UNIVERSITY OF MISSOURI.

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BY

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PREFACE.

Believing that the threefold relation existing between themselves; the students under their care and the state, demanded something more than the ordinary class-room work at their hands, the members of the Faculty of the University of Missouri two years ago determined to prepare a series of lectures, illustrative of the specialties of the various departments, and sufficiently popular in character to be attractive not only to the undergraduates, but also to the public at large. The first course, delivered in the University Chapel during the winter of 1877-78, was pronounced so successful that the Faculty felt encouraged to enter upon a second, and this, in turn, was received with indications of popular approval so flattering in character that it was resolved to publish the entire second series. This volume is the result of that determination. The lectures herein contained, while designed primarily for the students of the University, nevertheless it is believed do not lack certain elements of popularity which render them, at least in some degree, adapted to the wants of the reading public. To that public this book is now presented with the hope that the original purpose of the lectures will be held in remembrance, and with the expectation that succeeding volumes will prove more worthy of the appreciation already so kindly manifested by the friends of the University in behalf of this first effort.

THE UNIVERSITY OF MISSOURI,
COLUMBIA, BOONE COUNTY, MO., 1879.

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PETROLEUM.

By Paul Schweitzer, Ph. D., Professor of Chemistry in the University of Missouri.

Lecture delivered on the 8th of February, 1879, in the presence of a joint committee of the Legislature, sent to examine into the condition and wants of the University, and written for publication about five months afterward.

Ladies and Gentlemen: I consider it a privilege to be able to occupy this stand to-night, for the 8th of February is a memorable day in the history of our University, of our town and of our state. It has probably escaped the memory of most of you, and I take pleasure in reminding you of it, that to-day is the forty-first anniversary of the birth of our University. On the 8th of February, 1839, the bill "to provide for the institution and support of the State University," drawn up and urged by patriotic and far-seeing citizens, became a law by the signature of the Governor. Men in our own midst took an active part in the proceedings, and it was mainly due to their efforts, aided by active co-operation of large-hearted and generous citizens of our county and town, that the University was located here and the law carried into effect without delay.

In how far the expectations of the founders of the University, of the fathers of many of you here assembled to-night, have been realized, it is not for me to speak;

suffice it, to point to the growing interest in our State University, manifested by press and pulpit, to the fostering care, confidently expected at the hands of our Legislature, and to this audience, willing and anxious to discuss a subject, which from its national importance as well as from the dangers to property and life, surrounding it, claims at the present moment the attention of the citizens of the state, and especially of our Legislature, in session at Jefferson City, and contemplating, I am informed, a change in the law relating to the inspection of Petroleum.

HISTORICAL REVIEW. Petroleum, as the name implies, means rock oil, and is the oily, more or less volatile liquid, which exudes at different places on our globe from the rock or ground below, having as such been known and used for different purposes from very early times. It was known to the ancient Egyptians and Assyrians, who obtained it from the valley of the Euphrates and the neighborhood of Baku. It was mentioned 2,000 years ago by Herodotus as occurring on the island of Zante, and later by Pliny and Dioscorides under the name of Sicilian oil as coming from Agrigentum; but to name all the localities, where in the course of time Petroleum was discovered and used, would lead too far, and I will merely state that the earliest mention of its occurrence in our own country was made in 1750 in a report of the commander of Fort Duquesne to General Montcalm, describing the ceremonies of the Seneca Indians on Oil Creek, Pa. Twenty years later Peter Kalm gave a map of the Pennsylvania Oil Springs in his "Travels in North America," published in 1772, and in 1819 oil was obtained by accident, in sinking two salt wells on the Muskinghum river, Ohio, the same thing happening in 1829 at Burkesville, Ky.; in 1833 Prof. Silliman described the

Seneca Oil spring(*) of Cuba, Alleghany county, N. Y., and Hildreth the salt wells of the Little Kanawha valley, West Va., which yielded in 1836 from 50 to 100 barrels of Petroleum, which was collected and sold as medicine.

In 1840 a spouting well at Burkesville, Ky., yielded for a few days seventy-five gallons of oil a minute, but soon failed; in 1844 Murray mentions it as occurring at Enniskillan, Canada, and in 1850, scarcely 30 years ago, the first illuminating oil, made from crude Petroleum, was offered for sale by Samuel Kier at Pittsburgh.

Since then the number of localities in the United States, at which Petroleum is found, has rapidly increased, and the improvements in lamps for burning it, together with the introduction in 1856 of genuine coal oil(†) for illuminating purposes, made by Joshua Merrill of Boston, gave an impetus to the production and manufacture of Petroleum and coal oil, which in the course of a few years not only completely revolutionized the manner of lighting our houses, but changed the direction and thoughts of thousands and hundreds of thousands of human beings.

Old trades were broken up and new ones started; men grew rich over night to get poor again on the day following; excitement, even in those days of excitement and civil war, ran high, and multitudes of men changed their modes of life with their habitations; and now after these days of expectation and excitement have past away, and the currents of life and trade run again in smooth and well defined channels, what results are there

(*) The so-called Seneca Oil, used for medicinal purposes was not from this spring, but from Oil Creek, Pa.

(†) Made by destructive distillation of bitumen, bituminous coal, shale or like material.

left to tell of the great spasmodic and powerful effort of so many men? Light has been brought to millions of people; their hours of day have been lengthened; pine knots and tallow dips have given way to the cheap and cheerful lamp; and last but not least, the old dreary and unprofitable winter evenings of farm house and cottage have been replaced by pleasant hours of recreation and civilizing influences of music, improvement and study. And this boon of cheap and pleasant light has not been given alone to our own countrymen, but its blessings extend to the remotest corners of our globe, witnesses of American enterprise and industry, and possible perhaps through the concurrence of exceedingly fortunate circumstances in our land.

Yet these changes did not occur without convulsions. Their beginnings may be traced to the 28th of August, 1859, when Col. G. L. Drake, the superintendent of the Pennsylvania Rock Oil Company, thinking to obtain oil like water by sinking an artesian well, carried out this idea amid the jeers and jokes of his neighbors, and on that day "struck oil" at a depth of 71 feet, and collected a thousand gallons a day, which sold at the rate of sixty cents a gallon or twenty-three dollars a barrel.

From that moment the scene changes as if by magic; the doubting neighbors are gone; the surrounding wilderness, broken only by an occasional cottage and cornfield, shows signs of life; men of business, tramps and travelers appear, attracted by rumors of unheard of riches, quickly, easily and certainly acquired.

They come first singly like the drops of a passing shower, but soon swell to a current like a mountain stream after a rain, and at last pass into a rushing flood of

humanity, pressing eagerly and anxiously onward to surely expected wealth and fortune. Hillside and valley are stripped of covering; log house and shanty grow up over night; hand and machine are busy to tap the earth of its liquid treasure. A forest of derricks is seen where but yesterday was a forest of trees; all is working, drilling, pumping, collecting and shipping. By the end of the year 200 oil wells are sunk and in operation, and the work still continues and is to continue for years to come(3). Places grow up and disappear like mushrooms; the history of the world, probably, shows not another phase like it; within the short space of three months a place of two houses becomes a town of 1,600 inhabitants with virtues and vices, joys and sorrows, piety and profanity. And in less than a year, through failure of wells, through fire, death and removal, all had disappeared so effectually, that the passing wanderer was scarcely able to point out in the desolation and growing brush, where once stood the town of Pithole.

This was the time and these the symptoms of the oil fever, a repetition of the gold fever of 12 years before, and in its results, I am sure, much more beneficial. True, men got rich and got poor again; but if the golden cup, after the first taste, slipped from their grasp and despair led them to ruin, they were only a few in comparison with the rest, and followed the inexorable law, which says that conscious effort is required in retaining, as well as in attaining, what is desirable in life.

Scarcely one of the farmers in the neighborhood of Oil Creek, who in the space of a few months became possessed of half a million or a million of dollars, was able to keep it long; incompetence, extravagance and carelessness spent the money as fast as it came, and in a few years the original owners of the land were found in no way better off, than they had been before.

The immediate effect of this large and sudden influx of ambitious and energetic men into the Pennsylvania oil district, all bent upon obtaining a large quantity of Petroleum was of course an over production with consequent fall of prices; and it is surely no wonder, when we bear in mind that most of the rock oil obtained previously had been used for medicinal purposes only. In 1852 Coal oil was made by Philbrick and Atwood of Waltham, Mass., for the first time in the United States and offered for sale in the market, (Coup oil, from the coup' d'etat of Napoleon), but it was used for purposes of lubrication, and not till 1856 was an illuminating oil of like nature made and sold here, though it had previously been imported and used to a limited extent. This genuine Coal oil differs however materially from Petroleum in having a greater specific gravity, in consequence of which it could be burned with little or no alteration in the old fashioned oil lamps. It was superior as an illuminator and cheapar than any of the fatty oils and explosive mixtures used then, and the industry spread until in 1860 14 establishments for producing Kerosene(*) were scattered over the Atlantic States and produced 100,000 barrels of it a year worth $2,142,693.

Most of this remained, however, in the east, the west and south using the old materials in the old lamps.

In this condition of affairs Pennsylvania steps suddenly in with 250,000 barrels of oil, raising this production the next year to two millions, the year after to 3 millions, and going up from year to year until the stupenduous figures of to-day are reached(1). What wonder that the price of Petroleum, for which there was no market

(*). A superior brand of coal oil, the name being derived from two Greek words KER, the heart, and OZAINA the odor.

because there was no use, should decline; it fell rapidly from $20 a barrel in 1859 to $9.60 in 1860, to $0.49 in 1861, and even for a portion of this and the following year to $0.10 a barrel, in some instances the barrel included. It was then that about 5 million barrels of oil were allowed to run waste into the creeks and rivers, which by getting ignited at times, through carelessness or accident, caused conflagrations that threatened the very existence of towns and villages in their course, and destroyed millions and millions of property. But the industry, so auspiciously started, could not be checked; it possessed within itself all the elements of ultimate success. A cheap, reliable and brilliant source of light was needed outside of the larger towns all over the country; and since Professor Silliman in 1855 in the first practical report ever made on Petroleum, had clearly pointed out its advantages and its mode of treatment for obtaining the best results, it was simply for American ingenuity to step in, and overcome the difficulties that might be in the way of its successful employment. Lamps for it had to be invented, and presently we see the inventor at work. The first patent for a Petroleum lamp, so-named, was issued in 1859, and during the year the total number of grants for patents of lamps, burners and appliances in general rose to 40, the next year to 71, the next to 53, the one after that to 101, and so on regularly up to the present time.(2)

The difficulties in the construction of lamps and burners for Petroleum, rested mainly on its low specific gravity and high percentage of carbon, and were overcome almost at the outset. Some of the burners described and patented then were never improved upon and the continuity of the stream of patents up to the present day, though demonstrating that the perfect burner and perfect lamp have not been invented yet, demonstrates

also that its construction must be attempted upon a different and novel principle.

The relatively successful solution of this problem had, however, an immediate and rather important practical result: it killed in the first instance at one blow the Whale oil fisheries, which had flourished so long on the Atlantic coast, New England alone sending out annually a fleet of 600 whaling vessels; and it stopped in the second instance, the Coal oil distilleries that had just started into successful existence, and converted them into Petroleum refineries, perpetuating thereby the name of Kerosene, by transmitting it from the artificial to the natural product.

The price of oil rose again, and more powerful efforts were made for its possession, and with such uccess that soon all means for storing or carrying it to market failed; single wells spouted at the rate of 3,000 barrels a day(*) with no provision to collect it or stop its flow. Tanks of novel construction were used: the natural basins formed by building dams across valleys, and conducting the oil into them as into lakes. Energy and enterprise, however, soon provided suitable vessels; wooden and iron tanks, increasing yearly in size until at present many of them have a capacity of 125,000 barrels.

At the same time a project that had once failed was taken up again and carried into successful operation; it was the laying of wrought-iron conduit pipes directly from the wells to the railroad stations. This was accomplished with the usual energy, connecting f. e. Millerstown with Pittsburgh, 32 miles distant, by means of a three inch pipe, laid at the rate of a mile a day and tested within the same time for a pressure of 1200 pounds per

(*) The Phillips and Empire wells, sunk in 1861, which have yielded upward of a half a million barrels each.

square inch. Like a huge snake it runs over the surface of the country, down valleys and up hills, crossing on its way 27 turnpikes and as many creeks and rivers, one of which and a railroad track pass above it; watched day and night in its entire length, it is furnished with six intermediate stations, at each of which a 40 horse power steam engine raises the oil to an elevated tank of 1500 barrels capacity, from where it flows by gravity to the next station. This arrangement is found necessary to speedy transportation, though Millerstown is 335 feet higher than Pittsburgh.

The system, which of all so far devised is the cheapest, has grown to grand dimensions. The whole Pennsylvania oil district is intersected by a network of pipes, the aggregate length of which was 3,000 miles on the first of January, 1879. They are under the control of 15 companies, who from time to time form pools under the name of "The United Pipe Lines," which dissolve again as their interests diverge or mutually conflict(*).

(*) [Stowell's Petroleum Reporter, Dec. 16, 1878.]

UNITED PIPE LINES.

We clip the following in regard to the organization and business capacity of the United Pipe Lines, from their recent report addressed to their patrons and the public:

ORGANIZATION.

The United Pipe Line Company was organized in 1877 by a consolidation between the following companies, viz: The (old) United Pipe Lines, the Antwerp and Oil City Pipe Companies, the Atlantic Pipe Company, the American Transfer Company, (in Clarion and Venango counties,) and the Sandy Pipe Line.

These formed the association now known as the United Pipe Lines, which was incorporated in March, 1877, with a capital of three million dollars.

CAPACITY OF THE LINES.

At the present time, October, 1878, the company owns, and has in active operation, over fifteen hundred (1,500) miles of two (2) inch pipe, and three hundred (300) miles of three (3) and four (4) inch pipe. It has connected with these pipes, more than three hundred and fifty (350) iron tanks, with a capacity of over 5,200,-

The business of these pipes and transportation lines is at present so widely extended, that delivery tanks are found in nearly all eastern refining centres, and a pipe line certificate for any number of barrels of oil bought at Pittsburgh, enables the holder to draw this quantity any where in the east. These sales used to be effected by measure alone, and resulted in so much annoyance to both buyer and seller, that all transactions are made at present by weight alone in refined as well as in crude oil, and the price and quantity adjusted in accordance with certain well-defined rules about specific gravity, fire test and color.

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000 barrels of forty-two (42) gallons each, of which 1,800,000 barrels are owned by the company, and 3,400,000 barrels held by them under contract with the owners. It owns over eight hundred (800) miles of telegraph wire connecting all its offices and stations with each other, and with the general office of the company at Oil City, Pennsylvania. It is fully equiped with boilers, pumps, and all necessary means for receiving and transporting to delivery points, at least seventy-five thousand (75,000) barrels of oil per day. It has points of delivery upon all railroads in the Oil Regions, at which twenty-five hundred (2,500) cars, containing two hundred and twenty-five thousand (225,000) barrels can be loaded daily; and can also deliver directly to refineries at Oil City, Pa.

[Stowell's Petroleum Reporter, June 16, '79.]

TIDE WATER PIPE CO. LIMITED OPENED.

At four o'clock in the afternoon of May 28th the monster pump of the Tide Water Pipe Co. Limited was set in motion at Corryville, and the first oil entered the pipe and started towards Williamsport, reaching the latter place about 7:10, p. m., on June 4th, one hundred and forty-seven hours and ten minutes after leaving Corryville.

