensation and voluntary power, a feeling analogous to that produced in the first stage of intoxication; but unattended by pleasurable sensation. Dr. Kinglake, who felt my pulse, informed me that it was rendered quicker and fuller.

This trial did not satisfy me with regard to its powers; comparing it with the former ones I was unable to determine whether the operation was stimulant or depressing.

I communicated the result to Dr. Beddoes; and on April the 17th, he was present, when the following experiment was made.

Having previously closed my nostrils and exhausted my lungs, I breathed four quarts of nitrous oxide from and into a silk bag. The first feelings were similar to those produced in the last experiment; but in less than half a minute, the respiration being continued, they diminished gradually, and were succeeded by a sensation analogous to gentle pressure on all the muscles, attended by a highly pleasurable thrilling, particular-

ly in the chest and the extremities. The objects around me became dazzling and my hearing more acute. Towards the last inspirations, the thrilling increased, the sense of muscular power became greater, and at last an irresistible propensity to action was indulged in; I recollect but indistinctly what followed; I know that my motions were various and violent.

These effects very soon ceased after respiration. In ten minutes, I had recovered my natural state of mind. The thrilling in the extremities, continued longer than the other sensations.

This experiment was made in the morning; no languor or exhaustion was consequent, my feelings throughout the day were as usual, and I passed the night in undisturbed repose.

The next morning the recollections of the effects of the gas were very indistinct, and had not remarks written immediately after the experiment recalled them to my mind, I should have even doubted of their reality. I was willing indeed to attribute some of the strong emotion to the enthusiasm, which I supposed must have been necessarily connected with the perception of agreeable feelings, when I was prepared to experience painful sensations. Two experiments, however, made in the course of this day, with scepticism, convinced me that the effects were solely owing to the specific operation of the gas. . . .

Removed Pain

At the end of July, I left off my habitual course of respiration; but I continued occasionally to breathe the gas, either for the sake of enjoyment, or with a view of ascertaining its operation under particular circumstances.

In one instance, when I had headache from indigestion it was immediately removed by the effects of a large dose of gas; though it afterwards returned, but with much less violence. In a second instance, a slighter degree of head-ache was wholly removed by two doses of gas.

The power of the immediate operation of the gas in removing intense physical pain, I had a very good opportunity of ascertaining.

In cutting one of the unlucky teeth called dentes sapientiae, I experienced an extensive inflammation of the gum, accompanied with great pain, which equally destroyed the power of repose, and of consistent action.

On the day when the inflammation was most troublesome, I breathed three

large doses of nitrous oxide. The pain always diminished after the first four or five inspirations; the thrilling came on as usual, and uneasiness was for a few minutes swallowed up in pleasure. As the former state of mind however returned, the state of organ returned with it; and I once imagined that the pain was more severe after the experiment than before. . . .

Detail of Mr. Coleridge

The first time I inspired the nitrous oxide, I felt a highly pleasurable sensation of warmth over my whole frame, resembling that which I remember once to have experienced after returning from a walk in the snow into a warm room. The only motion which I felt inclined to make, was that of laughing at those who were looking at me. My eyes felt distended, and towards the last, my heart beat as if it were leaping up and down. On removing the mouth-piece, the whole sensation went off almost instantly.

The second time I felt the same pleasurable sensation of warmth, but not, I think, in quite so great a degree. I wished to know what effect it would have on my impressions; I fixed my eye on some trees in the distance, but I did not find any other effect except that they became dimmer and dimmer, and looked at last as if I had seen them through tears. My heart beat more violently than the first time. This was after a hearty dinner.

The third time I was more violently acted on than in the two former. Towards the last, I could not avoid, nor indeed felt any wish to avoid, beating the ground with my feet; and after the mouth-piece was removed, I remained for a few seconds motionless, in great extacy.

The fourth time was immediately after breakfast. The few first impressions affected me so little, that I thought Mr. Davy had given me atmospheric air; but soon felt the warmth beginning about my chest, and spreading upward and downward, so that I could feel its progress over my whole frame. My heart did not beat so violently; my sensations were highly pleasurable, not so intense or apparently local, but of more unmingled pleasure than I had ever before experienced.

Detail of Mr. Wedgwood

July 23, I called on Mr. Davy at the Medical Institution, who asked me to breathe some of the nitrous oxide, to which I consented, being rather a sceptic as to its effects, never having seen any person affected. I first breathed about six quarts of air, which proved to be only common atmospheric air, and which consequently produced no effect.

