

# SCIENCE

FRIDAY, APRIL 13, 1888.

DESPITE THE SNEERS in some quarters, and vacillation in others, where neither sneers nor vacillation are becoming, the movement in favor of manual training is proceeding with remarkable vigor and rapidity. Ex-Pres. Rutherford B. Hayes recently delivered an excellent address on the subject before the Ohio Legislature, and in the cities of St. Paul and Detroit the school boards are now considering favorable reports presented by special committees on the subject. The Detroit report is so thoroughly representative of the way in which competent school boards are proceeding, that we quote a portion of it. It contains the following passage: "The bulk of our children cannot make a living except through hand-work: intellectual training alone is therefore an insufficient preparation for life, so far as they are concerned. Man is by nature a tool-user. As much of his superiority comes from his skilful hands as from his brain. Neglect to educate his hand, and you deprive him of a large portion of his power. The hand is the peer of the intellect: it executes what the mind conceives. The most brilliant ideas are shorn of their splendor if the hand is without the necessary skill to express them. The hand and the mind should receive equal culture. True education looks after the whole man: any education short of this is a failure. To make man a harmonious being, such as he was intended to be by his Creator, all his powers must be equally developed. Such development, according to Everett, was found in Washington, of whom he said that he reminded him of a circle, every point in whose circumference is equally distant from the centre. The present system of education is strongly biased in favor of professional and literary pursuits, to which there would be no objection were every man's vocation in life, law, medicine, theology, or kindred avocations. But these are not the callings for which the majority are intended. The average man must earn his bread by the sweat of his brow, and must be a producer, in order to obtain support. Manual labor has fallen into disrepute among us, and the result is that the great majority of our young men go into the professions, while we have to go abroad for skilled mechanics. The professions are overstocked, and two-thirds of their members earn precarious livings. Those who do not seek the professions join the huge army of poorly paid clerks and book-keepers, or become Micawbers, dawdling away life 'waiting for something to turn up.' The condition of our girls is still worse. They, too, have been taught to look down upon labor, and their only hope of support is inherited wealth or fortunate marriage. The poor have no fortunes to leave behind them, and the divorce courts tell us that marriage is, alas! too seldom 'love in a cottage.' How shall all this be remedied? By the manual-training school. Educate the hand side by side with the head, and you will dignify labor. The principal reason why the professional man is treated with respect, while the mechanic is regarded as a mere drudge, is because the one is something outside of his pursuit, while the other is practically nothing. There is as much nobility in a piece of fine cabinet work as in a bill in chancery, and yet the world does not think so. Why? Because the lawyer is a man of general intellectual culture, while the mechanic is the contrary. Mix brain with any thing, and you ennoble it. Make a man the victim of mere routine, and you degrade him. No matter how skilful he may be, he will rank no higher than a mere automaton. In fact, the automatic machine which he tends in the shop is considered his superior. All through the centuries, intellectual pursuits have been favored, while manual labor has been treated with disrespect, if not scorn. Plato tells us, in his 'Repub-

lic,' that God made men of gold, of silver, and of iron; that those made of the first-named material were intended to be our rulers, those made of the second were to be their assistants, while those made of the third were placed on earth to be hewers of wood and drawers of water. Plato could not see any dignity in mere manhood. Were he alive to-day, however, he would have a higher appreciation of the man of toil. He would learn that this era of the world is termed the reign of the people, and that in the future their pursuits are to be esteemed as highly as the pursuits of those who win bread and fame by the tongue and the pen. This esteem will be accorded to them, not because the achievements of the tongue and the pen are unworthy of the honor which they have heretofore received, but because they will be brought into the service of the workshop. In this glorious future the tools of the artisan, and the books of the scholar, will be regarded as equal members of a happy brotherhood working together in beautiful harmony. As has been said, the son of Vanderbilt's brakeman will then have the same chance for success in life as the son of Vanderbilt. And when that blessed day comes, discontent among the laboring-classes will largely disappear, for no one will then be obliged to run the race of life handicapped with its present inequalities. Give us the manual-training school, and there will be less occasion for strikes, lock-outs, and anti-poverty societies." Whether all the beneficent economic and social effects that the report predicts will follow the introduction of manual training, is at best doubtful; but that the tenor of the report is sound is unquestionable.