The quantity required to fill the pipe was 20,000 bbls. This is the first 6-inch pipe line of any considerable length ever constructed. The line is 100 miles long. There are but two pumping stations, one at Corryville, and the other 22½ miles from this place. The highest elevation 1,200 feet is reached about 31 miles east of Corryville, and from this point the oil reaches Williamsport by gravity.

The estimated cost of the line is between $700,000 and $800,000. The weight of pipe used is 5,000 tons. The minimum capacity of the line is 6,000 bbls. daily, which can be increased under pressure to 10,000 bbls.

From the railroad stations the oil is carried to the refineries, and there a difficulty was met, growing out of the property of Petroleum, of passing through the pores of the casks in which it was shipped; this caused in the beginning much annoyance and much loss; shipments would be made to New York and Boston, the barrels arriving there only half filled, and whole cargoes would disappear bodily in their passage across the ocean. Many of you doubtless remember, in these early days, the appearance of the oil trains, with their platform cars freight-with barrels, each one perspiring, as it were, from every pore, and leaving behind an oily, offensive and unsavory trail.

But the inventor stepped in again, and one of the first patents taken effected the cure. It consisted in covering the inside of the barrels with a coating of liquid glue, forced into the pores of the wood by pressure; the outside is then painted blue, the heads white and the barrel is ready to receive its charge, 42 gallons, more or less, which it retains admirably and for a long time.

The immediate effect, however, of the escape of the oil through the casks, coupled with the need of cheaper transportation, brought about the construction of so-called tank cars, wrought-iron boilers of 85 barrels capacity, on trucks, which proved so convenient in every way that scores of them were built, 2,500 being in use at present in Pennsylvania alone, and probably no less than 5,000 in the United States. At the same time tank-boats were designed, huge floating reservoirs, which hold 3,000 barrels of oil each, and distribute its contents to the different points on the river and on the Erie canal. A hundred of them are in operation at present during the summer months.

INDUSTRIAL ASPECT. Having thus sketched the growth of the Petroleum industry, and followed the oil in its course from well to refinery, we will now take a look at its commercial importance, and then answer the questions of what it is, why and how it is refined, and what should be the safeguards that must be taken, in order to protect its consumers against danger and fraud? A look at the tables(4-6)shows us that the Pennsylvania district produced during the calender year of 1878, 15,165,462 barrels of oil of the value at the wells of $21,689,920, while the rest of the United States produced 445,000 barrels valued at $645,250, and that there were exported in the same time 8,071,780 barrels of Petroleum and its products, representing a value of $46,730,972. This export, according to the report of the Chief of the Bureau of Statistics, places Petroleum the fifth in the list of important commodities sent abroad.(*) During the 20 years preceding, that is since 1859, there have been produced by Pennsylvania 111,017,862 barrels of oil valued at $293,872,162, and by the rest of the United States 4,706,500 barrels valued at $12,472,225, while the total exports reached the equivalent of 54,878,837 barrels with a value of $488,079,842. Truly astonishing figures, which in connection with the manufacture and export of lamps and burners and the different industries, directly and indirectly bearing upon the production, transportation and refining of Petroleum, indicate the magnitude of the business, and serve to furnish an idea of the great army of men

(*) Annual Report of Chief of the Bureau of Statistics on the Commerce and Navigation of the United States, for the fiscal year ended June 30, 1878.—STATISTICAL ABSTRACT, page XL.

1	Cotton, raw, exported	$180,031,484
2.	Wheat	96,872,016
3.	Pork, bacon, hams and lard	86,679,979
4.	Indian Corn	48,030,358
5.	Petroleum and products of	46,574,974

that depend upon it for a livelihood for themselves and for their families.

CHEMICAL COMPOSITION. Petroleum in its natural condition is a rather complicated liquid, exhibiting at the different places of its occurrence differences in aspect, gravity, quality and composition. While the petroleum f. e. from some parts of Europe is light, clear, nearly colorless and odorless and in need of little refining, that of our own country is for the most part thick, greenish black, strongly odorous and totally unfit for immediate use. Our best samples are at the most translucent, yellowish or brownish red and exhibit in a marked degree the peculiar phenomenon called fluorescence, which is retained by it even after refinement. Its specific gravity varies from 30 to 32°B at Franklin, Pa., to 52°B at Pomery, Ohio. The differences in the eastern markets are however only 46°B to 48°B, they being supplied with oil, which comes from the distributing tanks of the pipe line companies, and which is a pretty thorough and uniform mixture.

The first step in the analysis of Petroleum may be said to have been taken by Unverdorben in 1831, who separated it by fractional distillation into some of its constituents. Since then many illustrious chemists have been engaged in the difficult task of unraveling its composition, difficult for the reason that Petroleum is not a chemical compound, but a mixture of a large number of compounds, some of which are what chemists call isomeric, that is they possess the same percentage composition of their elements, but different chemical and physical properties.

Nearly all the constituents of Petroleum belong to that well defined group of compounds called Hydrocarbon, contain nothing but Carbon and Hydrogen united

in different proportions, and of which Marsh gas and Olefiant gas, are examples; both of these are in fact constituents of crude Petroleum, but soon escape with others on account of their volatility; each is the beginning member of a distinct series of compounds which follow one another regularly and lawfully up to those of a most complicated nature. Fourteen compounds of the Marsh gas or Paraffine series and three of the Olefiant gas series have so far been identified in Petroleum, without, however, in the least exhausting the stock, which with at least three other substances of a different nature make the total number of compounds in American Petroleum twenty(7). It may be stated in this connection, that none of these compounds belong to groups from which the various and brilliant aniline or naphthaline dyes are derived, all statements to the contrary notwithstanding.

REFINING PROCESS. You understand, then, that Petroleum is a complicated body; and it is owing doubtless to its complicated nature that the question as to its origin has not yet been satisfactorily settled. We will discuss, however, neither this nor the other question intimately connected with it, viz: the manner and place of its occurrence, but turn our attention to more practical questions, bearing upon the conversion of it into burning oil or kerosene by the process of refining, which consists not, as might be supposed, in a separation of any or all of the twenty compounds mentioned, but in a separation of a few products of commercial importance with well defined properties and with unlimited powers of application. The work of the chemist is inventive and his object knowledge; the work of the refiner is applicative and his object gain.

From this practical point of view, Petroleum may be said to possess properties, many of which must be

eradicated or at least materially changed, before it will answer the different purposes to which it is applied, and since we desire to confine ourselves to Kerosene oil, we will state here its requirements in the order of their importance. A good Kerosene oil should be

1. Safe, that is to say not readily inflammable.
2. Odorless, that is to say not possessing a disagreeable odor.
3. Clean, that is to say not creeping over.
4. Pure, that is to say not encrusting the wick.
5. Light, that is to say not having too high a specific gravity.
6. Colorless.
7. Cheap.

Safety is placed at the head and cheapness at the foot of the list, and all have to be reached by the three operations of the refining process, which are:

1. Fractional distillation.
2. Treatment with Chemicals.
3. Washing with water and perhaps another distillation.

The first step, fractional distillation, is carried on in large stills, in which the crude oil is subjected to gradually-increased direct heat, and the different products collected by suitable arrangements at different parts of the establishment; or the crude oil is steamed to get rid of the more volatile and inflammable gases, and then subjected for a number of hours to a uniformly elevated temperature, which need not however approach the boiling point of the oil when the heavier ones split up, as it were, into still heavier ones, and in lighter or illuminating oils, increasing thereby their quantity, or lastly the two processes are combined in various ways to suit the character of the crude oil worked, and the specialty in which one or the other refinery may excel.

The percentages of Kerosene obtained by these three modifications A, B and C of the process of fractional distillation are 55 per cent., 66 per cent. and 75 per cent.(8) The last would seem to be the most advan-

tageous, but the quality of the 75 per cent. of oil obtained by it is inferior to the 55 per cent. and 66 per cent. of oil obtained by A and B. Bourgougnon, one of the Petroleum inspectors of the New York Produce Exchange, states the amount of burning oil in the crude oil of the New York market to be 60 per cent. and 66 per cent. obtained by cracking, i. e., partial destruction of the lubricating oil and paraffin is probably the highest amount, which can at present be obtained from American Petroleum(9).

The Kerosene obtained by the previous operation has now been freed from the light and heavy portion of the crude oil, both being objectionable, the former or naphtha on account of its ready inflammability and the latter or lubricating oil on account of the difficulty of burning it in our ordinary lamps. The first and fifth points in the list of requirements have been covered and the way prepared to reach the others; the oil is still colored, possessed of an odor, which if anything is more unpleasant than that of the crude oil, and of ingredients, which if not removed would speedily encrust the wick and weaken its illuminating power. It is run into large cylindrical tanks of 1,800 barrels capacity, where it is agitated for some time with strong sulphuric acid or oil of vitriol in the proportion of 44 gallons of the latter to 100 barrels of the former. The effect of this is to turn black or carbonize, that is destroy the impurities, which impart to the oil its odor, color and other objectionable features; these subside at the end of the operation with the oil of vitriol, and are removed by a faucet at the bottom of the agitator.

Water and caustic soda lye are then added in proper quantity to neutralize the acid, which may have remained suspended in the oil, after which the washing with

water is continued to remove the last traces of saline and tarry matter remaining. The oil is then ready for the market, either directly, or after subjecting it to some minor operations, as exposing it for some hours to diffused daylight and bleaching it, or even distilling it for a second and last time.

LEGAL PROTECTION. It is now the refined or Kerosene oil of commerce, and supposing the operations mentioned to have been performed judiciously and conscientiously, possessed of the desired qualities; it can be placed in the hands of the consumer without fear and without risk, a messenger of joy and of enlightenment. But has this been the experience of the world, and our own experience? have complaints about quality or price of it never reached us? have accidents from unexpected ignition or explosion of oil, even when carefully handled, never been recorded? Alas, we know too well the answer to these questions, and though we will not attribute all accidents to inferior illuminating oils, a large number are undoubtedly chargeable to them, and to the parties who placed them either fraudulently or ignorantly on the market; a long and melancholy record testifies loudly to error or crime committed. Our wives and children on whom the danger from inferior oils with its consequences mainly falls, call for protection, and when the state steps in for the very purpose of affording it, can political consideration or sectional feeling, can protective legislation, that protects the few at the expense of the many, or even ignorance of the subject on the part of those who frame the laws, be set up as an excuse for scattering broadcast those messengers of harm, which by bearing upon their face the license and stamp of the law, lull the buyer into a feeling of security, false and illusory, worse than the knowledge of imminent danger?

These remarks apply to all oils sold before the time of Petroleum legislation, and to the oils still in many of our states, in which legislation has attempted protection, or at least regulation; *it is a fact that a large proportion of the oils sold in our own state during the past four years have been unsafe and have not come up to the requirements of the law*(10). This has been brought about in the first instance by want of knowledge of the character and properties of Petroleum on the part of legislators, coal oil inspectors and the public in general; and in the second instance, to say the least by too broad legislation. I would state it as an axiom, which I challenge any one to contradict: *that the interests of the refiner and dealer must adjust themselves upon the basis of security to the masses, not this to interests outside and different from its own.* In the absence of strictly scientific tests and with the one generally employed at present the oil should be made to appear as bad as possible, and not as good as possible, and in this light we will try to determine what constitutes a safe oil and the method of ascertaining its safety.

An explosion is a rapid or practically instantaneous production in a confined space of a large volume of gas, which acts on account of its elasticity upon its enclosure, and forces it in the direction of least resistance, or shatters it to pieces. Ordinarily explosions are the direct result of chemical action, as when a combustible body, intimately mixed with Oxygen or a substance readily furnishing it, comes in contact with a light; the combustion results in the formation of a large body of gas which in proportion to its volume exerts an explosive force. Coal oil or naphtha can, therefore, never explode by themselves; Oxygen or atmospheric air is needed to form with them a mixture; and since gases and fluids do

not mix, it follows that Coal oil must first assume the gaseous state or be volatilized before the conditions for an explosion can be reached; in proportion now as coal oil is ready to do this the chances for the explosion increase.

But it is within the nature of things, that evaporation increases with increase of temperature, that coal oil becomes gaseous or yields a vapor in proportion as it gets warmer; and the main practical difference between it and naphtha lies in the fact, that while the latter assumes the gaseous condition and will take fire or explode when mixed with air at the low temperatures of our winters, the former requires heating to a variable extent to produce the same result. It has been ascertained that oil after burning in well constructed lamps for several hours rises 10 degrees higher than the temperature of the surrounding air, and since this is occasionally in our latitude 100° Fahrenheit, it follows that the oil may then be of the temperature of 110° Fahrenheit. At or rather below this temperature no oil should disengage a combustible vapor in such quantities as to take fire on the approach of a light, for should it do so, the mixture of this vapor with atmospheric air will surely result in an explosion. *110° Fahrenheit should therefore be fixed as the minimum point of safety for all burning oils.* But if temperature is the measure of safety for an oil, why not make it 180° or 200° Fahrenheit; a greater degree of safety would be reached and accidents become rare or perhaps unknown: simply because the advantages reached on the one hand are offset by corresponding greater disadvantages on the other; the oil would become dearer and be of much less illuminating power than it has at present, for this depends, all things considered, on its fluidity or lightness, which is propor-

tional to its safety. A word may be said here in regard to patent preparations and patent lamps for rendering naphtha and unsafe oils safe. All such contrivances are utterly useless. No unsafe oil can be made safe by any preparation and will not be safe to burn in any lamp, even if called a safety lamp; but a safe oil will be safe always and in all lamps.

No fear need be had that by making the law stringent and protection real, the price of oil would rise to any great extent or rise at all. The so-called 150 fire test oil was sold during the past winter at 25 cents a gallon, and so was the 110 fire test oil, kept by unscrupulous dealers in contravention of the spirit if not of the letter of the law. Pratt's Astral oil, a superior brand of Kerosene manufactured in New York, could be had at the same time at 18 cents a gallon, wholesale, and was quoted in the markets 2 to 3 cents higher than 150 and 8 to 9 cents higher than 110 fire test oil; these latter brands sold, therefore, at 16 and 10 cents a gallon respectively, making with an addition of 3½ cents a gallon freight from New York to St. Louis, their prices in the latter city 19½ and 13½ cents (11).

The difference between 19½ and 25 or 5½ cents represents the legitimate profit on each gallon of 150 fire test oil, to be divided between wholesale and retail dealer; if the latter now sells 110 fire test oil at the price of the former, he charges 6 cents a gallon additional, to which he has no right—a fraud which he is enabled to perpetrate solely in consequence of a miserable law, already two years in existence, aided in it by the ignorance of the buyer, who fails to appreciate the difference between a superior and an inferior oil. What amount this seemingly little sum of 6 cents a gallon grows up to in the course of a year is realized by bearing in mind

that our state consumes 4,200,000 gallons of oil, on which we are thus unrighteously taxed 252,000 dollars. The objection that this estimate is too high since 150 fire test oil is sold in our state, can hardly be considered valid, for out of thirteen samples sold at Columbia one only was marked 150° fire test, and even this fell 36 degrees short, and Columbia is perhaps no worse off in this respect than other parts of the State.

METHOD OF TESTING. If we adopt then 110° Fahrenheit as the lowest temperature at which an oil may be permitted to emit an inflammable vapor, how shall we go about to ascertain the fact? Numerous methods have been proposed to this end, but without entering into a discussion of them or their principles, I will merely state, that the one universally adopted, at present, is based on an experment in which a direct observation is taken of the flashing point. A few ounces of oil are gradually heated in a simply constructed apparatus, and the temperature observed at which vapor is given off from its surface in sufficient quantity to produce, on the approach of a lighted taper or gas jet, a flash or flicker of light.

