

Scientific American.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT NO. 37 PARK ROW (PARK BUILDING) NEW YORK.

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

The American News Co., Agents, 121 Nassau street, New York. The New York News Co., 8 Spruce street, New York. A. Asher & Co., 20 Unter den Linden, Berlin, Prussia, are Agents for the German States. Messrs. Sampson Low, Son & Marston, Crown Building, 185 Fleet street, London, are the Agents to receive European subscriptions. Orders sent to them will be promptly attended to.

VOL. XXV., NO. 3 . . . [NEW SERIES.] Twenty-sixth Year.

NEW YORK, SATURDAY, JULY 15, 1871.

Contents:

(Illustrated articles are marked with an asterisk.)

Answers to Correspondents 42
Applications for the Extension of Patents 44
Artificial Leather 31
A second Street Tunnel under the Chicago River 34
Australian Timber 36
Burning Chimneys 34
Business and Personal 39
College Commencements 39
Curious Eggs 33
Curious Sleepers 35
Disease and Carelessness 38
Dream Workers 36
Druggists' Apparatus for Dividing Powders 41
Drying Apparatus for Hose 41
Duration of Animal Life 39
Editorial Summary 41
Experiences of a Bureau Officer 32
Experiments on the Strength of Cast Iron Girders 34
Glue Kettles 40
How to discover Sewage Contamination in Water 41
How to look at the Sun through a Telescope 36
Humboldt 37
Ice a Necessity 40
Improved Grain Hulling Machine 31
Improved Ring Bolt for Carriages 31
Improved Show Case 41
Inventions Patented in England by Americans 42
Magrah's Chain for Hanging Saws 38
Mechanical Equivalent for Zinc 38
Metallic Lined Spool Heads 38
Munroe's Refrigerator 40
Necessary Rules for Sleep 38
Official List of Patents 43
Paine's Perpetual Motion 36
Peter Cooper's Success in Life 36
Phrenology and Spiritualism 33
Prejudice, Ancient and Modern 39
Raising a Sunk Ironclad 41
Recent American and Foreign Patents 41
Resignation of the Hon. H. Capron 41
School Seat 41
Scientific Intelligence 38
Steam Nut Crackers 38
Subterranean Electrical Disturbances 38
The Application of Steam to Caissons, No. 5 32
The best Repeater yet 42
The Broom of Disease 39
The Causes of Disease 42
The Electro-deposition of Tin 42
The Irrational House 37
The new Railroad Depot 41
What an Editor should Eat 41
Wood Boring Beetles 35

COLLEGE COMMENCEMENTS.

It is estimated that there are two hundred and twenty-five colleges, for males, in the United States, entitled to confer degrees, and that the total attendance upon them, of undergraduate students of arts, is, in round numbers, 14,000. This will allow one student to every 2,850 of the population; and as one quarter of the students leave every year, we have at the annual commencements the picture of 3,500 young men presenting themselves for the degree of Bachelor of Arts from all of our Colleges. This is a pretty large army of recruits to be admitted each year to the ranks of college alumni, and if classical education is what it is represented to be, the young men ought to exert a controlling influence over the affairs of the nation.

There is no doubt that college graduates are to be found in the highest positions of our land. The leading clergymen, physicians, lawyers, and statesmen are taken from the ranks of college alumni; and there appears to be something in the training which they have received that gives them an advantage over their competitors. There are, however, in our country, numerous instances of self-made men who, by extraordinary intensity and peculiar natural gifts, have surmounted the disadvantages of defective early training, and have risen to the highest eminence. These instances are rare and cannot be quoted as an argument against the advantages of college training.

Any reflecting man must observe that, of late years, a larger proportion of the so-called self-made men rise to prominent positions than formerly. A peculiar kind of talent is required to secure an ascendancy in politics. And our modern rulers cannot afford to waste time on the finer points of education if they expect to attain early success in the possession of office. We find college graduates pushed aside and intriguing men of inferior training accepted in their places. So many instances of this kind have occurred lately that it is said that the total number of students attending colleges in the United States is not relatively but absolutely less than it was thirty years ago; in other words, although the population of the country has largely increased, the attendance upon colleges has either remained stationary or has actually diminished. While at one time in our history there was one person in every thousand in college, we now find only one person in nearly three thousand. The average is said to be brought down by the great influx of foreigners, but it cannot be looked upon as an encouraging sign of the times. It is not safe for our colleges to shield themselves under cover of foreign emigration, but they would do well to consider whether the decrease in attendance may not be partly due to defects in their curriculum of instruction. Perhaps the fathers who supply the money do not feel that they get their money's worth. This is a practical age, and people are very much in the habit of sitting down and counting the cost of an education; and if the investment does not yield a good return, they certainly will not make it.

