

Scientific American Supplement.

No. 15.

FOR THE WEEK ENDING APRIL 8, 1876.

PUBLISHED WEEKLY,

AT THE

OFFICE OF THE SCIENTIFIC AMERICAN,
No. 37 Park Row, New-York.

MUNN & CO., Editors and Proprietors.

O. D. MUNN.

A. E. BEACH.

The SCIENTIFIC AMERICAN SUPPLEMENT is uniform in size with the Scientific American. Terms of subscription for SUPPLEMENT, \$5.00 a year, postage paid, to subscribers. Single copies, 10 cents. Sold by all newsdealers throughout the country.

COMBINED RATES.

The Scientific American and SCIENTIFIC AMERICAN SUPPLEMENT will be sent together for one year, postage free, to subscribers, on receipt of \$7.00.

Remit by postal order. Address,

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

NATURAL EUTHANASIA.

By B. W. RICHARDSON, M.D., F.R.S.

By the strict law of Nature, a man should die as unconscious of his death as of his birth.

Subjected at birth to what would be, in the after-conscious state, an ordeal to which the most cruel of deaths were not possibly more severe, he sleeps through the process, and only upon the subsequent awakening feels the impressions, painful or pleasant, of the world into which he is delivered. In this instance the perfect law is fulfilled, because the carrying of it out is retained by Nature herself: human free-will and the caprice that springs from it have no influence.

By the hand of Nature, death were equally a painless portion. The cycle of life completed, the living being sleeps into death when Nature has her way.

This purely painless process, this descent by oblivious trance into oblivion, this natural physical death, is the true euthanasia; and it is the duty of those we call physicians to secure for man such good health as shall bear him in activity and happiness onward in his course to this goal. For euthanasia, though it be open to every one born of every race, is not to be had by any save through obedience to those laws which it is the mission of the physician to learn, to teach, and to enforce. Euthanasia is the sequel of health, the happy death engrafted on the perfect life.

When the physician has taught the world how this benign process of Nature may be secured, and the world has accepted the lesson, death itself will be practically banished; it will be divested equally of fear, of sorrow, of suffering. It will come as a sleep.

If you ask what proof there is of the possibility of such a consummation, I point to our knowledge of the natural phenomena of one form of dissolution revealed to us even now in perfect, though exceptional, illustration. We have all seen Nature, in rare instances, vindicating herself despite the social opposition to her, and showing how tenderly, how soothingly, how like a mother with her foot on the cradle, she would, if she were permitted, rock us all gently out of the world; how, if the free-will with which she has armed us were brought into accord with her designs, she would give us the riches, the beauties, the wonders of the universe for our portion so long as we could receive and enjoy them; and at last would gently withdraw us from them, sense by sense, with such imperception that the pain of the withdrawal would be unfelt and indeed unknown.

Ten times in my own observation I remember witnessing, with attentive mind, these phenomena of natural euthanasia. Without pain, anger, or sorrow, the intellectual faculties of the fated man lose their brightness. Ambition ceases or sinks into desire for repose. Ideas of time, of space, of duty, lingeringly pass away. To sleep and not to dream is the pressing, and, step by step, still pressing need; until at length it whiles away nearly all the hours. The awakenings are short and shorter; painless, careless, happy awakenings to the hum of a busy world, to the merry sounds of children at play, to the sounds of voices offering aid; to the effort of talking on simple topics and recalling events that have dwelt longest on the memory; and then again the overpowering sleep. Thus on and on, until, at length, the intellectual nature is lost, the instinctive and merely animal functions, now no longer required to sustain the higher faculties, in their turn succumb and fall into the inertia.

This is death by Nature, and when mankind has learned the truth, when the time shall come—as come it will—that “there shall be no more an infant of days, nor an old man who hath not filled his days,” this act of death, now, as a rule, so dreaded because so premature, shall, arriving only at its appointed hour, suggest no terror, inflict no agony.