The experiments to give uniform results, should of course be made in a uniform manner; and the law should describe the manner in detail for the guidance of inspectors, so as to prevent all ambiguity in its execution; a failure in this, as experience has proven, makes the law useless and the officers acting under it liable to the charges of grave irregularities. In making a test, f. e., with a few ounces of oil within 10 or 15 minutes, the lighter portions will be given off within that time, and produce a flash say at 90° Fahrenheit; in repeating the experiment now, but with this difference, that the oil is heated so gradually that 45 minutes are required to bring it to the same temperature as before, the lighter

portions are given off much slower, and may not produce a flash at all. The test should likewise be termed the *flashing test* and the temperature at which it occurs the flashing point, and the old term *fire test*, still used in some of the states, avoided; for fire test may mean either the flashing test, already described, or the continuation of the test until the oil itself takes fire and continues to burn, known as the *burning test;* and in the absence of a clear statement by law, the choice between the two meanings is left to the discretion of the inspectors. There is no necessary connection between the two tests, whatever. The burning test may be high and the flashing test low; but if the flashing test is high the burning test must of necessity be high also. A glance at the table (12) exhibits sufficiently the judgment of other states in this matter, and I leave it to this audience to decide whether the intelligence that framed the laws of England, Indiana, Ohio, Michigan, Massachusetts, Rhode Island and New York, is offset by the intelligence of Vermont, Pennsylvania, Maryland, Illinois, Georgia, Maine and Missouri.

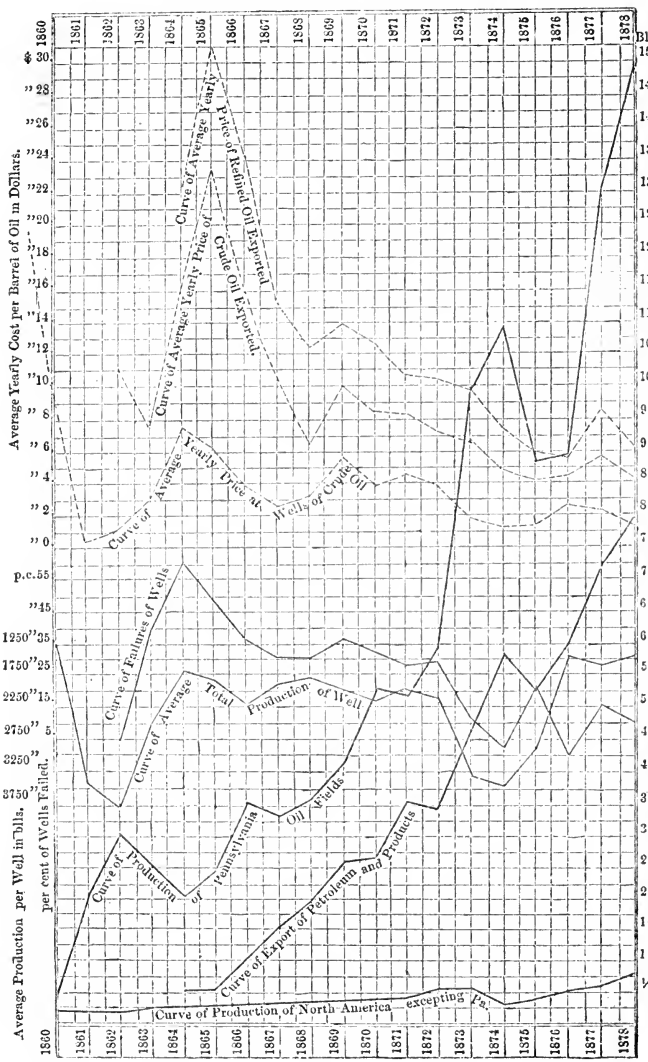
But I feel I have kept you already too long and must hasten to a conclusion. I am aware that I have omitted from this discussion many points that deserved mention, and treated others, perhaps, less fully than was expected. If I have erred in this direction I beg your indulgence; my purpose was to entertain you and to convince you of the need of speedy and better legistion looking to the protection of Coal oil consumers in more than one direction; if I have succeeded in this my purpose has been accomplished. Should any one of you desire to know more of the details of the subject, I am ready cheerfully to furnish them as far as they are in my possession, and this I would specially wish of the mem-

bers of the legislature that may be present, to whom I now take the liberty of presenting a draft of a bill which may serve as a guide in framing a new Coal oil law, worthy to represent Missouri in the sisterhood of states, and which I hope and trust will be enacted and given us by the legislature during the present session(13).

DIAGRAM, TABLES AND STATEMENTS.

The reference to Table No. 1 in the test is misplaced and should have been given seven lines above at the end of the paragraph.

Graphic Exhibition of some of the tables.



1. INDUSTRIAL TABLES TAKEN FROM THE U. S. CENSUS SHOWING THE GROWTH OF THE PETROLEUM INDUSTRIES.

	Estab'h-ments.	Steam Horse-power.	Engines No.	Hands employ'd	Capital invested.	Wages paid.	Value of material.	Prod'ct in gallons.	Product in dollars.
EIGHTH U. S. CENSUS VOLUME: MANUFACTURES, JUNE 30, 1860.									
1. Coal Oil (Lubricating?)									
TheU.S.	64			922	$ 2,240,518	$ 339,360	$2,167,103		$ 4,254,987
2. Kerosene Oil (Illuminating?)									
TheU.S.	14			551	$ 2,085,000	$ 216,924	$ 895,124		$ 2,142,693
3. Lamps, lamp fixtures and lamp trimmings.									
TheU.S	32			454	$ 261,800	$ 180,636	$ 295,786		$ 680,020
NINTH U. S. CENSUS VOLUME: INDUSTRY AND WEALTH, JUNE 30, 1870.									
1. Each Mining Industry—Petroleum. Table 14.									
TheU.S.	2314	23482	2297	4488	$10,045,826	$3,995,030	$1,401,945	181,263,505	$19,304,224
Penn...	2148	20943	2095	4070	$ 9,249,283	$3,797,818	$1,293,177	171,207,662	$18,045,967
2. Coal Oil—Refined. Table 8.									
TheU.S.	170	4214	198	1870	$ 6,770,383	$1,184,559	$21,450,189		$26,942,287
Penn...	89	2341	105	957	4,006,433	157,359	4,496,163		15,251,223
3. Lamps, Lanters and Locomotive Headlights. Table 8.									
		(*)10	(*)1						
TheU.S.	40	154	16	558	$ 689,300	$ 286,843	$ 403,259		$ 995,289
Penn...	8	15	4	96	78,700	47,606	89,322		184,500
		(*)10	(*)1						
New Y.	12	27	3	175	210,500	100,560	133,214		398,976

(*) Water wheels and their horse power.

2. NUMBER OF PATENTS

issued in the United States on oil burners, vapor burners and appliances to lamps in general, growing out of the introduction and general use of Petroleum and its products, collated from the Reports of the U. S. Patent Office(*).

YEARS.	Oil burners and lamps.....	Vapor burners and lamps.....	Appliances.....	Total.....	Value of lamps and burners exported. Introduced here for want of a better place(‡).
1859(†)	23	12	5	40	
1860	31	32	8	71	
1861	40	5	8	53	
1862	77	3	21	101	
1863	59	2	27	88	
1864	71	4	11	86	
1865	33	3	27	63	
1866	84	7	44	135	
1867	52	11	40	103	
1868	106	25	55	186	$ 65,772
1869	59	25	51	135	167,883
1870	57	39	56	152	168,008
1871	65	20	46	131	160,198
1872	63	11	36	110	232,055
1873	49	7	34	90	287,215
1874	36	3	52	91	168,231
1875	83	—	71	154	207,721
1876	79	—	88	167	188,838
1877	78	22	79	179	243,373
1878	24	4	56	84	245,377

(*) From this list are excluded all patents relating to lanterns, signal lights and burners and lamps based on illuminating material other than Petroleum or its products.

(†) In this year the first patent was issued in which the word Petroleum occurs.

(‡) An estimation of the capital invested in the manufacture of lamps, I was unable to obtain.

3. STATISTICAL TABLES OF PENNSYLVANIA OIL WELLS(*).

YEARS.	Wells sunk during the year ending January 1.....	Wells working on January 1 of the year.....	Total number of wells drilled up to January 1.....	Total number exhausted and failures up to January 1.....	Number failed and exhausted during the year ending January 1...	Per cent. of failures, etc. during the year ending January 1.....	Average production in bbls. per week during year ending Jan. 1.
1860		203					10
1861	200	406	403				1206
1862	200	609	606				3470
1863	350	812	959	47	47	5.79	3764
1864	500	1015	1459	444	397	39.11	2573
1865	950	1218	2409	1191	747	61.33	1737
1866	900	1421	3309	1888	697	49.05	1758
1867	800	1624	4109	2485	597	36.76	2215
1868	800	1827	4909	3082	597	32.68	1832
1869	860	2030	5769	3739	657	32.36	1796
1870	991	2233	6760	4527	788	35.29	1887
1871	1007	2436	7767	5331	804	33.00	2159
1872	946	2639	8713	6074	743	28.15	1972
1873	1032	2842	9745	6903	829	29.17	2090
1874	530	3045	10275	7230	327	10.74	3248
1875	433	3240	10708	7468	238	7.34	3380
1876	600	3174	11308	8134	666	20.98	2769
1877	†536		536	536	None.		
"	2290	6000	13598	7598	(‡)	0.00	1495
1878			536	536			
"	3839	8458	17437	8979	1381	16.33	1553
1879			536	536			
"	2975	10337	20412	10075	1096	10.60	1467
	20739	55569					
	536	536					
	20203	55033					
	203						
	6						
	20412						

This divided by 20412 gives the average productive time of a well during the whole period as 2.68 years.

(*) The figures in the first and second column up to 1874 are taken from Special Report on the Petroleum of Pennsylvania by Henry E. Wrigley: Second Geological Report of Pennsylvania, 1874; the other figures in the same columns have been furnished by Mr. S. H. Stowell; the rest were calculated, as will easily be understood. The percentages of failures were derived from second and fifth columns; I call attention to the discrepencies of figures in second and third columns for 1861 and 1862, the differences of the two furnishing the number six added to the sum at the bottom of first column.

(†) 536 old wells reopened by blasting.

(‡) No well failed in this year. Are the figures correct?

4. TABLE SHOWING THE AVERAGE YEARLY PRICE PER barrel of Crude Oil at the wells and of Crude and Refined Oil at the ports of export.

Years.	Price per barrel at wells. Crude	Price per barrel in export. Crude	Price per barrel in export. Refined.	(†)	Years.	Price per barrel at wells. Crude.	Price per barrel in export. Crude.	Price per barrel in export. Refined.	(†)
1859	$20.00				1869	$5.48	$10.12	$13.73	$3.61
1860	9.60				1870	3.74	8.69	12.81	4.12
1861	0.49				1871	4.50	8.40	10.79	2.39
1862	1.05	$11.09			1872	3.84	7.14	10.46	3.32
1863	3.15	7.52			1873	1.84	6.85	9.87	3.02
1864	7.62	16.25	$22.22	$5.97	1874	1.29	4.96	7.27	2.31
1865	6.18	23.48	31.25	7.77	1875	1.48	4.03	5.92	1.89
1866	3.78	15.75	24.23	8.48	1876	2.73	4.54	5.88	1.34
1867	2.54	10.67	15.08	4.41	1877	2.45	5.88	8.86	2.98
1868	3.05	6.47	12.35	5.88	1878	1.37	4.20	6.05	1.85

(†) Difference between the two preceding columns, representing cost of refining. The irregularities in the prices are very likely the result of speculation.

5. PRODUCTION OF CRUDE PETROLEUM IN THE UNITED STATES AND CANADA FROM 1859 TO 1878 INCLUSIVE.

PITTSBURGH, PA., June 4th, 1879.

P. Schweitzer, Esq., State University of Missouri, Columbia, Mo.:

DEAR SIR: Your favor of the 26th ult. was duly received and its contents noted. Enclosed herewith I hand you a detailed statement of Petroleum production in the United States and Can-

ada from 1859 to 1878 inclusive, made up from data which I have been able to collect for the last 7 years.

The early years of Petroleum production were without system and without a market, consequently there was no regular account kept of the production and cannot be given by any person except as an approximation; the same may be said of the production account outside of the Pennsylvania oil fields. Since any record has been preserved I have in my office quite a complete chain. So I present results therefrom having confidence in their general correctness. Since I have been publishing the "Reporter" I have had every facility for making accurate reports and have the data on file in my office to verify all figures contained in the reports.

Respectfully, S. H. STOWELL,
Editor "Stowell's Petroleum Reporter."

These figures refer to calendar years beginning with the first of January, while those given by the Chief of the Bureau of Statistics refer to fiscal years beginning with July 1 and ending June 30. In constructing the curve of production for the rest of the United States excepting Pennsylvania, the totals given in the different columns up to 1875 and '76 were distributed evenly over the preceding sixteen and seventeen years; but the production of Canada up to the year 1862 was added during that year. It was intended to present merely the difference between this curve and that of Pennsylvania.

RECAPITULATION.

Penn. Total production..	111,007,862 bbls.		Value..	$293,872,162
W. Va. " " ..	3,542,000 "			
Ohio " " ..	411,500 "			
Ky. & Tenn. " ..	398,000 "		(*) "	12,472,225
California " ..	355,000 "			
Total production in U. S..	115,714,362 "		Total..	$306,344,387
Canada total production..	3,596,945 "		(*) Value	9,531,904
Total in U. S. & Canada..	119,311,307 "		Total..	$315,876,291

(*) These figures were obtained by taking $2.65 as the price per barrel of oil.

TABLE.

YEARS.	Penn. in bbls. of 42 gallons.	Canada in bbls. of 40 gallons.	W. Va. in bbls. of 42 gallons.	Ohio in bbls. of 42 gallons.	Ky. & Tenn. bbls. of 42 gallons.	Cal. in bbls. of 42 gals.	Av'g, yearly pr. per barrel of oil at the wells.	Total value.
1859	2,000	Amt. utilized	Prior to 1876 West Va. produced	Prior to 1876 Ohio including Smith's Ferry produced.....	Prior to 1877 Kentucky and Tennessee produced.....	Prior to 1876 California produced	$20.00	$ 40,000
1860	500,000	prior&inlcud					9.60	4,800,000
1861	2,113,609	ing 1862 was					0.49	1,035,668
1862	3,056,695	(*)11,775					1.05	3,209,524
1863	2,611,309	82,814					3.15	8,225,622
1864	2,116,109	90,000					7.62	16,124,751
1865	2,497,700	110,000					6.18	15,435,786
1866	3,597,700	175,000					3.78	13,599,306
1867	3,347,300	190,000					2.54	8,502,142
1868	3,646,117	200,000					3.05	11,120,657
1869	4,215,000	220,000					5.48	23,098,200
1870	5,260,745	250,000					3.74	19,675,186
1871	5,205,341	269,397					4.50	23,424,034
1872	5,939,003	308,100					3.84	22,805,771
1873	9,890,964	365,052					1.84	18,199,374
1874	10,950,730	168,807					1.29	14,126,442
1875	8,787,506	220,000	3,000,000	275,000		175,800	1.48	13,005,509
1876	8,968,906	312,000	120,000	55,000	250,000	32,000	2.73	24,485,113
1877	13,135,671	312,000	172,000	36,500	73,000	73,000	2.45	32,182,394
1878	15,165,462	312,000	250,000	45,000	75,000	75,000	1.37	20,776,683
Totals.....	111,007,862	3,596,945	3,542,000	411,500	398,000	355,000		$293,872,161

Avr'g. price per bbl. $2.65

(*) Some 5,000,000 bbls. run to waste in 1862 for want of a market.

