Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, postage included	$3 20
One copy, six months, postage included	1 60

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at $3.20 each; additional copies at same proportionate rate. Postage prepaid.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly; every number contains 16 octavo pages, with handsome cover, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, $5.00 a year, postage paid, to subscribers. Single copies 10 cents. Sold by all news dealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, postage free, on receipt of *seven dollars*. Both papers to one address or different addresses, as desired.

The safest way to remit is by draft, postal order, or registered letter.

Address MUNN & CO., 37 Park Row, N. Y.

☞ Subscriptions received and single copies of either paper sold by all the news agents.

Publishers' Notice to Mail Subscribers.

Mail subscribers will observe on the printed address of each paper the time for which they have prepaid. Before the time indicated expires, to insure a continuity of numbers, subscribers should remit for another year For the convenience of the mail clerks, they will please also state when their subscriptions expire.

New subscriptions will be entered from the time the order is received; but the back numbers of either the SCIENTIFIC AMERICAN or the SCIENTIFIC AMERICAN SUPPLEMENT will be sent from January when desired. In this case, the subscription will date from the commencement of the volume, and the latter will be complete for preservation or binding.

VOL. XXXVII., No. 22. [NEW SERIES.] *Thirty-second Year.*

NEW YORK, SATURDAY, DECEMBER 1, 1877.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF
THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 100,

For the Week ending December 1, 1877.

Terms.—SCIENTIFIC AMERICAN SUPPLEMENT, one year, postpaid, *five dollars*. One copy of SCIENTIFIC AMERICAN and one copy of SCIENTIFIC AMERICAN SUPPLEMENT, one year, postpaid, *seven dollars*. CLUBS.—One extra copy of the SUPPLEMENT will be supplied gratis for every club of five SUPPLEMENT subscribers at $5.00 each.

All the back numbers of the SUPPLEMENT, from the commencement, January 1, 1876, can be had. Price 10 cents each.

NOW READY.—The SCIENTIFIC AMERICAN SUPPLEMENT for 1876, Complete in two large volumes. Over 800 quarto pages; over 2,000 engravings. Embracing History of the Centennial Exhibition. New Illustrated Instructions in Mechanical Drawing. Many valuable papers, etc. Price five dollars for the two volumes, stitched in paper; or six dollars and fifty cents, handsomely bound in stiff covers.

Remit by postal order. Address

MUNN & CO., 37 Park Row, New York.

☞ Single copies of any desired number of the SUPPLEMENT sent to one address on receipt of 10 cents.

THE CURE OF DIPHTHERIA.

Dr. E. N. Chapman, of Brooklyn, N. Y., has discovered an antidote to the poison of diphtheria, by which the percentage of deaths is reduced to less than one in fifty. Statistics show that the percentage of recoveries in cases treated under the usual practice is about thirteen, or eighty-seven out of a hundred sufferers succumb to the fell disease.

Diphtheria first appeared in this country in 1858. Dr. Chapman, in 1859, lost several cases, and became distrustful of the regular methods. He had been using alcohol in the cure of ship-fever, and he determined, though contrary to all rules, to try it in diphtheria. To his surprise, several of his patients recovered. He then tried quinia, and found it acted well, but not so quickly. At last he settled on a combination of the two, alcohol and quinia, and with these remedies, he claims that diphtheria is more amenable to treatment than many common diseases. In an epidemic, such as diphtheria, all are affected by the morbific agent; but a few only yield to it. Mature, vigorous persons have vitality enough to resist the disease. Children and weakly adults are its usual subjects. Dr. Chapman considers that there is, almost always, super-added a local and direct exciting cause, such as defective exercise, improper diet, dark rooms, damp houses, imperfect ventilation, and poisonous emanations from decomposing filth in privies, cesspools, sewer pipes, etc. To such agencies the strongest constitution will soon succumb. The blood being deteriorated, its crasis is impaired and its vitality lowered; and then the sympathetic nerves, failing to receive due stimulus, waver in their efforts to carry on the animal functions.