Somehow, college education has grown into disrepute, and college professors would do well to inquire why. It is none of our business to answer questions of this character. We have to deal with the applications of science to the arts, and the patent diplomas which we procure for our customers are written in plain English, and do not require an interpreter; but we have some knowledge of the wants of the country, and we publish every week a list of inquiries from all parts of the United States, going to show what people want to know. We would suggest to college authorities the proprie-

ty of reading these questions, and also of studying the great demands of the age, and, after the perusal, let them ask themselves, how many of these inquiries could be answered by a college graduate? This would be a fair test to make, and it may possibly afford an explanation of the falling off in the attendance upon colleges. Perhaps the colleges do not offer the kind of education that the times demand. It may be that a little less Latin and Greek, and more of the physical sciences, would be acceptable. That we are correct in our surmise is proved by the fact that a large number of schools of science have been organized all over the land, and the attendance upon them will soon far exceed that upon the old-fashioned institutions. Schools must keep up with the progress of the age, as well as inventions, and as the inventor who brings out something that nobody wants, necessarily fails, so the college which teaches what was fashionable in the middle ages, but is now utterly superseded, must also go down for want of patronage.

"There is a screw loose somewhere," to adapt a phrase taken from our profession, and it ought to be secured. When our colleges are able to provide an education that will enable men to make better mechanics as well as clergymen, better merchants as well as lawyers, better farmers as well as doctors, they will come nearer to answering public demand than they now do; and, instead of having an attendance of 14,000, in a population of 40,000,000, they would soon run up the number to more than a hundred thousand, and be able to scatter the seeds of learning over the whole extent of our great nation.

The Commencement season is the occasion for the gathering together of the faithful all over the land. Let the Alumni this year consider some of the points raised by us, and we doubt not that much good may be made to grow out of the discussion.

THE CAUSES OF DISEASE.

The uncertainty of medical men as to the real value of the greater number of remedies which have been recommended and tried in all ages, for the cure of disease, has been due to ignorance of the causes of the various ills to which the animal economy is liable. We think it may be safely asserted, that the discovery of the cause of any complaint has always been followed by an immediate improvement in its treatment. But even in this enlightened age, when the aids to scientific investigation have become so potent, it is surprising how little is known of those things which induce sickness.

Groping in the dark, we have made some unexplained discoveries of remedies which have proved efficacious. The rationale of the action of most of these is still a sealed book. In what way mineral poisons act to neutralize the effect of certain animal poisons—how it is that one drug acts as a sudorific, another as an expectorant, still another as a stimulant, cathartic, or emetic—yet passes our comprehension.

In surgery there still remain some unsolved enigmas, but it is in its province much less involved in perplexities than that of its sister department of medical science.

There is, doubtless, very much in pathology that must remain mysterious, till we more nearly approach to the greatest of all mysteries—life. Biology must make enormous advances before pathology can develop into anything like the proportions which the sciences of chemistry and physics have attained. No other field of investigation is so much beset with difficulties as this. Whichever way we turn and struggle to penetrate the mists that obscure our vision, we meet with the most discouraging obstacles. Were it not that all nature groaning in travail together makes an appeal that humanity cannot resist, the investigation would long ago have been abandoned as hopeless. But by dint of the most arduous toil, and through the actual martyrdom of many who have even braved death rather than be turned back, there have been gathered together a few precious crumbs of knowledge, and from these has been created a real, though very imperfect, science of pathology.

Among the most recent, as well as the most important, contributions to this science, are the results of investigations as to the extent and variety of atmospheric influences in the production of pathological conditions.

The microscope has been the chief instrument by which these investigations have been prosecuted. It reveals to us that what appears to the unaided human eye as a clear transparent medium, is really a mingled cloud of mixed gases, watery vapor, organic germs, the dust of nearly every known solid, and even living creatures.

Every breath we draw is loaded with materials that, introduced in sufficient quantity, would cause immediate and serious embarrassment to the vital functions.

So numerous and potent are these invisible enemies, animate and inanimate, that Dr. Sutton, Assistant Physician and Lecturer on Physiology in the London Hospital, takes the ground that inherited structures and external conditions are the true factors of disease.

Miasms, formerly supposed to be noxious exhalations or gases, unknown to chemists, and eluding their research, are now believed to be, for the most part, extremely minute germs, that find ingress to the circulation through the lungs, and there mature and breed, and multiply till their presence makes itself felt in chills and fevers. Though it is not proved by actual observation, that the infection of small-pox, measles, scarlet fever, etc., consists in similar germs, it is extremely probable that these diseases are so propagated.