6. EXPORTS OF PETROLEUM OILS AND ITS PRODUCTS FROM ALL THE PORTS OF THE UNITED STATES. (1)

The value of the totals is given in dollars, of the gallons in cents.

YEARS.	Mineral Oil. Crude.	Value.	Pr'c per gal.	Mineral Oil. Refined.	Value.	Pr'c per gal.	Naphtha, etc.	Value.	Pr'c per gal.
1862	[2] 5,828,129	1,539,027	26.4						
1863	[3] 155,874	27,839	17.9						
1864	9,908,654	3,864,187	38.7	[5] 12,791,518	6,764,411	52.9	[7] 438,197	154,091	35.2
1865	12,293,897	6,868,513	55.9	12,704,825	9,506,589	74.4	480,847	173,867	36.1
1866	16,057,943	6,015,921	37.5	32,255,921	18,626,141	57.7	673,477	188,825	28.0
1867	7,344,248	1,864,001	25.4	62,686,657	22,509,466	35.9	224,576	34,174	15.2
1868	10,029,659	1,546,933	15.4	67,909,961	19,977,870	29.4	1,517,268	267,873	17.7
1869	[6] 12,425,366	2,994,404	24.1	84,403,492	27,631,042	32.7	2,673,094	445,770	16.7
1870	9,955,066	2,060,155	20.7	98,350,753	30,041,320	30.5	5,422,604	564,864	10.4
1871	9,859,038	1,971,847	20.0	132,608,955	34,138,736	25.7	7,209,592	746,797	10.3
1872	13,559,768	2,307,111	17.0	122,539,975	30,566,108	24.9	8,092,635	932,160	11.5
1873	18,439,407	3,010,050	16.3	158,102,414	37,195,735	23.5	9,743,593	1,487,439	15.3
1874	17,776,419	2,099,696	11.8	217,220,504	37,560,955	17.3	9,737,157	1,038,622	10.7
1875	14,718,114	1,406,018	9.6	191,551,933	27,030,361	14.1	11,758,940	1,141,440	9.7
1876	20,520,397	2,220,268	10.8	204,814,673	28,755,638	14.0	14,780,236	1,442,811	9.8
1877	26,819,202	3,756,729	14.0	262,441,844	55,401,132	21.1	15,140,183	1,816,682	11.9
1878	26,936,727	2,694,018	10.0	289,214,541	41,513,676	14.4	16,417,621	1,411,812	8.9

VALUE OF THE TOTAL PRODUCT EXPORTED TO GERMANY.

1864	$ 657,390	1867	$3,722,062	1870	$9,539,393	1873	$12,067,630	1876	$ 9,041,350
1865	1,580,484	1868	4,495,067	1871	8,787,053	1874	12,021,324	1877	17,804,007
1866	2,695,593	1869	7,544,550	1872	8,736,119	1875	8,330,541	1878	11,912,758

6. EXPORTS OF PETROLEUM OILS AND ITS PRODUCTS FROM ALL THE PORTS OF THE UNITED STATES.—(1) CONTINUATION.

The value of the totals is given in dollars, of the gallons in cents.

YEARS.	Lubricating oil.	Value.	Pr'c per gal.	Paraffin Tar Pitch, etc.	Value.	Pr'c per gal.	Total number of gallons.	The same in barrels.	Total value.
1862 - -								[9] 138,765	
1863 - -								3,711	
1864 - -				9,746	24,871	255.2	23,148,115	551,140	10,807,560
1865 - -				[4] 15,928	37,662	236.5	25,495,497	607,036	16,586,631
1866 - -				26,921	65,012	241.5	49,014,262	1,167,006	24,895,899
1867 - -				50,312	34,800	69.1	70,305,793	1,673,470	24,442,441
1868 - -				38,685	47,395	122.5	79,495,573	1,892,751	21,840,071
1869 - -							99,502,152	2,369,099	31,071,216
1870 - -				245	374	152.7	113,728,668	2,707,826	32,666,731
1871 - -				5,345	4,758	89.0	149,682,930	3,563,881	36,899,568
"		22,660			[5a] 14,770				
1872 - -	541,419	211,287	39.0	[5] 438,186	41,724	9.5	145,171,583	3,456,466	34,058,390
1873 - -	748,699	277,966	37.1	781,074	79,566	10.2	187,815,187	4,471,790	42,050,756
1874 - -	1,244,305	404,243	32.5	1,827,798	142,299	7.8	247,786,483	5,899,678	41,245,815
1875 - -	1,173,473	313,646	26.7	2,752,848	187,103	6.8	221,955,308	5,284,650	30,078,568
1876 - -	963,442	303,863	31.5	2,581,404	193,206	7.5	243,660,152	5,801,432	32,915,786
1877 - -	1,601,065	497,540	31.1	3,196,620	317,355	9.9	309,198,914	7,361,879	61,789,438
1878 - -	2,304,624	639,381	27.7	3,968,790	316,087	62.9	338,841,303	8,067,650	46,574,974
"				[4] 247,827	155,998		247,827	5,901	155,998
								Bbls.54,881,661	$488,079,842

(These notes refer to the tables on the two preceding pages.)

1. Compiled from the "Annual Report of the Chief of the Bureau of Statistics on Commerce and Navigation.—Domestic Products."

2. Petroleum, crude and refined: This statement was not fully reported in the Collector's returns, Petroleum not then being among enumerated articles.—"Report."

3. The quantities and values of Petroleum exported were not reported in the Schedules of enumerated articles. The quantities and values here entered are derived from special enquiries and are below rather than above the actual exports.—"Report."

4. The figures of this column to 1871 inclusive and the figures marked 4 for 1878 give gallons of solid Paraffin taken to weigh seven pounds each.

5. The figures of this column up to 1871 inclusive comprise a portion of Coal Oil reported by the Collector as follows:

1864.....	1,144,769	gallons.	$676,444	59.0	cents	per	gallon.
1865.....	1,019,251	"	821,088	80.5	"	"	"
1866.....	746,044	"	456,955	61.2	"	"	"
1867.....	561,096	"	242,283	43.2	"	"	"
1868.....	687,574	"	225,727	32.8	"	"	"
1869.....	954,529	"	339,511	35.6	"	"	"
1870.....	448,248	"	177,137	39.5	"	"	"
1871.....	398,222	"	151,044	37.9	"	"	"

6. This figure includes coal oil 521,053 gallons worth $187,866 or 36.1 cents per gallon.

7. The figures in this column are given in the schedules to 1869 inclusive as Benzine; in 1870 Benzine and Naphtha are given separately, and in 1871 and following they include Gasoline, Naphtha and Benzine.

8. The figures in this column indicate Residuum, Tar, Pitch, etc.; they are given in the "Reports" in barrels, which I changed into gallons by assuming the barrels to hold 42 gallons, and making the multiplication.

8a. Is the value of Residuum, Tar, Pitch, etc., the quantity of which is not stated.

9. These figures were obtained by dividing the number of gallons by 42.

MARSH-GAS SERIES.—FORMULA C^nH^{2n+2}

No.	NAME.	Formula.	Carbon.	Hydrogen.	Boiling Point (C.)	Specific Grav. (0° C.).	Observer.
1	Methyl hydrid (methan)	CH^4	75	25	A gas.	.559	F.
2	Ethyl hydrid (æthan)	C^2H^6	80	20	"		F.
3	Propyl hydrid (propan)	C^3H^8	81.81	18.19	−17°		F. R.
4	Butyl h. (normal butan)	C^4H^{10}	82.8	17.2	0	.600	W.
5	Pseudo-butan	"	"	"	17		
6	Amyl h. (normal peutan)	C^5H^{12}	83.33	16.67	37–39	.645	W.
7	Dimethyl-propan	"	"	"	30.2	.626[17°]	P.& C.,W.,S.
8	Hexyl h. [normal hexan]	C^6H^{14}	83.72	16.28	68.5	.689	P.& C.,W.,S.
9	Æthyl-isobutyl	"	"	"	61.3	.676	W.
10	Heptyl h. [normal septan]	C^7H^{16}	84	16	98,1	.730	W., S.
11	Æthyl-amyl	"	"	"	90.4	.718	W., S.
12	Octyl h. [normal octan]	C^8H^{18}	84.21	15.79	127.6	.752	W.
13	An isomer of No. 12	"	"	"	119.5	.737	W.,P. & C.
14	Nonyl hydrid [nonan]	C^9H^{20}	84.38	15.62	150.8	.756	W.

OLEFIANT-GAS SERIES.—FORMULA C^nH^{2n}.

1	Decylene	$C^{10}H^{20}$			174.9		Warren.
2	Undecylene	$C^{11}H^{22}$			195.8		Warren.
3	Bidecylene	$C^{12}H^{24}$			216.2		Warren.

F.—Fouque; R.—Ronalds; W.—Warren; P. and C.—Pelouze and Cahours; S·—Schorlemmer.

IMPURITIES NOT YET ISOLATED.

1. Those possessing in their composition Sulphur.
2. Those which give rise to the color of Petroleum.
3. Those possessing the disagreeable and specific ordor of American Petroleum.

In this list Thallen, discovered by Prof. Morton is not mentioned, because it is probably only an educt of the distillation of Petroleum at high temperatures and not a product occurring in it naturally, and further because L. Prunier and R. David, Comptes rendus 87, pgs. 991-93, state that Petrocen, Carbocen, Carbopetrocen and Thallen are only mixtures with from 88 to 96 per cent. of Carbon.

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8. PRODUCTS OF FRACTIONAL DISTILLATION.

	A(*)	B(*)	C(†)
Gasolene	1.5 per cent.		3.0 per cent.
Naphtha	10.0 "	20.0 per cent.	10.0 "
Benzine	4.0 "		3.0 "
Kerosene	55.0 "	66.0 "	75.0 "
Lubricating oil	17.5 "		
Paraffin	2.0 "		
Loss, Gas, Coke	10.0 "	14.0 "	9.0 "
	100.0 "	100.0 "	100.0 "

(*) These three tables are taken from C. F. Chandler's "Report on Petroleum," 1871.

(†) This table is taken from H. B. Cornwall, "Petroleum," 1876.

TABLE.

Gravity, Beaume. (*)	Name.	per cent. yielded.	Gravity, Beaume.	Boiling Point, Fah.	
115°B. to 105°B.	Cymogene....	——	110°	32°	Condensed by pump, made by one firm only for an ice machine, boils at 32° F.
105°B. to 95° B.	Rhigolene	——	100°	65°	Condensed by ice and salt, used as an anæsthetic, boils at 65° F.
95° B. to 80° B.	Gasolene.....	1½	85° to 90°	110°	Condensed in worm by cold water, used in "air gas machines" and gas "carbonizers."
80° B. to 65° B.	Naphtha.....	10	71° to 76°	180°	For oil cloths, cleaning, etc.; so-called "Safety oil," "Danforth's oil," "American Safety Gas," etc.; for adulterating kerosene, cleaning oil wells.
65° B. to 60° B.	Benzine.....	4	62° to 65°	300°	For paints and varnishes.
60° B. to 38° B.	Kerosene or Refined Petroleum.	55	46°	350°	Ordinary oil for lamps.
38° B. to 25° B.	Paraffin Oil....	19½	30°	570°	Semi-solid when cold. Chilled and pressed to separate paraffin, oil used for lubricating.
	Coke, Gas & loss	10	——		
	Total.....	100			

9. STATEMENT AND TABLE IN RELATION TO QUALITY OF OIL.

Some light is thrown on this point by the following considerations. In the last report of the Chief of the Bureau of Statistics, Commerce and Navigation, the following figures are given for the fiscal year:

1878—619,007,044 gallons petroleum, total product in the U. S.
289,214,541 gallons refined oil exported.
26,936,727 gallons crude oil exported.

Now supposing 66 per cent. to be the highest amount of Kerosene of the proper quality obtainable, the refined oil exported would be equivalent to

433,821,811 gallons
26,936,727 gallons

460,758,538 gallons exported.
158,248,466 gallons left for home consumption.

619,007,004 gallons.

1877—454,560,582 gallons petroleum, total product in the U. S.
262,441,844 gallons refined oil exported.
26,819,202 gallons crude oil exported.

In the same way as before we have the refined oil equivalent to 393,662,766 gallons
26,819,202 gallons

420,078,614 gallons exported.
34,078,614 gallons left for home consumption.

454,560,582 gallons.

The amount remaining in our own markets, is sufficient for 1878 to cover home consumption, but fell far short in 1877, unless indeed we suppose a production of 76 per cent. of Kerosene; in that case the refined oil exported would be equivalent to

374,318,216 gallons
26,819,202 gallons

372,137,418 gallons exported.
82,423,164 gallons left for home consumption.

454,560,582 gallons.

This calculation gives for 1878 the equivalent of crude oil exported as 407,491,272 gallons, while Mr. Thompson McGowan of Cleveland, Ohio, fixes it at 407,482,175 gallons. That this oil however is inferior is proved by my own experience in Missouri and by the following statement taken from *Stowell's Petroleum Reporter* of May 15, 1879:

DETERIORATION OF REFINED OILS.

Considerable and general complaint has for the past six months, from time to time, been coming to us from the petroleum points of Europe, touching the condition of the last year's export.

These complaints found decided expression at a meeting of the different chambers of commerce, held at Bremen on the 25th of February last. At this congress it was plainly charged, that the recent imports of petroleum, especially the various brands of the Standard Oil Company, were of a marked inferior quality, that the inferiority consisted in the color, the fire test and the condition of the packages. Beside this expression from Germany, the Petroleum Association of London having in February last caused an analysis of quantities of imported petroleum found some of the Standard Oil Company's brands exceedingly deficient, as for instance: the brand known as the Royal Daylight—that this brand out of 15,373 bbls. they took 390 bbls. for test by analysis and found 34½ per cent. flashing at 100°; as to color and merchantable qualities they further found only 91 per cent. of the samples to be pure white, while 211 bbls. were Standard white, 65 good merchantable and 7 bbls. not good merchantable As well they may, these complaints seem to have awakened the attention of the trade in this country.

The *Produce Exchange* of New York promptly took the subject up and the result has been the appointment of a committee "to consider the recommendations of the Bremen Congress, and any suggestions that may be made by those interested in the trade, looking to a practical remedy of the existing cause of complaint."

And we are told that daily sessions will be held until the duties of the committee shall be satisfactorily discharged.

Touching the cause of the complaints of the inferiority, we have no doubt that it is in part due to the character of the oil obtained from the Bradford field; but at the same time we are constrained to believe that it may in part be due to the manufacture of special brands of high grade oil, which commands specially high prices; while the common standards are deteriorated.

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10. KEROSENE OIL SOLD IN COLUMBIA (MO.), AND MATTERS RELATING TO COAL OIL INSPECTION.

Number.	1875		1877		1879	
	Flashing point.	Burning point.	Flashing point.	Burning point.	Flashing point.	Burning point.
1	106		88	100	110	114
2	87		86	93	80	88
3	—		82	88	82	88
4	88		79	88	—	—
5	88		—	—	77	79
6	88		—	—	77	80
7	88		—	—	—	—
8	—		75	84	—	—
9	—		81	82	—	—
10	—		81	88	—	—
11	—		---	—	76	80
12	—		---	—	77	82
Average	91		82	89	83	87
13	139		149	171	—	—
14	—		---	—	140	150

These oils were tested during January or February of each year, and were taken from barrels stamped by the St. Louis Coal Oil Inspector as having 110° F. fire test, except Nos. 13, 14 and No. 1, 1879, which were stamped, the two former as having 175° F. and the latter 150° F. fire test. A complaint on the part of the retail dealer here to the wholesale merchant drew forth the following reply:

ST. LOUIS, MO., FEBRUARY 2ND, 1877.