"All local treatment," he says, "is worse than useless. It exhausts the nerve force and induces greater injection of the blood vessels, thus favoring the exudation.

"Alcohol neutralizes the diphtheritic poison, sets free the nerves of animal life, subdues the fever and inflammation, destroys the pabulum that sustains the membrane, cuts short the disease, conquers its sequelæ, and shields other members of the family from an attack. Upon the subsidence of the fever, as is usually the case in from twenty-four to thirty-six hours, a purulent secretion begins to loosen the membrane, and soon, thereafter, to detach it in flaky, ragged fragments. This process may take place, and recovery be possible, even when the larynx and trachea are implicated. The membrane is seldom renewed, when this secretion is maintained by a steady use of the remedy. Alcohol is as antagonistic to diphtheria as belladonna to opium, or quinia to malaria. Like any other antidote, it must be given promptly at the outset, or otherwise its potency will be lessened, perhaps lost altogether.

"Alcohol does not act as a stimulant, nor induce any of its ordinary effects. Enough may be given to cause profound intoxication in health, and yet there exists no signs of excitement or odor in the breath."

Quinia is an efficient alloy to alcohol. It energizes the ganglionic nervous system, and thus enables the organism to right itself and resume its function.

Dr. Chapman sustains his position by citing numerous cases in which this treatment was successful. He states that, in his long experience, he only knew of one case where a drunkard had diphtheria. He generally gives the alcohol in the form of whiskey.

THE GEOLOGICAL RELATIONS OF THE ATMOSPHERE.

The gaseous envelope which surrounds our globe plays a very considerable part in the chemical changes ever going on in rock formations, whether actually at the surface—as in what is called the "weathering of rocks"—or in the less apparent, but perhaps more powerful, action carried on below the surface. In a late number of the *Quarterly Journal of Science*, Edward T. Hardman, F.C.S., has a very exhaustive paper on "The Atmosphere Considered in its Geological Relations," from which we extract the following interesting facts:

Perfectly pure water has a very appreciable solvent effect on rocks, which is immensely augmented when it is chemically charged with carbonic acid, oxygen, nitric acid, and other matters derived directly or indirectly from the atmosphere. But while on the one hand the influence of the atmosphere disintegrates and destroys rock masses, on the other it is mighty in building them up. Without the small percentage of carbonic acid contained in the air there could be no vegetation, and there would be none of the coal beds which form such important members of our rock formations. The immense masses of limestone found everywhere, and the coral reef of the present day, must owe their being indirectly to the carbonic acid of former atmospheres. A drop of rain water absorbs a trace of carbonic acid from the atmosphere, falls on a rock containing lime in some form, dissolves the lime as bicarbonate, carries it down to the ocean, and finally gives it up to become part of the skeleton of a coral or mollusc, which in its turn may form a portion of an immense mass of limestone rock.

The bulk of the atmosphere is made up of oxygen and nitrogen, but these do not take so active shares in geological matters as the almost infinitesimal trace of carbonic acid present. The amount ranges from 3 to 10 volumes in 10,000 volumes of air. The principal sources of increase are, volcanic and other subterranean exhalations; respiration of animals; combustion of fuel and vegetable decay.

The series of rock-metamorphisms due to the simple absorption of carbonic acid by a plant is very interesting. The carbon is assimilated by the plant, and it dies and be comes thus a part of a coal bed or lies embedded in sediment of some kind. Decomposition sets in; and if there be a reducible compound near it, chemical changes result. If the strata contains sulphate of iron, it is reduced to sulphide, commonly known as iron pyrites or false gold. The reduction is effected by the carbon of the plant abstracting the oxygen from the sulphate. The resulting carbonic acid either is taken up by percolating water and penetrates farther into the heart of the rock, effecting new changes, or it finds its way to the surface through some crevice, or by aid of a mineral spring, and once more mingles with the the atmosphere, to be perhaps again absorbed by vegetation and pass through a similar round of changes afresh. In many cases the action of the carbonic acid changes a metallic ore from an insoluble to a soluble compound, thus reducing the ancient crystalline rocks. The metals carried away by streams were deposited along their beds, and valuable beds of ore were formed.