CAPT. C. E. DUTTON, of the United States Geological Survey, is now engaged in writing his monograph on the Charleston earthquake. The reports upon which this will be based are complete, and in shape for the public printer. No earthquake of ancient or modern times has ever been observed with so great care and fullness of detail as has that of which the city of Charleston was so near the centre of disturbance. Almost nothing remains to be desired in this report. Besides the observations made by professors in several colleges, by hundreds of railroad officials, and at signal stations, hundreds of intelligent private citizens have reported their own experiences, giving to Captain Dutton a mass of data such as has not before been collected in regard to a dozen earthquakes. This material has, of course, all been carefully digested; and the conclusions which Captain Dutton will present in his monograph will constitute one of the most valuable additions to scientific knowledge yet made through the United States Geological Survey. The same volume will also contain a report on the Sonora earthquake, very abundant material for which has been collected in those portions of the United States to which the *temblor* extended. Mr. Goodfellow's report upon the phenomena of the epicentral region of the disturbance in Sonora was all that was needed to complete the desirable data. Both of these monographs will be ready for the printer by June 1, and an effort will be made to hasten their publication.

AN EXPERIMENT is being tried in Chicago which deserves success. A series of economic conferences between business-men and working-men has been arranged with the purpose of making business-men and working-men acquainted with each other's views. Business-men do not attend working-men's meetings, and only know of their proceedings and debates at second-hand. Similarly working-men have no appreciation of the magnitude and complexity of the problems with which business-men are daily confronted. The

Chicago conferences aim to remove this lack of mutual understanding and appreciation, and to pave the way for a better state of things in that strike-ridden city. The conferences are to take place on successive Sunday evenings, and are seven in number. There are four representatives of the working-men to speak: namely, George A. Schilling, on 'The Aims of the Knights of Labor'; Thomas J. Morgan, on 'The Labor Question from the Standpoint of the Socialist'; Joseph R. Buchanan, on 'A View from the Labor Sanctum'; and A. C. Cameron, on 'An American Trades-Unionist's View of the Social Question.' The business-men are allotted three representatives: Lyman J. Gage speaks on 'Banking and the Social System'; Charles L. Hutchinson, on 'Is the Board of Trade Hostile to the Interests of the Community?'; and Franklin MacVeagh, on 'Socialism as a Remedy.' Miscellaneous discussion is not to be allowed at these conferences, because of its obvious dangers; but at the conclusion of each address any one in the audience is to be at liberty to question the speaker on any point, provided the question is stated respectfully. It is hoped that such questions and answers will prove an instructive and profitable feature of each meeting. We shall await with considerable interest some account of these conferences, and their success.

#### SCHOOL OF MECHANIC ARTS AT THE ALABAMA POLYTECHNIC INSTITUTE.

SINCE manual training as a feature of general education is exciting increased interest, we are gratified to note the advance of this important movement in industrial education in the South, and present as a matter of interest to our readers the plan of the rooms and the scheme of work of the School of Mechanic Arts at the Alabama Polytechnic Institute, Auburn, Ala. This school is under the charge of Mr. George H. Bryant, a graduate of the Massachusetts Institute of Technology.

The department of mechanic arts at the Alabama Polytechnic Institute was organized in 1885, and during the summer of that year the motive plant for the whole department, and the machinery and equipment for the wood-working shop, were purchased and erected. The former consists of a 25-horse power Harris-Corliss engine, steam for which is supplied by a 30-horse power steel, horizontal, tubular boiler, for which a substantial brick boiler-house and chimney were erected.

The wood-shop occupies one half of a room 50×90 feet (the lower story of one of the college-buildings), the other half being taken for the machine-shop. The equipment for this shop comprises the following: 20 double wood-working benches, each with complete set of carpenter's tools; 20 turning-lathes, 10 inches swing, each with set of tools; 1 double circular saw; 1 band saw; 1 surface planer; 1 buzz planer; 2 scroll saws (power); 1 large pattern-maker's lathe; 1 36-inch grindstone. In addition to these, the tool-room is supplied with a variety of extra hand-tools for special work.

During the summer of 1886 a substantial brick building, 32×72 feet, one story high, with monitor roof, was built for the forge and foundry departments. This is divided into two rooms each 35×30 feet, each department occupying one room.