* * * "If your University Chemist would attend to something he knows about, it would be more creditable to him. All

the oil we send you will stand 110 degrees test by any FAIR inspection. Our University Chemist here attempted the same-thing; but when he learned to test oil PRACTICALLY he was we think convinced, that theory was one thing and practice another."

I suppress the names of the parties from motives of charity, but suggest that the note be read in the light of the numerous accidents and horrors from Coal Oil that have occurred almost daily in various parts of our state and have been published in the St. Louis papers. These parties and others that might be named, evidently think that the testing of oils must be learned by the Chemist or man of Science from the Inspector, whose claim to the position, as usually filled, is of a political or similar character. I call in this connection attention to the following statement, which appeared in the St. Louis *Republican* of February 5th, 1879:

[From the Missouri Republican, Feb. 5, 1879.]

The grand-jury sat late on Monday evening. They were anxious to prevent a caucus on the part of certain parties, who, they had been led to believe were interested in covering up some crookedness connected with the gauging, inspection and stamping of coal oil in this city. They thought they were in a fair way to obtain convicting evidence, provided the parties under investigation did not succeed in getting together and agreeing on some plan for mutual protection. With a view to preventing that occurrence, they had a number of men employed in watching the oil-works, the coal oil inspector's office and such other places as a caucus was likely to be held. Yet, in spite of all these precautions, the officers were eluded, and in a little room at the Laclede hotel the meeting was held. It did not last long, but it probably sufficed to effect arrangements to tide over the present crisis.

The grand-jury, although not aware of the caucus, had learned that Hon. Harrison Attaway, coal oil inspector for St. Louis, had been summoned here from his home at Lebanon, Mo., by a telegram sent by his deputy, Mr. Cliff Able. They had also learned that Mr.

Attaway would very probably start on the 9:45 train for Jefferson City. * * * Shortly before train time Mr. Attaway, in a serious mood, arrived. He was about to secure his seat when the detectives approached him and told him that he was wanted. He demanded their authority and they said they had the authority of the grand-jury. After some parley, he went with them to the Four Courts.

Meanwhile officers were industriously endeavoring to ascertain the whereabouts of Mr. Cliff Able, Mr. Attaway's deputy, with a view to arresting him. Their efforts, however, were futile.

Yesterday forenoon Mr. Attaway and Mr. Able were at the Four Courts. The former went before the grand-jury, and was examined there for a couple of hours. The result of his examination was that a number of record books were brought from the inspector's office and taken charge of by the jury. The jury then proceeded to the criminal court and made report, the substance of which was not made known to the public. Bench warrants had been made out, and Messrs. Attaway and Able were notified that they would be required to give bond of $1,000 each. The former simply renewed his bond with Dr. Nidelet as security, to answer to any indictment that might be brought against him, and the latter gave bond, with Mr. J. J. Daly as security, to answer before the court to-morrow morning to the charge of contempt, the grounds of which charge will more fully appear hereafter.

As both the gentlemen professed to be utterly ignorant as to the nature of the prosecution to which they are to be subjected, and as the members of the grand-jury are pledged to secrecy in regard to all matters before them it is not practicable to state, with such a fullness and clearness as would be desirable, what are the charges and the facts on which they are based. Still, a pretty fair outline of the matter can be stated, as gleaned from a dozen different sources.

For many months there has been a general complaint among merchants who have the handling of coal oil in this city that the contents of the barrels purchased

by them were from one to three gallons—and sometimes as much as four gallons short of the quantity stamped on the head, ostensibly by the inspector. As their bills were all made out according to the stamps on the barrels, this was a matter seriously affecting margins. For a long time the discrepancy was explained away on the theory of evaporation, but the shortage became so great that dealers began to grow skeptical as to this theory. Then they got to comparing notes, and they were astounded to find how uniform was the cause for complaint.

Moreover the retailers found—and the record of coal-oil accidents went to sustain them—that the oil was very frequently not of the proof which the law requires; that instead of standing the degree of heat specified by statute as a minimum, it would ignite much below it. Gradually this grievance was made known to the wholesale men, who, in turn, associated it with the shortage phenomenon. In order that the general reader, who may not be posted as to the system of handling oil here, may understand the situation, a slight digression from the main story is here necessary.

In order to regulate the sale of this inflammable and popular commodity, there is a statute providing for a coal-oil inspector in St. Louis, another in Kansas City, another in Hannibal and another in St. Joseph. These men are paid by commissions, being allowed a specified amount for every barrel of oil inspected. All the crude oil coming to St. Louis is brought here by the firm of Waters, Pierce, & Co., whose refining establishments are at the edge of the Union depot yards, one at Fourteenth street and the other at Tayon avenue. They put the oil through a refining process, and it must be brought to a certain grade—susceptible of a certain fire test—before it can be placed upon the market. Moreover, every barrel must be gauged and stamped by the inspector or his deputy.

From the complaints of the merchants as to shortage and inferior oil, the grand-jury became satisfied that there was fraud somewhere. After taking a considerable amount of testimony showing that fact, they sent for Mr. Able, Mr. Attaway being absent from the city.

They learned that, instead of going to the works and inspecting the oil themselves, these gentlemen were in the habit of allowing the employes of the refining company to mark the grade and contents on the barrels and that this had been done for weeks at a time. Of course if inferior oil was put upon the market as of a high grade, there was a profit to somebody. And, of course, again, if thirty-six gallons were sold as forty, there was more profit to somebody. These two profits on each barrel of oil must represent vast sums in the course of a month's business in such a city as this, but it is not impossible that the circumstances have been misinterpreted, and that what appears to be fraud may have some fair explanation. Or, even if there are great frauds in the business, it is not impossible that the gentlemen under arrest and the refining firm are ignorant of them, while the employes are getting the benefit. All of this remains to be determined by investigation.

However all that may be, Mr. Able, when before the jury, agreed to exhibit to that body the books of the office. When he got outside the jury-room, however, he manifested a disposition to disregard his agreement. A subpœna was sent after him, and he disregarded it. A subpœna duces tecum was sent and he ran from the office. An attachment was sent and he was nowhere to be found. The jury, under the fear that the books would be rewritten if sufficient time was allowed, made streneous endeavors to get possession of the books Monday night, but failed. Those which were produced yesterday morning were examined, and a gentleman, who saw them in the jury-room, declared that they all had the appearance of having been written but a few hours before, the ink being quite fresh. This view, however, may be explained by a too suspicious mind.

When the jury learned that Mr. Able had consulted able counsel before and after entering the jury room; when they learned that telegrams had been sent Mr. Attaway; when they learned that the caucus referred to in the beginning of this article had been held in spite of their endeavors, they were very indignant, and it seems quite certain that there will be serious pun-

ishment for contempt. Two indictments have been found.

The legitimate fees of the office, as shown by the investigation, amount to $9,000 in a year, and this is to be divided between only the inspector and the deputy.

I also call attention to a statement in the St. Louis *Globe-Democrat* of February 25th, 1879:

[From the Globe-Democrat, Feb. 25th, 1879.]

The Grand Jury report presented to Judge Laughlin yesterday noon may be summed up as follows:

THE COAL OIL MATTER.

5. They also diligently investigated the complicity of the principal venders of petroleum or coal oil in this market, and desire to report the result of that investigation so that the law-makers, now in session at Jefferson City, may know how the law now in existence, intended for the protection of life and property, is evaded and rendered void and of no effect. The former law required that the fire test for standard oil should be 110. This test not being sufficiently safe, and for the better protection of the lives and property of those who use petroleum, a new law, the one now in force, was enacted by the legislature, raising the fire test for standard oil to 150, requiring that the contents for each and every barrel or package should be inspected by the inspector, and the same gauge tested and branded and the quantity and quality of each barrel branded on the barrel, and that all under 150 should be branded "Rejected." The jury found from the evidence of parties before them that the barrels were gauged and branded before the oil was put into them.

The gauging of the barrels is mostly done by the employes of the Waters-Pierce Oil Company. The oil as a general thing was tested, and in the tanks in which it was received from the East, and not in the barrels, as the law requires; and the fire tests are, to a great extent, made by the employes of the same company, and not by the Inspector, as the law provides. The barrels, as a general thing, were branded by the Inspector, but the brands were left in the possession of the oil compa-

ny, perfectly accessible to the company or its employes, so that they could be used if so desired, and the grand-jury found that in some cases they were so used by persons in the employ of the Waters-Pierce Oil Company. They also found that when the barrels were branded "Rejected" the word "Rejected" was erased or marked out by the employes of the company. The fire test appeared to have always been marked on the barrel, but how accurately the grand-jury had not as full and satisfactory evidence as they desired. But some test barrels, the fire tests of which were branded 150, were, on the inspection, found to be 10 or 15 below. Evidence is also before the grand jury that barrels were gauged to contain more oil than the size of the barrels could possibly contain—say a barrel, the capacity of which is 50 gallons, was gauged to contain 51 or 51½ gallons. The value of the oil ranges according to the test from 3 to 3½ cents per gallon between 110 and 150. There would no serious injury result from testing oil in the tanks, provided the oil was tested by the Inspector and the same filled into barrels into his presence.

And also not to be one-sided to the verdict published in the St. Louis *Globe-Democrat* of May 18th, 1879:

[St. Louis Globe-Democrat, Sunday, May 18, 1879.]

COAL OIL RING A MYTH.

WATERS-PIERCE OIL COMPANY VINDICATED.

A few weeks ago certain articles appeared in the St. Louis *Grocer*, a trade journal published under the auspices of Greeley, Burnham & Co., in relation to coal oil matters, reflecting upon the Inspector, Harrison Attaway, and the parties chiefly engaged in supplying the St. Louis market with coal oil. The articles charged that enormous frauds had been perpetrated in guaging and inspecting coal oil.

The "Waters-Pierce Oil Company" furnish probably ninety-nine hundreths of all the coal oil sold in St. Louis, and although they were not directly charged

with the supposed frauds, they at once sued Greeley, Burnham & Co. for a libel upon their business.

A large number of depositions were taken on both sides, and these conclusively showed that so far as Waters-Pierce Oil Company were concerned no wrong whatever had been committed; but that both the guaging and testing had been honestly done. But the testimony further showed that there had been no fraudulent guaging or testing done by anybody, and that consequently the indictment of the Inspector and of his deputy, Able, was an egregious blunder.

Two or three trifling irregularities appeared in the mode of discharging his duties by the Deputy Inspector, but not in the least affecting his integrity, and mostly chargeable upon deficiencies in the old inspection law, which never was sensible, and which has long since been outgrown by the business to which it was intended to apply.

THE ATTAWAY CASE ENDED.

When the case against Coal Oil Inspector Harrison Attaway was called in Judge Cady's court yesterday morning, the defendant's counsel, Messrs. George W. Cline and F. D. Turner, appeared and stated that the attorneys for the state, who were not present, had agreed that they did not possess sufficient evidence to secure a conviction. Prosecuting Attorney Hogan said he knew nothing about the case, and so, as the regular counsel for the prosecution was not present, was willing that the case should be dismissed for want of prosecution. Accordingly the defendant was discharged.

I may be allowed in this connection to make some additional remarks in regard to the inspection of Petroleum oils; the yearly consumption of them for the United States is estimated at 2,190,000 barrels and for our own state at 100,000 barrels; three fourths of this quantity is tested in St. Louis, bringing to the Inspector at least $9,000 a year in fees; were he to make inspections of smaller packages than barrels, his fees would be even more than that; now allowing 15 minutes to each

test, which including the time for collecting is certainly very moderate, 18,750 working hours will be required. The year, Sundays and holidays included, has 8,760 hours, whence it can be seen that the St. Louis Inspector and his deputy must each work 24 hours a day the year round, and manage besides to put in somewhere 1,230 extra hours, to accomplish the testing of 75,000 samples, for it is impossible to make even for an hour two tests alongside of each other with any degree of accuracy; close attention is required throughout. It is perhaps significant that the same gentleman who at the time of his first appointment made oath *to perform the duties of his office with fidelity*, and who was able to accomplish this in some occult manner, has been rewarded since by the Governor of the state with a re-appointment to the same position.

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11. PRICE OF OIL IN NEW YORK MARKET.

OFFICE OF CHARLES PRATT & Co.,
ESTABLISHED 1770,
No. 128 PEARL ST., NEW YORK,
JANUARY 28TH, 1879.

Prof. P. Schweitzer, Columbia, Mo.:

DEAR SIR: Your favor of the 20th instant at hand ordering ten gallons of Astral, which has attention. The price in barrels, small lots, is 21 cents, but we would sell a car load at 18 cents in barrels and 22 cents in cans.

In answer to your inquiries, we may state, that the difference in price between 110° fire test oil and 150° fire test, is to-day in this market 6 cents per gallon, but special causes sometimes lower or advance this. The price of Astral is from 2 to 3 cents per gallon above what is known in the market as 150° oil.

Yours truly, CHARLES PRATT & Co.

WHITE LINE,
ST. LOUIS, FEB. 22nd, 1879.

Freight from New York to St. Louis 4th class 54 cents.

D. T. PACKER.

12. TABLE OF TESTS OF PETROLEUM, REQUIRED BY LAWS IN DIFFERENT STATES.

STATES.	Flashing Point.	Burning Point.	
England	100° F		Date of law 1868
Indiana	100° F		" " " 1863
Ohio	100° F		" " " 1867
Michigan	120° F		" " " 1879
Massachusetts	100° F	110° F	" " " 1869
Rhode Island	100° F		" " " 1871
New York (*)	100° F		" " " 1871

(*) 1865—100° Fire test; 1866—110° Fire test.

	Fire test.		
Pennsylvania	110° F		" " " 1865
Vermont	110° F		" " " 1868
Illinois	110° F		" " " 1869
Georgia	110° F		" " " 1870
Maryland	110° F		" " " 1871
Maine	120° F		" " " 1867
Missouri (†)	150° F		" " " 1879

(†) 1865—110° F emit an explosive gas or take fire; 1867—110° F ignite and explode; 1868—same as before; fee reduced to 5 cents a package; 1870—same as before; fee raised to 6 and 12 cts. a package; 1877—150° F fire test.

13. THE NEW COAL OIL LAW, PASSED MARCH 27th, 1879.

The result of this lecture, which I repeated by invitation, on March 12th, in the hall of the House of Representatives at Jefferson City, was the introduction by Senator Burkholder of a coal-oil bill, which in my judgment covered very thoroughly all points of importance and had my unqualified approval and indorsement.

It was not, however, the only bill introduced on the subject in the legislature, and was with the rest referred to the committee on Insurance, which reported back a substitute, which finally passed and became a law.

This law, the result of the deliberation of several

committees, one of which at least was aided and enlightened by a representative and his attorney of a large coal oil house in the state, is an extremely inferior piece of workmanship; for it retains nearly all the faults of the old law, without offering any compensating superior features; no safer oils need be expected by the consummer under its working than have heretofore been sold in the state under the old law. I will mention a few, and only a few of the objections to it:

1. It does not require the Inspector to be a competent and qualified person, all reference to it being omitted; the old law made in this respect at least a show of aiming higher.

2. It omits all special reference to the mode of punishment or of removal of Coal Oil Inspector for incompetency when branding f. e., oils as of higher fire test than is actually the case.