Many skin diseases are now known to be the result of the establishment of insect colonies or vegetable plantations on the fruitful soil of the animal skin. Helmholtz it was, we believe, who, affected with a hay-cold or incipient catarrh, examined the nasal discharge, and found it an ocean of vi-

briones. Diseases of the mouth, in children, have been traced to fungoid growths, the germs of which find a nidus in their food. In short, in our food and drink, as well as in the air we breathe, there lurk, unseen without the aid of the microscope, the seeds of numberless ills.

And yet not one doctor (the word means teacher, and every doctor of medicine should be a teacher as well as a healer), not one in fifty owns a microscope, or could use it skillfully if he had one.

Medical students are taught anatomy, physiology, surgery, obstetrics, materia medica, and the theory and practice of medicine—which includes pathology—but the latter, which owes its progress more to the microscope than to any other modern scientific appliance, is taught without the use of this instrument, with the manipulation of which every student of medicine should be as familiar as with that of the scalpel. Every medical school that has not a professorship of microscopy, is behind the age.

Another instrument which has been recently employed in the study of pathology is the spectroscope. An instrument, whose power, in dealing with the minutest traces of matter, has been so fully demonstrated, will doubtless be of service in detecting peculiar abnormal conditions of the tissues and the fluids.

PREJUDICES, ANCIENT AND MODERN.

We read in the writings of one of the most genial and accomplished of modern authors, that "the world is no fool's or sluggard's paradise, but a battlefield ordained from of old." And evidently true as this is generally, and more especially and significantly in a moral sense, it is singularly applicable to the world of science. From the days of Galileo to our own times, the discoverer and successful explorer, of the region of the dim unknown which surrounds our limited yet constantly extending Cosmos of ascertained knowledge, has had not only to fight with Nature, who sometimes struggles hard to keep her secrets, but, having won access to her mysteries, to combat the prejudices, and often the ignorance of his fellow men.

The unwillingness of men to adopt a new revelation of scientific fact is found, more or less, in all societies, and is co-existent with the mental emaciation which we find everywhere, and the existence of which we recently had occasion to deplore. It is, moreover, the most lamentable characteristic of an ordinary mind, paralyzed by being used in one direction only (which our correspondent, J. C. McElroy, last week somewhat euphemistically called "specialism"), that all truth that is an advance beyond the narrow sphere of average experience, is doubted, struggled against, and denied, not because it is false, but because it is new.

This atrophy of the mind is, we are glad to think, diminishing in extent and influence. In the prodigious activity of the present day, when each field of knowledge has its myriad explorers, when even the rapidity of modern experimental science does not prevent microscopic investigation of every detail, and the whole domain is thoroughly searched for new treasures of fact, the toilers after truth have little patience with the opposition of the ignorant. And the extended and liberal education of this age, which is the greatest of the advantages that society derives from the increase of wealth, has done much to secure, for all new discoveries, a fair hearing and a candid and impartial criticism. Altogether, we Americans have little to reproach ourselves with on this ground; indeed, we have among us some who run after the new, be it true or not; and who, in their zeal for discovery, forget that scientific knowledge must grow organically, and not be created out of nothing. But certainly no truth, however at variance with the preconceived ideas of half educated men, will fail to find hearers in this country, although some of them may merely tolerate it to await the issue, as Gamaliel did in a notable instance.

It is, then, a most hopeful sign of the improved intellectual condition of this age, that the unreasoning opposition of the average mind and the "specialist" is losing strength and pertinacity. The complete man, whether he be philosopher, artist, merchant, or mechanic, will never be a "specialist" in the narrow sense of that term. He will have sympathies with and interests in all honest pursuits, and consider nothing human, and certainly no human knowledge, as alien to him. The cultivation of the mind is the first duty of every man to whom the blessing of education has been given; and a fair index to a man's want of mental capacity and discipline is afforded by the number and strength of his prejudices. And the giant strides of science, during the past few years, are not more remarkable in their effect upon the material and intellectual well-being of the world, than in the moral advantages men have gained by the cultivation of a large hearted and catholic tolerance for all diversities of opinion. And this tolerance is reasonable, and will continue to increase. It would be strange, indeed, if men who have seen the lightning chained and taught to work, and fire made an obedient and docile helpmate to man, who have learned the history of the component parts of the sun, and have seen the astronomer sweeping the heavens "to charm her secret from the latest star," were all to continue to oppose, with blind and unyielding obstinacy, the introduction of a new process or a new truth. There are still many persons constitutionally unfit for appreciating or doing justice to the talents and the toil of their fellow men, but they are fast diminishing in number; and, under Providence, it is Science, majestic, beautiful, and benign, who shall deliver the world from them and from their yoke.

FIFTY feet of the bottom of the Wyoming canal, near Wilkesbarre, sank suddenly a few days since, draining the whole level.