The equipment for the foundry consists of moulding-benches for twelve students, each supplied with a complete set of moulders' tools; a 14-inch cupola with all modern improvements; a brass furnace with a melting capacity of 100 pounds of brass at a heat, with a set of crucibles, tongs, etc.; also a full supply of ladles, large and small moulding-flasks, special tools, etc.

The forge-shop equipment consists of 12 forges of new pattern, each with anvil, set of smith's tools, etc. The blast for all the forges is supplied by a Sturtevant No. 3 steel pressure-blower (which also furnishes blast for the foundry cupola); and a No. 15 Sturtevant exhaustor draws the smoke from the fires, and forces it out through the chimney.

In the machine-shop are the following tools: 6 14 inches×6 feet engine-lathes; 2 16 inches×6 feet engine-lathes; 1 22×22 inches×5 feet friction-planer; 1 15-inch shaper; 1 20-inch drill-press; 1 Universal milling-machine; 1 post-drill 15 inches; 1 corundum tool-grinder; 1 bench emery-grinder. Chipping and filing benches for

twelve students, each with vise, set of files, chisels, hammers, etc., are provided, one-third of the shop being set apart for this work. In the tool-room are found a good variety of cutting and measuring tools, shop appliances, etc. The full course in mechanic arts runs through three years, as follows:—

*First Year.*—First term, elementary mechanical drawing (one month), carpentry; second term, carpentry, turning begun; third term, carpentry and turning alternating.

*Second Year.*—First term, pattern-making (six weeks), foundry-work begun, moulding and casting; second term, foundry-work finished, smithing begun in forge-room; third term, smithing.

*Third Year.*—First term, chipping and filing; second and third terms, machine-work in metals.

During the second year, lectures are given on moulding and casting, and the metallurgy of iron and steel, and in the third year occasional lectures on mechanical subjects connected with the shop-work.

A special course in steam and mill engineering, with practice with the apparatus, is provided for advanced students who wish to take extra or special work in practical mechanics. The average yearly attendance in this department during the past three years has been about ninety.

#### SOME SOCIAL AND ECONOMIC PARADOXES.<sup>1</sup>

The Artificial is Superior to the Natural. — Reforms are Chiefly advocated and brought about by Those who have no Personal Interest in Them. — Discontent increases with the Improvement of the Social Condition, etc.

THE progress of science has always been jeopardized by two classes of persons, who, though the exact opposite of each other, are both constantly striving to circulate specious errors under its name. One of these classes of persons seeks to induce belief in improbable things, on the ground that most now accepted truth has once been held to be improbable. The other class seeks to shake confidence in established truths on the ground that they have not yet received mathematical demonstration. On the one hand, theories which are still awaiting proof, or which lie on the extreme confines between the known and the unknown, are taught as established truths; and, on the other hand, great principles whose establishment has cost ages of most laborious research are brushed aside as if they were but visionary hypotheses. The first class judges every thing by analogy; the second confronts every thing with a paradox.

The sincere searcher after truth has much more to do than merely to acquire a knowledge of the truth that has been made known: he has to distinguish between real truth and apparent truth; and this when the apparent truth is presented to him under all the outward guise of real truth, and when the real truth is presented to him in the form of error to be shunned. The two classes may therefore be called respectively 'analoguers' and 'paradoxers,' between whom the honest and uninitiated inquirer must run the gauntlet; and strong indeed must be that judgment that comes through unscathed. There will always be Stokeses and Zöllners to offer specious proofs of what seem impossibilities, as there will always be Lobatschewskys and Dr. Deemeses to question geometric opinion, and Dukes of Argyll to undo the work of Darwins.

When, therefore, we approach the subject of the paradoxes of nature, we must do so fully aware that we may be placed in the category of paradoxers in general, and fully prepared to have our paradoxes discounted accordingly. And while the physical paradoxes that the universe presents are most of them too well known in our day to admit of being called in question, as they all were when first announced, I fear that in the case of social and economic paradoxes there will be no body of truth to which appeal can be made.

I propose to point out a few of those propositions in sociology, and especially in political economy, which are now on trial, and to indicate what I regard as the probable verdict of history upon their truth or falsity. But in this latter task I do not arrogate to myself

<sup>1</sup> Paper read before the Anthropological Society of Washington, D.C., March 20, 1888, by Prof. L. F. Ward.