The sharpness of death removed from those who die, the poignancy of grief would be almost equally removed from those who survive, were natural euthanasia the prevailing fact. Our sensibilities are governed by the observance of natural law and the breach of it. It is only when Nature is vehemently interrupted that we either wonder or weep. Thus the old Greeks, fathers of true mirth, who looked on prolonged grief as an offence, and attached the word madness to melancholy, even they were so far imbued with sorrow when the child or youth died, that they bore the lifeless body to the pyre in the break of the morning, lest the sun should behold so sad a sight as the young dead; while we, who court rather than seek to dismiss melancholy, who find poetry and piety in melancholic reverie, and who indulge too often in what, after a time, becomes the luxury of woe, experience a gradation of suffering as we witness the work of death. For the loss of the child and the youth we mourn in the perfect purity of sorrow; for the loss of the man in his activity, we feel grief mingled with selfish regret that so much that was useful has ceased to be. In the loss of the aged, in their days of second childishness and mere oblivion, we sympathize for something that has passed away, and for a moment recall events saddening to the memory; but how soon this consoling thought succeeds and conquers—that the race of the life that has gone was run, and that for its own sake the dispensation of its removal was most merciful and most wise!

To the rule of natural death there are a few exceptions. Unswerving in her great purposes for the universal good, Nature has imposed on the world of life her storms, earthquakes, lightnings, and all those sublime manifestations of her supreme power which, in the infant days of the universe, cowed the boldest and implanted in the human heart fears

and superstitions which in hereditary progression have passed down even to the present generations. Thus she has exposed us all to accidents of premature death, but, with infinite wisdom, and as if to tell us that her design is to provide for these inevitable calamities, she has given a preponderance of number at birth to those of her children who by reason of masculine strength and courage shall have most frequently to face her elements of destruction. Further, she has provided that death by her, by accidental collision with herself, shall, from its very velocity, be freed of pain. For pain is a product of time. To experience pain the impression producing it must be transmitted from the injured part of the living body to the conscious centre, must be received at the conscious centre, and must be recognized by the mind as a reception; the last act being in truth the conscious act. In the great majority of deaths from natural accidents, there is not sufficient time for the accomplishment of these progressive steps by which the consciousness is reached. The unconsciousness of existence is the first and last fact inflicted upon the stricken organism: the destruction is so mighty that the sense of it is not revealed.

The duration of time intended by Nature to extend between the birth of the individual and his natural euthanasia is undetermined, except in an approximative degree. From the first, the steady, stealthy attraction of the earth is ever telling upon the living body. Some force liberated from the body during life enables it, by self-controlled resistance, to overcome its own weight. For a given part of its cycle the force produced is so efficient that the body grows as well as moves by its agency against weight; but this special stage is limited to an extreme, say of thirty years. There is, then, another period, limited probably also to thirty years, during which the living structure in its full development maintains its resistance to its weight. Finally, there comes a time when this resistance begins to fail, so that the earth, which never for a moment loses her grasp, commences and continues to prevail, and after a struggle extended from twenty to thirty years, conquers, bringing the exhausted organism, which has daily approached nearer and nearer to her dead self, into her dead bosom.

Why the excess of power developed during growth or ascent of life should be limited as to time; why the power that maintains the developed body on the level plain should be limited as to time; why the power should decline so that the earth should be allowed to prevail and bring descent of life, are problems as yet unsolved. We call the force that resists the earth vital. We say it resists death, we speak of it as stronger in the young than in the old; but we know nothing more of it really, from a physical point of view, than that while it exists it opposes terrestrial weight sufficiently to enable the body to move with freedom on the surface of the earth.

These facts we accept as ultimate facts. To say that the animal is at birth endowed with some reserved force, something over and above what it obtains from food and air, would seem a reasonable conclusion; but we have no proofs that it is true, save that the young resist better than the old. We must, therefore, rest content with our knowledge in its simple form, gathering from it the lesson that death, a part of the scheme of life, is ordained upon a natural term of life, is beneficently planned, “is rounded with a sleep.”

AWARDS AT THE CENTENNIAL.

TO THE EDITOR OF THE SCIENTIFIC AMERICAN.