3. It makes it the duty of the Inspector to prosecute all persons found violating its provisions; this amounts either to nothing or to too much; no inspector can be expected to act the part of a detective for a large district, and he should surely not possess the right to prosecute offenders to the exclusion of every aggrieved citizen.

4. It forbids the sale and use (sec. 4) for illuminating purposes, of all fluids having a fire test below 150° F except when used in the form of vapor or gas; this provision is defective and useless, since all petroleum lamps are in reality gas or vapor lamps, and no law exists to make a distinction between them or draw anywhere a dividing line.

5. It gives a long and detailed description (sec. 2, line 12-48) of the manner of finding the flashing point of an oil, and after having found it makes no earthly use of it. It is required neither to be a fixed point nor to

be branded on the packages. Its purpose, unless it is to breed confusion, can not be apprehended.

6. It describes in detail the procedure for obtaining the fire test of an oil, consuming in every single operation 45 minutes, without counting the time for collecting samples or branding packages. This is a grave defect since it gives to inferior oils, as already explained, a fictitious superiority and throws most of the business into the hands of the St. Louis inspector; the labor involved in making a test from a tank of 1500 barrels capacity is not greater than making it from a barrel; yet in the former case the fee returned is 180 dollars and in the latter case 12 cents; who would like to be coal oil inspector in a small town?

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14. BIBLIOGRAPHY OF PETROLEUM.

I have made an attempt to collect as far as I was able all references to Petroleum, and to arrange them under certain headings, hoping that the labor expended will be repaid by the usefulness, to which the information may be put by brother Chemists. The references are given, wherever possible, to Berzelius' (B. J.) and Liebig's Jahresbericht (L. J.) and to the original sources of publication.

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" 1861, Andrews; Sill. Am. J. 2, 23, 85 P. fr. Pa. O. Ky.
" 1862, Hunt; Chem. News 6, 5, 16. P. fr. North America.
——— 1863, Hunt; Sill. Am. J., March, 1863.
——— 1866, Lesley; Proc. Amer. Philos. Soc. 10, 33, 187.
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" 1869, Baumhauer; Arch. neerland, 4, 299, P. fr. East India.
" 1869, Both; Russ. Zeitsch, Pharm. 8, 467, P. fr. Russian Asia.
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15. DRAFT OF THE COAL OIL BILL SUBMITTED TO A MEMBER OF THE LEGISLATURE.

Be it enacted by the General Assembly of the State of Missouri, as follows:

SECTION 1. The governor shall appoint for each of the cities of St. Louis, Hannibal, St. Joseph and Kansas City, and such other cities or towns as shall by the city or town authorities petition to him therefor, an inspector of coal oil, carbon oil, petroleum oil, kerosene, gasolene, or any product of petroleum used for illuminating or burning fluids, by what ever name known, which may be manufactured or offered for sale in this state; said inspector shall be a competent and qualified person, and shall at his own expense provide himself with the necessary apparatus for the testing of any such illuminating oils or fluids.

SEC. 2. It shall be the duty of the inspector, when called upon for that purpose by the owner, manufacturer of or dealer in any of said illuminating oils or fluids, promptly to test the same within the city or town for which he is appointed. The inspector shall in all cases take the oils or fluids for test from the package which is intended to be branded, and in no case shall he mark or brand any package before first having tested the contents thereof, and the quantity used for testing such illuminating oil or fluid shall not be less than half a pint, and shall be tested according to the provisions of this act, and all such illuminating oils or fluids that will emit an inflammable vapor at a less temperature than one hundred and ten degrees Fahrenheit, he shall brand "rejected for illuminating purposes," and all that will stand the flashing test of one hundred and ten degrees Fahrenheit, he shall brand "approved standard fluid."

SEC. 3. The inspector shall, in addition to the brand in section two provided, affix his brand or device upon each package by him inspected, designating first, his name and place and date of inspection thus, ————, inspector of ————, 18—, second, the flashing point,

thus, ———"F." and if the fluid inspected has a flashing point below one hundred and ten degrees F, he shall brand such package with the words "highly dangerous."

SEC. 4. If any person, manufacturer or dealer, shall sell to any person whatsoever in this state, any of the said illuminating oils or fluids before first having the same inspected as provided in this act, he shall, on conviction thereof, be fined in any sum not exceeding three hundred dollars; and if any manufacturer or dealer of said illuminating oils or fluids, shall with intent to deceive or defraud, alter or erase the inspector's brand to indicate a different fire test; than is found by the inspector, or shall use with such intent packages having any inspector's brand thereon, without having the contents actually inspected shall, on conviction, be fined in any sum not exceeding fifty dollars for each such offense.

SEC. 5. If any inspector shall brand any package or packages of the said illuminating oils or fluids in the manner prescribed for, "approved standard fluid," when such oils or fluids possess a flashing point of less than one hundred and ten degrees F, he shall on conviction thereof, be fined in the sum of three hundred dollars and forfeit his office.

SEC. 6. All prosecutions for fines and penalties under the provisions of this act shall be by indictment or information in any court of competent jurisdiction, and when collected, shall be paid into the treasury of the county where the offense is committed, one half of which shall be paid to the informer, and the other half to be paid to the common school fund.

SEC. 7. The inspectors are hereby empowered, if necessary to the convenient despatch of their respective duties, to appoint competent deputies, empowered to perform the duties of inspector, and for whom they shall and are hereby made respectively responsible and accountable.

SEC. 8. Every person appointed inspector, shall before he enters upon the duties of his office obtain a certificate of competency from the professor of chemistry at the University of the State of Missouri, and take an

oath or affirmation to support the Constitution of this State, and of the United States, and to perform the duties of his office with fidelity; he shall also execute a good and sufficient bond to the State of Missouri, in such sum and with such securities as shall be approved by the mayor of such city, conditioned for the faithful performance of the duties herein imposed on him, which bond shall be for the use of all persons aggrieved by the acts or neglects of such inspector or his deputy.

SEC. 9. The term of office of inspector shall be for one year, and for his compensation he shall be entitled to demand and receive from the owner of the illuminating oils or fluids tested, and marked and branded as in this act provided, twelve cents for each barrel, and six cents for each smaller package.

SEC. 10. The respective inspectors appointed under this act, shall keep a correct record of all illuminating oils or fluids inspected, in a book to be furnished by the city authorities of such city, and which shall be open to inspection by all persons interested, and report annually to the governor the number of barrels and smaller packages inspected, and quarterly to the mayor of the city for which he is inspector.

SEC. 11. No inspector nor deputy inspector shall, while in office, be interested directly or indirectly in the manufacture or vending of any of the said illuminating oils or fluids, to be inspected under this act, nor shall he for the purpose of testing, take away or appropriate any part of said illuminating oils or fluids to his own use, or for the use of any other person, under penalty of five hundred dollars, to be recovered by an indictment or information, in the manner provided for in section five of this act.

SEC. 12. The apparatus to be employed in this test shall consist of an outer vessel of metal to contain water, about four inches in diameter and four inches deep, so contrived that some source of heat, such as a spirit lamp or gas burner, can be applied to it to heat the water which it contains; an inner vessel of thin metal to contain the petroleum to be tested, about two inches

in diameter and two inches deep, provided with an external rim or flange, above which the edge of the vessel shall rise about one-fourth of an inch, and by which it may be supported in the outer vessel, so that its contents may be heated through the medium of the water; a Fahrenheit thermometer, with a spherical bulb, in the scale of which ten degrees shall occupy at least half an inch in length. In making the experiment with this apparatus, the inner vessel shall be filled with the petroleum to be tested, but care must be taken that the liquid does not cover the flat rim; the outer vessel shall be filled with cold or nearly cold water, a small flame shall be applied to the bottom of the outer vessel, and the thermometer shall be inserted in the oil so that the bulb shall be covered by the petroleum; when heat has been applied to the water until the thermometer has risen to about ninety degrees Fahrenheit, a very small flame shall be quickly passed across the surface of the oil, taking care however that the flame shall not touch the oil; if the vapor be not ignited, that is, if no pale blue flash or flicker of light be produced, the application of the light shall be repeated at about every two degrees of increase of temperature, until the flash of the ignited vapor can be seen, and the temperature at which this first takes place is the temperature at which the sample of petroleum gives off an inflammable vapor, and shall be marked upon the package, tested as the flashing point of such oil or fluid tested.

Sec. 13. Whenever any vacancy occurs under this act by death, resignation, removal from office or otherwise, the mayor of the city where the vacancy happens, shall immediately certify the same to the governor, who shall appoint and commission his successor, for the remainder of the term of office as herein provided, and in all cases where any inspector shall be charged by indictment or information, for a violation of the duties of his office as herein before provided, the governor may suspend him from the duties of his office, and appoint another one to fill such vacancy during the time such inspector shall remain suspended.

Sec. 14. All acts, amendments and parts of acts in

relation to the inspection of coal oil and petrolenm oils are hereby repealed.

SEC. 15. The necessity of an immediate change in the law, there being none now in force, whereby delinquent inspectors can be removed, is hereby declared an emergency, and this act shall take effect and be in force from and after its passage.

EVOLUTION AND CREATION.

By George C. Swallow, M. D., LL. D., Professor of Agriculture and of Natural History, and Dean of the Agricultural Faculty.

Three hundred and eighty-six years ago the third day of last August, there was a grand Gala Day at Palos in Spain. By the wishes of the good Queen Isabella, the courts of Castile and Arragon and the dignitaries of the Catholic Church, were assembled in that goodly city to pronounce a benediction upon Columbus and his three small ships, which that day sailed from this renowned port. These poor pinnaces, unseaworthy, badly manned and poorly equipped, turned their prows boldly out into the broad Atlantic, and for seventy-one days held their way into the vast expanse towards the setting sun, in search of the rich Cathay. As day after day passed by and favoring winds and currents bore them on and on, into the vast unknown, a superstitious fear settled down like a pall upon the ignorant sailors. They believed the earth a broad expanse, bounded by precipitous edges. They saw in their fears the trade winds and the equatorial currents bearing them steadily on to the fatal verge, over which they would plunge down and down into the fathomless abyss below.

But Columbus believed the earth a globe, and that he would find the *east under the setting sun!* The

fearful sailors counselled a return before it would be forever too late. Columbus with sublime faith in God and science, held a steady helm, and kept his course. The sailors plotted mutiny and threatened violence; but the intrepid leader kept his undeviating way, and on the morning of the twelfth day of October, planted the banner of Spain and the Church on San Salvador.

Thus ended the first great conflict between modern science and the church. The church taught that the earth is a *broad expanse* of land and water; but the dawnings of science declared it a *globe*. Columbus believed the science and conceived the idea of reaching China and the Indies by the west. He spent ten years in trying to persuade the monarchs of western Europe to furnish means for the voyage. But their Catholic majesties disbelieved his science and doubted his ability to solve the geographical paradox of finding the *east in the west*.

But the good Queen Isabella gave him the ships and the doubting prayers of the church for his success and safe return.

His *failure* to find *China* became a grand success in finding *America*. It was a splendid triumph for both science and the church; as it gave a new continent to the church for its victories, and to science for its wonderful discoveries.

This conflict involved no important religious truth; but there is another conflict between *some scientists* and the church, now waged with unparalleled ability and zeal all over the civilized world. In it are involved some of the vital truths of the Christian religion, and indeed, of all religions. It involves no less a question than the origin of man—whether he descended from a created Adam, or whether he must trace his ancestry

back through a countless series of animals to an infinitesimal speck of self-evolved sarcode.

The one is the teaching of the Bible, the other is the Theory of Evolution. The one is the teaching of God's word; the other claims to be the indication of God's works. But the word and the works of the Creator must agree. If they do not agree in both appearance and reality, it is because we do not interpret the one or the other aright.

Some appear to think that this disagreement between some scientists and theologians is fatal to both science and religion; but they should remember that the expounders of natural laws and christian teachers are alike fallible men; that they often do make mistakes in their expositions of natural and revealed truths. We might illustrate our ignorance:

An ocean steamer is a little world in itself. The owner provides the power for running the steamer and all things needful for the comfort and safety of the passengers. Two philosophic flies happen on one of these steamers. They determine to investigate its nature and laws. One fly goes down into the engine room and finds the water hot and vapory. The other fly investigates the dining table and finds the water cold and icy. There comes a grand conclave of the fly people; and the two investigators big with the magnitude of their discoveries, come from the antipodes of the ship-world and report. One reports his discovery of *water cold as ice*, which the people drink; and the other reports his discovery of *water as hot as fire*, which makes the steam to propel the ship.

The first positive in the fullness of his knowledge, loftily condemns the discoveries of his fellow-worker as rank heresy, fraught with the most fearful consequences

to the whole race. For, said he, if we drink his boiling water, it will kill us all. The other replies with equal zeal and assurance, that the teachings of his co-worker are mere superstitious dogmas, fit only for the ignorant and the vulgar. For, if water were cold it would make no steam, the ship would stop in mid ocean and involve all in universal ruin.

The flies take sides. The *cold water flies* and the *hot water flies* wage a bitter contest, until some observer sees the water poured into the tea kettle *cold* and come out *hot*, and reports the fact that water may be both cold and hot. This proves both parties right and both wrong—both right in the facts reported, and both wrong in the conclusions drawn from an imperfect knowledge of water.

Thus we might expect ignorant flies to differ about the nature and functions of the outfit of a steamer. No less should we expect ignorant men to differ about the moral and physical laws of the universe.

Some men seem to think a difference of opinion involves a criminal neglect of truth and duty; that scientists, who announce truths or theories apparently conflicting with the interpretations of revelation, are heretical and pestiferous, inimical to the cause of truth and christianity. But it is a remarkable fact that a larger part of the scientists thus condemned as hostile to the church, have been its devoted members; and many of the facts so vigorously condemned, have been accepted as true by the church itself. Among these may be mentioned the astronomical theories of Galileo and Copernicus, and the geological conclusions of Conybeare and Murchison, as to the age of the earth.

The theories thus far condemned have done very little injury to science or religion. A difference of

opinion among the flies, could scarcely retard the progress of an ocean steamer; so the theories of men will scarcely mar the progress of nature or the faith of men.

Tyndall's denial of the efficacy of prayer, has scarcely checked a father's care, or lessened the number of devout worshipers. Every christian must feel for him as for an orphan, who knows no father's listening ear. And every one can but pity a man, whose sublime *impudence* permits him to tell the hundreds of millions who know their prayers are answered, that they are deceiving themselves and bearing false testimony to their fellow-men.

So every scholarly christian must blush with shame when he hears our christian teachers confound the *creating* and *making* of the glorious *Mosaic Cosmos*, or in any way violating the acknowledged teachings of science and revelation.

HISTORY OF EVOLUTION.

But "*Development*," which you invite me to discuss, is no matter of recent origin; nor did it come fully developed like Minerva, all armed from Jupiter's brain. It has come in fragments from the brains of sundry speculators along the ages of the last three thousand years. But it was left for modern scientists to weave the parts into that ingenious system called *Evolution* or *Development*.

A history of the origin and progress of the various parts, would be instructive; but it would consume my hour. I can only glance at the origin of some of the most salient features.

Epicurus, so far as I know, gave the first distinct declaration of the *spontaneous generation* of *animals* from the dust of the earth. This Grecian philosopher taught that the primitive earth, rich and nitrous and

warmed by the sun, was soon covered with plants, and that animals sprang spontaneous from the fat soil.

About the middle of the last century, M. Maillet published a *philosophic romance*, in which he made the ocean the source of the lower orders of organic beings; and when the land appeared in the primeval ocean, these lower forms of plants and animals came trooping up from the teeming seas to populate the inviting shores. Flying fish became birds and creeping things, four-footed beasts; and some imaginary monsters, mermaids perhaps, became men.

