# Scientific American.

ESTABLISHED 1846.

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

**Club Rates.**

Ten copies, one year, each $2 70, postage included.....$27 00
Over ten copies, same rate each, postage included..... 2 70

☞ The postage is payable in advance by the publishers, and the subscriber then receives the paper free of charge.

NOTE.—Persons subscribing will please to give their full names, and Post Office and State address, plainly written. In case of changing residence state former address, as well as give the new one. No changes can be made unless the former address is given.

**Scientific American Supplement.**

A distinct paper from the SCIENTIFIC AMERICAN, but of the same size and published simultaneously with the regular edition.

**TERMS.**

One year by mail.....$5 00
SCIENTIFIC AMERICAN and SUPPLEMENT, to one address..... 7 00
Single Copies..... 10

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.

VOLUME XXXV., No. 19, [NEW SERIES.] *Thirty-first Year.*

NEW YORK, SATURDAY, NOVEMBER 4, 1876.


**Contents.**

(Illustrated articles are marked with an asterisk.)




**THE SCIENTIFIC AMERICAN SUPPLEMENT.**

**Vol. II., No. 45.**

**For the Week ending November 4, 1876.**


**TABLE OF CONTENTS.**





## DR. TAYLOR VS. PROFESSOR HUXLEY.

As a rule, it is a waste of time to pay any attention to the excursions of any man into unfamiliar fields of knowledge, however great his reputation for learning may be in other directions. A man may be an authority in Hebrew history, yet densely ignorant of the events of mediæval Europe. He may be chief among chemists, yet a beginner in biology, and entirely out of his element in mechanics. When such a specialist attempts to settle questions in departments other than his own, he is pretty sure to accomplish little else than the exposure of his own lack of knowledge. Even more certain to go wrong is the man who ventures into a field of knowledge in which the means and methods of study, the kind of evidence, the spirit of investigation, and the purpose of the work are each and all unlike those he is used to. The mental habits of the trained theologian, for example, are quite the reverse of those of the trained scientist. The one proceeds, calmly, dispassionately, and sensibly, to investigate actual existences, conditions, relations, and occurrences. The result may be more or less advantageous to him and to his fellows; but he is not personally responsible for it, whatever it may be, since no one can justly blame or punish him, here or hereafter, for finding things as they are. The theologian, on the contrary, deals with matters of emotion, aspiration, fancy. His materials are ever varying feelings and equally unstable imaginations. His things are words, often from languages vaguely understood, or technical phrases concerning the import of which there is no agreement. And the issues at stake are of transcendent importance—infinite felicity or eternal woe to such as assent or deny. To him authority, human or divine, is everything: tradition is almost omnipotent, and the penalty of independent thought is excommunication, the alienation of friends and associates, and, mayhap, personal damnation. And he naturally carries with him the same habits of thought, the same incapacity for unprejudiced and impartial investigation of realities, the same inability to appreciate the logic of facts, whenever he enters the scientific field as a self-elected umpire or dictator. Consequently his utterances therein are pretty certain to be valuable only as so many additions to the already over-abundant supply of illustrations of learned foolishness and of the uselessness of metaphysical methods for the advancement of real knowledge.

These remarks have been suggested by the labored attempt of the Rev. Dr. W. M. Taylor to break the force of Professor Huxley's lectures on evolution. Dr. Taylor is a gentleman of considerable eminence in the theological world: but that only makes the more ludicrous his Quixotic attack upon a purely imaginary Professor Huxley, in the course of which he exhibits an utter misapprehension of the scope and purpose of the real professor's remarks, and the most thorough-going ignorance of the range, amount, and quality of the evidence bearing on the question of evolution.

He is off the track from the start, assuming that Professor Huxley pretended to give a demonstration of the hypothesis of evolution, and that his lectures contained all the evidence to be produced in its support. The single fact that Professor Huxley promised no more than a popular illustration of certain lines of evidence bearing more or less distinctly and forcibly upon the hypothesis of evolution, and directly declared that it was no part of his purpose to enable any one to pronounce upon the truth or falsity of the doctrine, sufficiently proves the irrelevancy of four fifths of the pretended criticism. Professor Huxley did not promise nor attempt to "demonstrate" evolution, but merely to indicate the kind of historical evidence the theory demanded, and how geology was meeting the demand. To have recited all the evidence of this sort in the possession of Science would have required weeks or months instead of hours; while the evidence derived from existing conditions and relations in the world of animal and vegetable life would require an allowance of time not less liberal.

The remaining fifth of the two columns of the *Tribune*, which Dr. Taylor devotes to the destruction of the theory of evolution as Professor Huxley did not present it, comprises a curious array of misstatements, misconceptions, and absurdities, which we should like to traverse at length, but can merely sample for lack of space. No better evidence could be asked of the reverend doctor's incapacity for the task he has undertaken than is found in the following assertion, which may be a misapprehension, but certainly is a misstatement of the most ridiculous character. He says: "He (Professor Huxley) allows that species are persistent, and that there is little or nothing in the geologic records that sustains his position!"

After that, the reader will not be surprised at the assumption that the diversity of interpretation, "marvelous flexibility," etc., of Genesis is confined to the meaning of the word *day*: or that Professor Huxley craftily avoided the "fourth hypothesis" of creation—that is, creation in series, or successive creations in time—in spite of his positive exclusion of that view as unworthy of attention, it being unsupported by evidence of any kind, either scientific or scriptural.