Mr. R. H. Buel, in his suggestion; (published in a late SUPPLEMENT, No. 13), for standard tables wherewith to compare and judge the relative merits of mechanical and other devices exhibited at expositions, seems to me to overlook one very important fact, namely, that all inventions are not necessarily mere improvements on prior conceptions. To be sure it is rare that an invention Minerva-like springs in full panoply from the brain—and the Patent Office adopts this theory, it appears, in the caption of specifications—but, on the other hand, entirely new capabilities, new combinations, new adaptations are constantly appearing, and to prepare a table which, though it might hold good for to-day or for ten days, would be equally correct for a month or a year, would, to judge by the weekly lists of patents granted for “new and useful” ideas in this country alone, be practically impossible. To gauge this plan by the success of the English cattle-raisers is not just. All the attributes of a cow, for example, are determined by nature. By careful artificial selection, by scrupulous attention to food and other circumstances embraced under the single term “environment,” these attributes may be exaggerated (or more properly developed) or repressed. But no man can impart to the animal a single capability which is not already in potential existence. Either every capability of the brute is known, or else, if it be obscure and only ad-duced by development, then the progress of the latter is so slow as amply to afford time for its comprehension, and so to allow of comparison between its stages.

Now, if all machines developed, and did so within the limit of certain capabilities, then a parity of reasoning might be urged. But supposing two machines reached an identical result in entirely different ways—in both only a minority of “points” corresponding, others widely differing—how then could a standard table apply? Again, suppose one machine combines (like some wood-working apparatus) a multiplicity of attributes; another machine, belonging to a like class, has some of the capabilities of the first, besides others of its own; another machine, by like means, does something altogether different. Each stands practically alone. Unless a table be constructed showing that sawing has such and such an importance, planing another, boring another, and so on—a clear impossibility. I fail to see where a standard of relative comparison could be found.

Without suggesting further details, which I think any thoughtful person can call to mind, it seems that to machines for a single purpose, and of similar general design, Mr. Buel's standard tables could well be applied, but to suggest their applicability to the whole range of mechanical invention is to reach the obvious *reductio ad absurdum*, that the same runs only in constant and limited channels, and that all the future mechanical ideas of the race can by some prescience on the part of experts be crystallized into and provided for in tabulated forms.

PARK BENJAMIN.

PRESERVED TIMBER.

SOME trunks of trees in a remarkable state of preservation have recently been found in the wash-dirt in the Race-Course Company's mine at Haddon, Victoria, at a depth of a little over 200 feet from the surface. The grain and color of the wood corresponds very much with the blackwood of the present day, and seemed to have suffered so little from its repose for countless ages in its damp and dark bed as to be scarcely distinguishable from the wood of trees cut down within the last year or two.

[Mining and Scientific Press.]

AN IRON FURNACE FOR CALIFORNIA.

At last California is to have her first iron furnace. This, which is usually the first manufacturing enterprise of a new country where the material is found, seems to be almost the last to have started here. The reason of this is doubtless the greater attraction which the precious metals have had for the capital and energy of the State. The enterprise of Mr. P. Fitzhugh, an experienced iron master, has at length drawn attention to this source of wealth, and capital necessary to insure the completion of the works during the coming summer has been secured. The furnace will be built near Clipper Gap, on the line of the Central Pacific railroad, where a fine quality of magnetic iron ore is found in great abundance, and where also all other materials needed in the manufacture of charcoal pig-iron are easily and cheaply accessible.

There is up to this time no iron furnace west of the Rocky mountains—except one in Oregon—and all of our iron is consequently imported. Mr. Fitzhugh thinks that he has found a place that far exceeds any in the United States for making pig, bloomed, and rolled iron of the best quality at the least cost anywhere known to him, and with cheaper transportation to market than any other iron beds in California.

The cost of making one ton of pig-iron at the locality named is computed at \$20, as follows: Mining and delivering two tons of ore, to make one ton of iron, \$3; mining and delivering limestone (which costs the Portland, Oregon, furnace \$5), 25 cents; superintending and labor, \$3.75; charcoal, 125 bushels at 10 cents (many furnaces only take about 100 bushels, and it is delivered to the Oregon furnace for nine cents), \$12.50; repairs on furnace making about 5000 tons, \$2500 per year (or per ton) 50 cents; total, \$20 per ton. The transportation from furnace to San Francisco is \$3.66 per ton, so the cost of working and delivering one ton of pig-iron in this city is estimated as above at \$23.66.