In this author, we have the distinct *transmutation* of *species* announced in a form but slightly more reasonable than that in the fable of Deucalion. The change of fish into birds is a little more plausible than that of stones into men.

At the beginning of the present century, M. Lamarck and other French savans reasserted the theory of development and the transmutation of the lower animals into the higher, until all were produced by natural laws, without a Creator to give the vital spark and inspire the moral and religious nature of man.

But towards the middle of this century, *The Vestiges of Creation* appeared in England. In this famous work, the ingenious author combined the *Nebular Theory* of La Place, by which the *Heavenly bodies* were evolved out of the primeval *star-dust;* the *spontaneous generation* of Epicurus, by which the world was peopled with plants and animals; and the *Evolution* of Maillet, by which the simple animals, that sprang like mushrooms from the fat primal earth, were developed into the higher and higher orders, until the monkey becomes the man.

And all these wonderful miracles, these suspensions

and violations of laws, are accomplished by the laws themselves—by the powers of matter inherent in the primordial star-dust.

These remarkable departures from the usual standards of doctrine in both the scientific and religious worlds, were so great and startling as to attract universal attention and to awaken much solicitude for the stability of those opinions, upon which had been based the world's progress in letters, philosophy, science and religion. Mankind had believed there could be no beginning or change of existence without an adequate cause. And yet this Hypothesis of Development asks us to believe in a Nebulous matter or star-dust, which filled all space, condensed around certain centres, assumed a rotary motion, and from time to time threw off masses, which became systems, planets and satellites; that our planet was pregnant with spontaneous life; that seaweed covered all the shores with gaudy colors; that myriads of Protozoans swarmed in all the waters, and countless Polyps reared their coral cities in all the shallow seas; that when the first dry land appeared, the first of living things came swarming out upon the welcome shore and were transformed as each most desired into creeping things, the beasts of the field, the birds of the air, and even into man himself; and that all these wonderful creations and transformations came with no creative power and no power to rule, save what was inherent in the original star-dust.

But the *Vestiges* contained a formidable array of facts and fiction, science and philosophy, reason and sophistry, to sustain its strange theories. The discussions which this work called out, were exceedingly able and so fully sustained the old standards of thought and reason that scientific men continued to believe in the creation

and immutability of species, and the church-men in the Creator and the Genesis of Moses.

Some ten years later Mr. Charles Darwin published *The Theory of Evolution*, somewhat modified. He adopts the idea of Oken, that the first and lowest forms of animals were created; and from these simple primary animals, mere jelly-specks, all the higher orders were developed by *natural selection* and the *survival of the fittest in the struggle for life.*

Mr. Darwin has collected a vast array of facts from all departments of nature to illustrate his Hypothesis. He presents the facts and arguments with great fairness and ability. Still he does not appear to feel his theory proved; but that the facts which sustain it, far out-weigh those which condemn it.

Many, especially English and American scientists, who rejected the theory of Lamarck and the Vestiges, accept it as modified by Mr. Darwin, admitting the creation of the primordial animals. But the French more generally reject it. It is a remarkable fact that many nominal Darwinians not only accept the theory of their great leader, but also the entire unadulterated system of the Vestiges.

There are other singular facts in this connection. While the young Zoologists and Botanists of America accept the theory in its extreme form, the older Geologists reject it, while the advocates of the theory appeal to the vast cycles of the geological record for proof, the Geologists themselves fail to find any real proof in that record; while Tyndall and Proctor, who know but little of plants and animals and geology, accept development, Agazziz and Dawson and Hall, the first of all naturalists especially in the departments upon which this theory rests, wholly reject it.

Having stated this epitome of the history and present status of the Development Theory, I propose to examine very briefly some of the arguments by which it is sustained, and to present a few of the objections to it; and to do this from a purely scientific standpoint. It must be borne in mind that science accepts no theory as proved, until it is shown to be in perfect accord with all important known facts of science.

Whatever may be the opinion of Mr. Darwin or any other individual, the real question at issue in this whole discussion, according to Drs. Sebastian and Child, Prof. Haskel and Mr. Herbert Spencer, and Mr. Huxley, is whether all organic beings, all plants and all animals have been produced by the laws of nature without any supernatural creative power.

In this are involved two distinct questions:

1st. Whence came the first plant and the first animal? Epicurus says by the spontaneous generation of the earth. Evolution also says, by spontaneous generation. But Moses says, by creation.

2nd. Whence came the first plant and the first animal of each species? (There must have been a first dog and a first horse and a first man as well as a first of all animals.) Evolution says, by natural selection and the survival of the fittest. But Moses says, by creation.

Let us examine what science says on the spontaneous generation of organic beings and the evolution of species, by reviewing the leading arguments adduced to prove these hypotheses.

SPONTANEOUS GENERATION.

Many who believe in the spontaneous generation of animals, have been experimenting for many years to prove the theory.

Some thirty years ago, one Dr. Crosse announced

his success; that he had evolved new animals by passing a galvanic current through certain solutions. These minute beings were all alike, and were named *Acarus Crossii* in honor of their creator. But alas! for human hopes! Mr. Crosse exhibited his experiment; and the little mites came trooping up the wires from the productive solution. But an observer recognized them as old acquaintances—they were the well known little *spiders*, *Acarus horidus!* and Dr. Crosse was compelled to step down from the high throne of a creator to the very humble seat of a *hatcher of spider's eggs.*

Several other experimenters have supposed they had succeeded in this new line of creation; but careful investigation has clearly proved that they had merely warmed into life the germs of pre-existing organisms.

So far then as science speaks at all on this subject, it says there is no such thing as spontaneous generation of organic beings, and sustains Harvey, that all living things came from germs or eggs, the products of parental beings—"*Omne vivum ex ovo.*"

Since then science has settled this question of spontaneous generation against Epicurus and Lamarck, Crosse and their followers, it only remains to inquire how far science sustains the evolution of one species from another.

EVOLUTION.

Various arguments are advanced to prove that Evolution is the source of the higher orders of animals and plants. These arguments claim our careful attention, as upon the issues depend many opinions which mankind have held as sacred as household gods.

I. BY HYBRIDISM OR THE PRODUCTION OF HYBRIDS.

It is claimed that Hybrids, as the mule from the ass

and the horse, become distinct species; and that the higher orders were thus produced by natural laws only.

It is well established that mules or Hybrids, are sometimes produced in both the animal and vegetable kingdoms; and that Hybrids are like both parents in some respects and unlike both in others.

But there are many very serious objections to Hybridism as a mode of developing new and higher species of animals.

1. There are few if any instances in which Hybrids are capable of perpetuating themselves. All the skill and science of men, incited by the hope of boundless gain, and aided by the resources of nations, have been exerted in vain to produce a fertile mule. Man has exhausted all his resources for these thousand years; he has brought to his aid all the relatives of the equine family—the Zebra and Quagga from the wilds of Africa and the Hemionus from the steppes of Asia, to aid his grand work in producing a fertile equine Hybrid. But all in vain. All the Hybrids prove barren *inter se.* The integrity of species is sustained—the creative feat stands vindicated.

2. The Hybrid is sometimes fertile with one or both parent species; but in all such cases the progeny looses the characteristics of the Hybrid and returns to one or the other of the original species, thus barring all hope of a new species from such Hybrids.

3. In the vegetable kingdom, it is well established, though disputed by some, that Hybrids may be fertile. But it is clearly shown that the progeny of the Hybrid returns to one or the other of the parent species; as proved by the seedlings of the famous Bartram Oak, from which it was expected a new species would be established.

4. It is admitted by all that Hybrids seldom occur in nature; that nearly all well established cases, have been produced in the domestic state and by conditions forced upon the parents by the power and art of man. Such is the want of sympathy between different species in the state of nature as to preclude the production of Hybrids under all ordinary circumstances of natural animal life.

5. If the 500,000 species of animals have been produced by Hybridizing a few of the primitive species, nearly or quite all of them must have been produced in a state of nature; since they are older than man, or at least contemporary with him, and could not have been produced by his aid.

6. Hybrids partake of the nature of both parents. They are seldom higher or lower than the average of the two ancestral species. No Hybrid has shown the characteristics of a higher species or order. If then it were even proved that Hybrids form new and permanent species, the higher orders could not have been thus produced from the lower primordial species.

There are therefore no facts to show it even possible to produce a carniverous Hybrid from herbiverous parents, none to show even the remotest possibility of producing a human Hybrid from any two species of monkey.

It is claimed by many that the various races of dogs were produced by Hybridizing two or more species of native dogs. If so the experiment has been a long one and under man's best care. But it has produced nothing but dogs; and no one expects it ever will produce anything but dogs.

II. BY NATURAL SELECTION.

But the most important modification of the Theory

of Evolution, is that of Natural Selection or the survival of the fittest.

By this theory Mr. Darwin and many others claim, that the changes produced in animals and plants by food, climate and other causes, are preserved and transmitted when those changes improve the animal, and give him greater fitness for the conditions of life in which he has been placed; and that those not thus improved will be less able to sustain themselves and will perish in the struggle for life; and thus by the survival of the fittest, animals will be gradually improved until new species are formed.

It is claimed by this hypothesis that the progress of the species will be constantly upwards, so that by this development continued through the ages past, the low primeval species have been changed into the higher orders until the jelly-speck has become the man.

It will be seen that the grandest results are claimed for this species of Evolution. From it we have all the 500,000 varied forms, shapes and sizes, which swim in the water, fly in the air and live upon the land.

Any system or theory which thus comes in to change the whole current of thought in our race, should come with good credentials and prove itself in perfect accord with the laws of nature, before it can be admitted as a principle of science.

True Science is cautious and conservative; no defect can long escape its probe and scalpel. Very many important conditions must be fulfilled before this theory can be accepted as the origin of all the higher organic beings.

Among others it must be clearly shown that the first animals were of the lowest orders; that these were followed by those a little higher, and these again by oth-

ers still higher—up and up by minute gradations through all the thousands and thousands of stages to man, the highest in the scale.

But the facts show no such succession. There is however such an approximation to it, as could give the casual observer a plausible basis for the Theory of Development. Some of the lowest animals did appear among the earliest forms of life; and there was a continual introduction of higher types until man completed the series. But when we examine this succession in its details as developed in the rock record of all the vast geological cycles, we find thousands of stubborn facts, which utterly preclude the idea of such a continuous and regular succession from the lower to the higher as the theory demands.

A few only of these facts can be examined at this time.

1ST. In this rising development of the animal kingdom, we have five very marked stages of progress, each represented by a sub-kingdom in the classification. In the Primordial strata, the very oldest rocks known to contain animal remains, we find *Protozoans*, *Radiates*, *Mollusks* and *Articulates*, representing four of the five sub-kingdoms; and these four contain more than nine tenths of all the animals that have ever lived.

If, therefore, Development be true, it made a thousand fold more progress at the very outset, when it was working upon microscopic mites, than it has since through all the vast cycles of the Silurian, Devonian, Carboniferous, Reptilian, Mammalian and Human ages. This is scarcely credible.

2ND. The theory demands a regular succession from the lower to the higher in a continuous series both in time and grade. But the facts show this is not so in a

vast number of cases scattered through the whole series from the lowest to the highest. As an illustration, Cephalopods, the very highest order of *Mollusks* and *Trilobites* high among the *Articulates*, appeared among the first animals and the first fishes were much more perfect than their immediate successors, and even than many now living.

If the Armor-bearing fishes were developed into the Salachians which succeeded them, the progress must have been like Virgil's *descensus* in *averno*, easy and downward.

3RD. Since this theory depends upon the survival of the fittest in the struggle for life, it made a grand mistake when it filled the early seas with a huge race of mailed sharks and ganoids, to be the progenitors of the more perfect and wholly defenceless *Teliosts*.

Science has failed to show how the Cod and Turbot could be the fittest to survive in the struggle for life with their proginators the Sharks. There are hundreds of similar impossible successors.

4TH. Many animals and plants have had no ancestors and no progeny. Trilobites had neither ancestors nor posterity. There was no animal for them to be developed from, and they left none to be developed into. It would take a strong power to develop the Elephant out of any animal that lived before him. The same is true of whole races of plants; as our deciduous trees.

5TH. The theory demands not only that the lowest of any given order should appear first, but that the highest of the lower order should be followed by the lowest of the succeeding higher order, family or genus. Thus: if A, B, C and D represent successive classes, and the numbers 1 and 5 represent the different orders in these classes, the theory would demand a regular suc-

cession from 1A to 5D. Thus—1A, 2A, 3A, 4A, 5A, 1B, 2B, and so on to 5D. But in fact we usually find the lowest order of any class preceding the highest order of the lower class, thus:

1A, 2A, 3A, 4A, 5A,
1B, 2B, 3B, 4B, 5B,
1C, 2C, 3C, 4C, 5C,
1D, 2D, 3D, 4D, 5D.

The last arrangement represents the actual order of progression from class to class in a vast number of cases; as the transition from the Mollusks to the Articulates.

The Devil fish is the highest of the Mollusks, and the Worms the lowest of the Articulates. But according to the Theory, the Devil fish should be both lower than the Worm in the scale of being, and prior to it in point of time; whereas he is just the contrary in both respects. The Worms were among the earliest animals, and the Devil fish, among the latest. And yet the Devil fish must violate all sense of propriety and all order of time to make the theory good. He must perform the double miracle of transforming his magnificent proportions—a body as large as a steamer's boiler, and arms as long as the jack-staff, into a puny mud-worm, who lived millions of years before his ancestors, the Devil-fishes, were born.

So often is this arrangement true, that it becomes the rule rather than the exception, and appears to be an insuperable objection to the theory.

Many of the changes demanded by Evolution are so supremely preposterous as to provoke a smile and leave the conviction of utter impossibility. The highest Articulate is a tiny insect, and the first Vertebrate, the next in order of the grade, was a huge fish covered with a thick coat of mail. Could you see the earliest fish ever found on this continent as nature embalmed him in the

rocks of Indiana, side by side with his insect ancestor, you would think it would require about as much of a miracle to develop the fish from such an ancestor as it would to make him from the dust.

6TH. If all plants and animals have been born of development, there ought to be some proof of such changes within the 5,000 or 6,000 years of the Historical Period. But there is no record, no proof, no claim that a single species has been produced in these long ages. Some have become extinct; but none have been added even by man's aid. We are reminded of many changes producing varieties; but of none that claim the distinction and permanence of species. And besides, nearly all the important variations have been produced by man in the domestic state.

The variations of the domestic pigeons are perhaps the most marked, and Mr. Darwin has made them most prominent. Still the extreme varieties are fertile among themselves, and their progeny show marks of the original stock, and a disposition to return to the Rock-Dove.

We are also referred to the Berkshire as a great improvement on the wild boar, and the Spanish Merino on the wild sheep. But there is about as much proof that the Hydraulic Ram is the result of development as there is that the Spanish Merino comes from a survival of the fittest in a region populated with bears and wolves and hyenas and lions.

But what claim has the Berkshire to superiority as the fittest to survive? Fat. Yes, fat brings more dollars and cents! but dollars and cents do not mark the scale of superiority among animals. If fat makes perfect, then the opossum is superior to the squirrel, the hog to the horse, and the African to the Caucassian.

If, however, the Berkshire is a fair sample of development, he should be able to survive in an open struggle for life with his undeveloped ancestor. The test is easily made. Turn your Berkshires into the forest with the wild hogs; place them together for the struggle in the same arena where the survival of the fittest, according to the Theory, has won so many victories in producing so many thousand new animals. No one can doubt the result. If the Berkshire survives at all, it is because he will lose what makes him a Berkshire, because he becomes a wild hog, as many a fat pig has done before.