The atmosphere in the carboniferous age contained a much larger portion of carbonic acid. This has been gradually absorbed into the earth, until the amount stored in the earth is estimated at 6,620 times as much as there is in the atmosphere, although the latter contains 1,250,000,000,000 tons of carbon. All animal carbon is derived from the atmosphere. Say a tiger dines off a cow, the carbon and nitrogen of her flesh have been obtained from vegetation, which in turn extracted them from the air; so that we have a kind of physiological "House that Jack built," "This is the Tiger that ate the Cow that devoured the Grass that absorbed the Carbon," etc.

Any considerable difference in the volume of carbonic acid must result in diminution of animal life. Very little above the ordinary standard carbonic acid in air becomes a deadly poison to all warm-blooded animals. If diminished vegetable life would languish, graminivorous animals would die of starvation, and finally the carnivora, being obliged to prey upon each other, would of course become extinct. The result would be a completely barren and desolate planet, perhaps in some degree resembling the moon.

Oxygen is the next in importance as a geological agent. Percolating in rocks, dissolved in rain water, it quickly reacts on all oxidizable substances. Carbonates and protosalts are converted to peroxides; sulphides are changed into sulphates, and sometimes alums are formed.

Carbon and oxygen are thus antagonistic in their action on rocks and minerals, and are thus keeping up a circulation between the earth and the air. The carbon always reduces the oxides, and the oxygen replaces the carbonic acid of carbonates with the same inveteracy.

The ammonia existing in the air is absorbed by plants, and by their decomposition forms nitrates. "And now," Mr. Hardman says in conclusion, "it will be seen what an all-powerful agent the atmosphere we breathe is. Without its aid we should know never a stratified formation, and would simply form a ball of truly primitive rock. We should have no coal, no metalliferous deposits, no rivers or seas, and no rain—consequently no denudation by rain and rivers—for the vapor of waters could not ascend into empty space. We should have—but, last and worst of all, there would be no "we." Life would be impossible, and the earth would finally degenerate into a pale-faced moon." That this is probably her mission cannot be denied; and probably before Saturn and Jupiter have cooled down to a habitable temperature, the senescent earth will roll through space—cold, void, and airless.

VENERABLE JOURNALISTS.

In the December issue of *Godey's Lady's Book* appear the valedictories of both the editor and the publisher of that magazine, which with the beginning of the new year is to pass into other hands. Much has been written and said about the exhaustive nature of the journalist's profession, and the general deduction has been made that as a rule literary people are neither long-lived nor are they able to withstand the mental labor incumbent upon them, over any very extended periods of years, comparison being had with members of other callings. No better examples demonstrating the contrary of the commonly accepted opinion could be found than in the careers of Mrs. Sarah Josepha Hale and Mr. L. A. Godey. Mrs. Hale states that she began the editing of the *Ladies' Magazine*, in 1827—fifty years ago—nine years later that periodical was consolidated with the *Lady's Book*, of which Mrs. Hale assumed the editorship, the active duties of which she has subsequently continuously performed. A half century of steady journalistic labor is in itself phenomenal, more so when it be considered that a woman has accomplished the task and it becomes still more remarkable when we are told that it has been done not early, but late in life, Mrs. Hale now having attained the venerable age of 90 years. Certainly no one would imagine that the editor of the sprightly periodical before us, a journal which pre-eminently deals with fashion and art, and is addressed especially to the young, is the same editor who wrote in the same brilliant way and made up the same interesting papers for our grandmothers, but the fact remains that she of late years has been writing for a third generation of readers. The same is true of Mr. Godey, although he is a mere youth as compared with Mrs. Hale, being but seventy three years of age. He began literary work when but fifteen years old, and hence his journalistic life has extended over fifty-eight years, during all but the first ten of which he has uninterruptedly published the *Lady's Book*.

Both of these venerable members of the press—and with the exception of William Cullen Bryant, we can recall