According to analysis by Professor Price, of this city, this magnetic iron ore contains 62.44 per cent of iron, and has no injurious ingredients that would in any way affect the quality of iron. The iron ore and limestone beds are large, rise nearly to the surface, and can be quarried and delivered much cheaper than the cost to New-York or Oregon furnaces, and the latter have to drift many feet under ground and transport their ores or limestone hundreds of miles. The ores are in the vicinity of an immense growth of wood, which can be easily and cheaply conveyed to the proposed furnace, and can be reduced to charcoal at any season of the year, and do not require to be collected in large quantities for winter supplies. It is stated that the ores will work the toughest iron, suitable for car wheels and steel rails. Professor Whitney, late State Geologist of California, in Vol. I, page 884 of his report, gives an account of the deposits of iron ore within six miles of Auburn, Placer County (the place in question), and says:

“It is in larger quantity than has yet been discovered in the auriferous slate series, cropping out on a side hill and forming a mass of more than thirty feet thick, of which the longitudinal extent is not known, although it is evidently considerable. It is hematite, appears to be of excellent quality and remarkably pure and free from intermixture with rocks. This locality is more favorably situated than any yet discovered in the State.”

We understand that the amount of capital required in the business of starting this furnace for the first year is about \$75,000, and that all the arrangements have been perfected. We are very glad to know that at last California is to have an iron furnace, and hope it will not long be the only one. The population of the State has increased so materially, and the demand for iron for various purposes is so great, that it is a pity to see so much money going out of California which could be saved within its borders and at the same time develop a new and profitable industry, both for capitalists and laboring men.

[Engineer.]

A NEW ALLOY.

THE White Brass Company, of Southwark, are about to introduce a new metal to the public which possesses some interesting peculiarities. Tests made with it in the Royal Gun Factories have given some very remarkable results, and we do not think an apology is necessary for laying some particulars concerning this alloy before our readers. This new alloy is termed “Manganese Bronze,” it is composed of any ordinary bronze alloy combined with manganese, which it appears has the effect of cleansing the metal of all oxide, and rendering it very homogeneous and close grained, even a good sized ingot broken through presenting a fracture as fine and close grained as a piece of steel; the metal also possesses increased strength, toughness, and hardness, which latter quality can be increased very considerably. In color it resembles good gun-metal, but is of a rather brighter and more golden hue. It can be forged at a red heat and rolled into rods or sheets and drawn into wire and tubes.

Six specimens were submitted by the White Brass Company for trial and tested by the permission of Colonel Younghusband at the Royal Gun Factories for tensile strength, elastic limit, and ultimate elongation. These consisted of three cast specimens of different degrees of hardness, and three from each of these forged at a red heat and drawn down from a cast ingot about 2½ in. square to a round bar 1 in. diameter, afterwards turned to gauge for the testing machine .533 in. diameter.

No. 1 cast—intended for construction purposes where strength and toughness are necessary—gave an ultimate tensile strength of 24.3 tons per square inch, with an elastic limit of 14 tons and an elongation of 8.75 per cent. No. 1A, forged from the same metal as No. 1 was cast from, gave a tensile strength of 29 tons per square inch, elastic limit 12.6 tons, elongation 31.8 per cent. No. 2 cast—rather harder than No. 1—tensile strength 22.1 tons, elastic limit 14 tons, elongation 5.5 per cent. No. 2A, forged from the same, tensile strength 28.8 tons, elastic limit 13.2 tons, elongation 35.35 per cent. No. 3 cast—still harder—tensile strength 23.6 tons, elastic limit 16.8 tons, elongation 3.8 per cent. There was a slight flaw in this specimen, which caused it to break with a less strain, and to stretch less than it would otherwise have done. No. 3A, forged from No. 3, tensile strength 30.3 tons, elastic limit 12 tons, elongation 20.75 per cent.

It will be seen from the above that No. 1 cast specimen is about equal in tensile strength and elongation to wrought-iron of average good quality, while its elastic limit is rather higher, for scarcely any wrought-iron will exceed ten or eleven tens, and all the forged specimens considerably exceed the very best wrought-iron, both in tensile strength and ultimate elongation, and are fully equal to mild qualities of steel. We believe it will be admitted that if such results can be obtained, and certainly secured, the results of these experiments prove this new manganese bronze to possess very valuable qualities, and such as will render it useful