But all these are as nothing, compared with the triumphantly funny demand: "If evolution rests on a basis as sure as astronomy, why do we not see one species passing into another now, even as we see the motions of the planets through the heavens? Why cannot its votaries foretell that, at a certain time and in a certain place, not too far from personal inspection by us, some modification in the structure of an animal or a plant shall occur, without any human intervention, even as astronomers predict the occurrence of a transit of Venus across the sun?"

Yet the man who is capable of perpetrating such a grand absurdity—absurd in what it asks, as well as in what it denies—really believes himself competent to pass upon a problem involving a vast amount of natural knowledge and no small degree of natural intelligence. And doubtless there are not a few who will accept his flourish of misplaced logic as conclusive against evolution, and rejoice with him that Professor Huxley's "imposition" has thereby been nailed to the counter "that it may not get into currency."

## IRON AND STEEL WORKING IMPROVEMENTS.

We give in our this week's SUPPLEMENT a full abstract of a recent paper read before the Iron and Steel Institute, at Leeds, England, on the Haswell system of forging iron by hydraulic pressure, by Mr. J. O. Butler, and of the interesting discussion which followed. Much valuable practical information concerning iron forging was elicited. Among the speakers was Sir Joseph Whitworth, who gave some remarkable particulars concerning his operations in compressing molten steel. He stated, among other things, that he had lately completed a pair of steel screw shafts for the ship Inflexible. They were 283 feet long, weight 63 tuns. A weight of 97 tuns would, ordinarily, have been required; but by the compression of the molten steel, a saving in weight had been effected of 34 tuns. In practice the fluid steel is subjected in the mold to a pressure of six tuns, or 12,000 lbs., to the square inch.

This week's SUPPLEMENT also contains abstracts of papers, read before the Institute, on the "Straightening and Planishing of Round Bars," a process by which the scale, instead of being rolled in, is removed, and a smooth, clean surface produced, the bars being as finished and straight as if turned in a lathe.

Also an interesting paper on the "Utilization of Blast Furnace Slag, with its Heat, for the Manufacture of Glass." It appears from this paper that, by the addition of a few simple chemicals and apparatus, it is practicable to connect the profitable manufacture of glass with iron furnaces without in any manner interfering with the usual continuous operations of the blast furnace: the heat now lost being successfully applied to the production of the glass.

## SOME THOUGHTS ON LABOR.

We have recently perused with much interest a little work entitled "Talks about Labor," written in a pleasant colloquial strain by Mr. J. N. Larned, of Buffalo, N. Y., in which the labor question is dealt with, in some respects, in a novel manner. The writer's main point is that political economy alone is not capable of dealing with the labor question, that the relations of capital and labor cannot be adjusted by abstract theorizing, but that the problem is constantly complicated by human needs, misfortunes, and passions, which must be considered. "We eke out now," he says, "a tyrannical and heartless theoretic economy with practical charities and generosities which make it tolerable. The change to be brought about is this: that we must reduce the generosity to a system, not of generosity but of justice in right." This, in the main, is but another form of expression for the counsels of moderation and regard for the rights of others that we have hitherto offered in considering cases of labor troubles; for we have long been persuaded that an equitable and permanent adjustment of the difficulties existing between employers and employed is to be reached, not by measures of coercion between the contending parties, or by like heroic treatment, but through the slow but sure judgment of society, brought about through the perception of the mean to which moderate action and opinion on both sides must approximate.

We cannot here follow the author through the various arguments which spring from the above proposition, and therefore at once pass to the remedy which he thinks likely to be most effectual against the strikes and lock-outs of the future. And this is a kind of limited coöperation between employers and employed, in which a system of dividends out of the profits is introduced to supplement the wages system. Then, it is urged, the working classes would begin to observe and apprehend the phenomena of the market out of which the laws of industrial economy are derived, and consequently would be inspired, from personal motives, to act in coöperation with the managers of capital. The idea so far is not new; and while we are by no means prepared to assert that it may not be practicable, past experience furnishes many instances of unsatisfactory results in its working. It was introduced in England by Messrs. Briggs & Son, of the Whitwood collieries, in 1865. This firm organized a limited company, and the men were made partners in the prosperity of the concern to a certain fair extent. The project met with the warmest favor from such men as John Stuart Mill and Thomas Hughes, but the workmen were dissatisfied with their gains, and it fell through. Samuel Smiles, in a recent work, says that the firms of Greening & Co., Manchester, and Fox, Head & Co., of Middlesborough, in the iron trade, also admitted their men to partnerships in profits. The latter firm started on this plan in 1866, and after nine years' trial the system was abandoned, last year. Sir Joseph Whitworth has announced his intention of testing the scheme, but his results, if any, are not known to us. Generally, however, so long as profits are large the men are contented; but when the market falls and gains are reduced, then the aggregate returns are still expected to remain at former figures. In the case of Fox, Head & Co., the unions kept forcing wages higher as profits decreased, until finally a successful demand for twenty per cent increase resulted in the abandonment of the plan.

Not long ago, a case came under our immediate observation where the men in a large factory deliberately forfeited a dividend, amounting to some ten per cent of the profits of a considerable period, and due within a few days, in order to