I then had six quarts of the oxide given me in a bag undiluted, and as soon as I had breathed three or four respirations, I felt myself affected and my respiration hurried, which effect increased rapidly until I. (Turn Page)

GEOLOGY

Helium Gas in Minerals Indicates Great Earth Age

BERYLS, which when clear are used as precious stones, contain different amounts of helium gas, according to the age of the rocks from which they have been obtained. This helium gas is derived from the transmutation of other elements which has been going on extremely slowly ever since the rocks were first formed. Therefore the amount of helium in a given mineral may give a clue to the age of the rock in which it is contained.

Lord Rayleigh, distinguished British physicist, reports in *Nature* that from his latest analyses of beryls containing helium gas, and from his experiments of the rate at which alpha particles or

helium atoms are being produced from the element beryllium, it would take about fifty to a hundred billion years for the observed amounts of helium to accumulate in the mineral.

This period of time is much longer than that estimated from the amount of lead derived from the transmutation of radioactive elements in similar rocks, which never indicate an age of more than two billion years.

Since these "chemical clocks" do not quite agree in the age they indicate for the earth's crust, Lord Rayleigh will continue his investigations to find out how their evidence can be reconciled.

became as it were entranced, when I threw the bag from me and kept breathing on furiously with an open mouth and holding my nose with my left hand, having no power to take it away though aware of the ridiculousness of my situation. Though apparently deprived of all voluntary motion, I was sensible of all that passed, and heard every thing that was said; but the most singular sensation I had, I feel it impossible accurately to describe. It was as if all the muscles of the body were put into a violent vibratory motion; I had a very strong inclination to make odd antic motions with my hands and feet. When the first strong sensations went off, I felt as if I were lighter than the atmosphere, and as if I was going to mount to the top of the room. I had a metallic taste left in my mouth, which soon went off.

Before I breathed the air, I felt a good deal fatigued from a very long ride I had had the day before; but after breathing, I lost all sense of fatigue.

Science News Letter, June 10, 1933

The first physician to write a treatise on occupational diseases was Bernardino Ramazzini, in 1700.

GENERAL SCIENCE

Scientists of Many Countries Gather for Pacific Congress

SCIENTISTS from those countries whose shores are washed by the great Pacific Ocean are meeting these first two weeks of June in the sessions of the Fifth Pacific Science Congress as guests of the Canadian government.

More important than the formal papers which report various aspects of biological and physical research in the east and new world west are the informal chats and meetings which will occur between scientists of different nations and races during the progress of the sessions at Victoria and Vancouver.

The turmoil of the Far East, the conflict in arms and territory between Japan and China, the even more important economic rivalries between commercial groups along nationalistic lines can not be completely ignored in the backs of the minds of the scientists who confer on mutual problems. That is perhaps

too much to expect. But in no other field of human activities can politics and economic conditions be more effectively subdued. Scientists working on similar problems, once they have the opportunity to know each other through correspondence and publications, become true internationalists, citizens of the world in the service of humanity. This tendency will be enhanced by the days of personal acquaintance under the favorable auspices of western Canadian hospitality.

These scientists may well establish avenues of common understanding upon problems and racial differences that will aid the statesmen to keep the peace of the world and preserve friendships between the nations.

Thirty-one countries are sending one or more official delegates. The United States has been honored with an allotment of 25 official delegates, while Canada, the host, has 20. Japan has 15.

Dr. H. M. Tory, president of the Canadian National Research Council, is president of the congress' executive committee. Nearly 600 scientists and representative institutions in countries interested in the study of Pacific problems are presenting papers at the fourteen days of sessions which will end on June 14. Many of the scientists will journey to Chicago for the meetings of the American Association for the Advancement of Science beginning June 19 and to see the Century of Progress exposition.

The long distance record in presentation of a paper before the Congress is to be held by Lord Rutherford of Nelson, England's famous physicist, who addressed the first scientific session at Vancouver June 5, speaking over transoceanic radio and long distance telephone from Cambridge, England.

Science News Letter, June 10, 1933

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If such nebulae consist of very small particles, such as atoms of a gas or extremely fine dust, they should redden the light of the stars and appear blue to the observer. In fact, they should be as much bluer than are their neigh-