This trial was made under the most favorable circumstances during the late war. By Order Number 11, Berkshires, Chester Whites, Poland Chinas, and Racers were turned out to struggle for life in our western counties. A few years after I was surveying that country and saw many of these hogs and their descendents. But few indications of the improved breeds remained, and the younger specimens bore decided marks of lapsing to the original type. And this is what we should expect from the very laws of life.

There are volumes of facts to show that horses, oxen, dogs and hogs, runing wild, gradually lose all domestic variation and assume a uniformity of color, size, and structure supposed to be, and in some cases known to be, like the primitive wild stocks.

This is clearly shown by the wild horses of Tartary and in a less degree by the wild horses of the Falkland Islands and South America, and the semi-wild herds of the North American Indians. The wild horses of America have changed less as they have been in a wild state a much shorter time.

But the variations in domestic animals are much less

than would be at first thought supposed. Those which are at all marked, are confined to a few species; while the others have scarcely changed at all for many thousand years. Many figures and embalmed specimens of our domestic animals and plants, have come down to us from the ancient nations of Mesopotamia and Egypt, which shows that their living descendents have made no material progress for the last forty or fifty centuries. We also have still more ancient proofs of this permanence of type in the domestic animals and plants from the ruins of the Swiss Lake dwellings, and the Danish Shell-heaps, and the Cave-dwellers of Central Europe.

Should it be even admitted that domestication has produced new species, the fact would scarcely make the evolution by natural selection possible; since there is so little analogy between the possibilities of the domestic and wild states. You might as well attempt to prove that our native Crab-apple was developed from the Haw, because man can grow Bellflowers on the domesticated Siberian Crab; as to prove the horse was developed from the ass, because the carrier pigeon is the progeny of the wild Rock-dove.

This difference of possibilities between the wild and domestic state, is well shown in the hog and pigeon. Great as are the changes produced in the domestic hog and pigeon, it is known that their wild representatives have made no perceptible changes since the flood, either by natural selection or by the survival of the fittest.

If then we would measure the probabilities of forming new species by natural selection, our illustrations must come from the natural or wild state; since that is the only state where natural selection can act, and the only place where species have been formed, if formed at all, by natural powers.

We must, therefore, hold the changes produced by man in domestication, of little value in this discussion.

7TH. But every one of the numerous breaks in the series of animals, has a significance of the highest value in this relation, since each and every one of them must prove fatal to evolution. For Pope's couplet is emphatically and literally true here:

"From nature's chain whatever link you strike,
Tenth or tenthousandth, breaks the chain alike."

And yet there are hundreds of thousands of these breaks, missing links, impassable gulfs, over which science has found no bridge.

But it is said the missing links are buried in the Geological Records. This is a delusion; for Geology is the most unhealthy place for Darwinism imaginable.

To illustrate: let us examine one only of these many thousand breaks in the succession; and let us take one with which all are familiar, and one that presents the fewest difficulties to the progress of evolution—the link between the monkey and man in its physical aspects.

All admit there is a break between the man and the monkey, as they now exist, which must be filled by a series of beings gradient by small steps of progress from the monkey to the man. These gradient beings must have been very numerous and of too remarkable a character to be over looked if now living, or for their remains to be lost, if they ever did live.

(a.) It is very remarkable that all these gradient animals, which connected these two living races, and by which the monkey was developed into man, should have utterly perished. All the gradients, all the links between the Carrier Pigeon and the Tumbler, and those between the Bull-dog and the Grey-hound, are still liv-

ing and more numerous than ever before. Will some Darwinian tell us why all of man's nearest and best ancestors have become extinct, while the hundreds of thousands more remote and less desirable, still live like poor relations to remind us that we are something worse than mortal?

If these gradient animals between the man and the monkey were fitter to live than the monkey, as the Theory of Evolution implies, why have they all perished while so many monkeys live?

(b.) Men and monkeys have lived together upon the earth ever since the origin of man, sometime in the Drift Period, which evolutionists say was 300,000 years ago; and the monkey came into being in the Eocene, the dawn of the vast cycles of the Tertiary. This surely gives us time enough to test the theory.

The monkeys have left their remains, recording their history in all the rocks of these vast cycles and in all the continents, in Asia, Africa, North and South America and in Europe. Their history has been tolerably well written up.

Man has lived in Europe since the Drift Period, in Asia and Africa probably as long, and in America nearly as long. He has buried his bones and scattered with free hand his implements, his carvings, his monuments, his temples, his dwellings, his traditions, and his books all along the ages and all over the world. From these abundant materials, man's history too is pretty well made up.

Man has searched with untiring zeal for all that is new and old; he has desecrated tombs and temples to lay open their mysteries; he has exhumed ancient cities —Herculaneum, Troy and Ninevah give up their hoary records—he has, also, fished up from the depths of Swiss

lakes the remains of their ancient Lake Dwellers; unearthed the Mound-Builders and Aztects of America; dug up the Cave-dwellers of Europe; and searched all the rocks these hundred years; and yet he has not found a mark nor a fragment to show there ever were any beings between the man and the monkey, that man was ever any more like a monkey than he now is, or that the monkey was ever more of a man than now.

The embalmed men and monkeys of the Egyptian tombs, are the same as the living men and monkeys, no nearer together, no farther apart.

The still more ancient traditions and mythologies make the most ancient men heroes and demi-gods, quite as perfect as we are.

Of the pre-historic man, the most ancient relic found in Europe about which there can be no doubt or dispute, is the Engis Skull. Of this skull, Prof. Huxley says: "It is a fair human skull."

The oldest skull found in America about which there can be no question of origin, is the New Madrid skull, which is a fair Caucassian skull. It might have been of a Hebe or of an Eve.

We also have ancient skulls of a lower type; but none lower than the skulls of some living men.

The history of the monkey shows that he is no nearer a man now than he was at the beginning. The rocks show no intervening varieties.

We must conclude, therefore, that the wide chasm between the physical structure of the man and the monkey is not and never has been filled; and that there is no evidence whatever making it physically possible to derive man from the monkey.

III. EMBRYOLOGY.

But one of the most plausible arguments of the Ev-

olutionists, is drawn from Embryology. The embryos of the higher animals resemble the embryos of the lower ones in the early stages of development; therefore, the higher animals are developed from the lower. As the embryo of a man is like a fish at one stage of its development, so man was developed from a fish.

But Agassiz, who had studied Embryology more thouroughly than any man living or dead, said this argument had no valid foundation. No embryo has produced a being either above or below the parental species. Prof. Virchow, the best living authority, bears the same testimony as Agassiz.

IV. THE ORIGIN OF THINGS.

But if all other difficulties were removed, if there were a complete series of animals from the lowest to the highest—all having such close affinities that each could be traced to its ancestral species, there would still remain three insuperable objections to Evolution as a system of nature.

1st. It does not account for the Star-Dust, the original matter from which the worlds were evolved.

Development is the evolving of something out of something else, or some other thing. Hence Development cannot evolve something out of nothing, or the original matter of the worlds out of nothing.

And, besides, Development acts by the laws of nature and by these laws only. But these laws are mere properties of matter, inherent in and dependent upon matter for their powers of action, and for their very existence. These laws, therefore, or Development acting by them, cannot originate the matter of which they are the mere properties.

Science clearly indicates a first cause, which must

be without and superior to nature. Science too as such, must accept whatever first cause best meets and explains all facts and conditions of the natural world, whatever first cause is in best accord with science itself, or the laws of nature.

Several theories of the origin of the material world, have been proposed. But that promulgated more than 3500 years ago by one Moses, a learned Egyptian, declares the first cause to be a supreme being, immortal, invisible, all-wise, benevolent, and the Creator of all things.

Scientists have generally accepted the *Mosaic Theory*, as in best accord with the teachings of science itself. It is true that men love to hear and believe something new and strange; but neither common sense nor science will give up this theory of a Creator until something better is proposed. You might as well expect the passengers of an ocean steamer to give up their good ship in mid ocean and take passage in a leaky skiff, as to give up the Mosaic Creator for Evolution.

2nd. Evolution gives no solution of the origin of life and the peculiar structure of Organic Beings.

Science has clearly shown there was a time when neither plant nor animal existed on the earth; when there was nothing but inorganic matter, dust and rocks.

There were no laws governing life and living beings; for there were no life and living beings to be governed.

But in the progress of events, plants and animals appeared upon the earth, and with them the laws, such as digestion and assimilation, which control organic beings.

Several theories have been proposed to account for

the origin of living things. Among others we have had Spontaneous Generation, the Fortuitous Concourse of Atoms, and Evolution. Which of these is most plausible, I am unable to tell. And it would be difficult to say in what they differ.

But none of them are known in nature; and science has as clearly proved them impossible, as it is possible to prove a negative, by showing that all living things come from eggs and that all eggs are produced by living beings. So certain are we of this that our laws and jurisprudence are based upon it. Upon its certainty we imprison and hang men and women. In short we hold this scientific principle more sacred than we do property, character and life itself.

How then can we believe in spontaneous generation? in the Evolution of animals?

It is quite certain that Evolution cannot produce living things; for in them we find life, and new laws so strong as to overcome the pre-existing laws. The laws which raise up the oak and the elephant, overcome gravity and inertia; and those which form sugar, starch, blood and muscle, overcome pre-existing affinities.

Evolution can only transform, and there was nothing in nature to be transformed into life.

But it is said Evolution works through the laws of nature. But no facts, no science, has shown that one law can produce another law superior to itself.

It is therefore utterly impossible for the Evolution Theory to account for the origin of organic beings, and the laws of life.

Here again, the Mosaic Theory is the only one yet proposed, able to solve this problem of the origin of living beings. The Supreme Being of this Theory, has the power, the wisdom and benevolence to give the life

and the superior laws of organic beings. And there are no facts, no science, which militate against this Theory of Creation, though promulgated 3000 years before the rise of modern science.

If on the morrow, we should find new houses and cities springing up all over our prairies, houses not made with hands or any other known power; if we should see the soil rise up into the houses and form itself into foundation ashlers harder than adament and more beautiful than rubies; the clay rise and form itself into bricks in the wall, more delicate than opal, and the sand into windows as clear and sparkling as diamonds—all forming houses more gorgeous and brilliant than the palaces of the Arabian Nights; if we should see cars rolling through the mid heavens without track or engine, but self-poised and self-impelled, and leaving trails as bright as rainbows; if on the morrow we should see for the first time such wonderful beings with power to multiply themselves indefinitely, would we say they had sprung spontaneous from the earth? that they had been produced by Development? or rather, would we not say they are the work of some supernatural power? that they are the creatures of the Supreme Being of the Mosaic Theory?

Should such new and wonderful beings appear, it would not be so strange as the first animals and plants were. Man might think he could build a house; but none save Drs. Crosse and Sebastian, would undertake to make the oak or the elephant.

3rd. We find in man, in all men everywhere, a strong inate apprehension of some external invisible power, which, in a greater or less degree, moulds our destinies and metes out to us the good and evil of life; whose anger, therefore, all deprecate with sacrifices, and

whose favor all propitiate with prayers and vows. Some call this universal element of man's nature by one name, some by another. Comte calls it Superstition, Virgil, Piety; Sir Humphrey Davy and Dr. Carpenter call it Religion.

Call it what you will, no animal but man has it. No animal but man, has a moral nature, knows right from wrong, repents, prays, sacrifices. No monkey has superstition or religion; no brute fears or loves the unknown powers, whether they be gods or demons.

Hence there is nothing in the brute that can be developed into man's religious nature. You might perhaps develop a monkey out of his tail, and make him stand erect; his posterior hands may be transformed into those beautiful things concealed in No. 2 gaiters; the teeth and facial angle changed; the diabolical grin, transformed into the ineffable smile of a mother's love; yea, and that tongue, taught to utter the words of affection, fidelity and truth; while we admit the possibility, but not the probability of these wonderful changes, we most positively declare that science has shown no fact, developed no principles, indicating the possibility of deriving man's moral and religious natures from any intellectual power of any brute.

But the Theory of Moses recognizes and provides for this higher nature of man. "God breathed into his nostrils the breath of life, and man became a living soul" an "Image of God."

Thus Moses places man infinitely above all other animals, gives him a brotherhood with angels, and a sonship in Deity.

Shall we then give up this Creation of Moses, which thus elevates us and unites our destinies with the

infinite, for this Evolution of Darwin, that links us to the worm, gives us a sonship in the monkey and binds us to the beasts that perish?

As a christian student of science, I protest. In the name of all the splendid achievements and utilities of science, in the name of all the grandeur of moral truth, and all the sublime hopes of immortality, I am compelled to protest against such a sale of man's birth-right.

INSECT WAYS.

By Samuel M. Tracy, M. S., Professor of Entomology and Economic Botany and Superintendent of Gardens.

In the "Poet at the Breakfast Table" Oliver Wendell Holmes tells us of a man who had devoted his whole life to the study of one group of insects, the *Scarabeans*, and the height of whose ambition was to be known to the world as a Scarabeist, to be an acknowledged authority on that one family of beetles. Clinging to the body of the common bumble-bee is frequently found a little beetle not more than a sixteenth of an inch in length, and to determine whether this insect was a true parasite, or simply attached itself to the bee in order to be carried to the nest, there to live on the food stored up by the bee, was a question to which this man had given the best years of his life.

It may be questioned whether it is wise for a person to devote a whole life to the solution of a problem which is comparatively of so little practical or scientific importance, but it is undoubtedly true that a more intimate acquaintance with insect life and insect ways would be of far more value to us than is usually estimated, and would amply repay a greater amount of study than is generally given to other branches of Natural History.

The weather is a universal topic of conversation; not a daily paper do we read without seeing reports and

predictions concerning the weather in different parts of the country. The United States government has established stations at all important places where daily signals are shown indicating the approach of storms or of pleasant weather. During the past month the papers have been full of reports of the injury done to the fruit trees by the severe cold of the past winter. Last summer there was a universal cry of drouth from Texas to Minnesota, and not a season passes in which some portion of our country is not so deluged with rain as to render travel almost impossible and the farmer's labor fruitless. Violent wind and excessive rain, severe cold and long continued drouth, notwithstanding the fact that they rank in popular opinion as the vicegerents of the Almighty in fixing upon man the primal curse, "By the sweat of thy face shalt thou eat bread" do not, even with their combined forces, entail upon us as much labor and loss as do the insignificant and often unnoticed insects which are to be found almost wherever we will take the trouble to look for them.

Were it not for our insect foes the products of the soil would be nearly or quite doubled annually. There is not a crop to which the farmer can devote his attention which is not invariably injured to a greater or less extent by these almost invisible foes, and often the greatest care and the most unremitting vigilance cannot save his property from utter destruction. Wheat suffers from the chinch bug, the Hessian fly and the weevil, corn from the white grub and the corn worm, potatoes from the wireworm, the potato beetle and the blister beetle, the grape from the phylloxera, the apple from the codling moth and the borer, the peach from the borer and the curculio, the latter of these insects having made a perfect

peach an unusual sight in some districts, besides taking the plum from the list of our common fruits and making it a great rarity. While these and many other injurious insects confine themselves to certain plants which are their natural food and so may be in a manner controlled and mastered, we have still to contend with the army worm and the grasshopper which devour every green thing which grows in their path.

Is it not then worth our while to give some time and attention to the study of a form of life which exerts such a powerful influence upon our prosperity as individuals and as a nation; Yet so limited is the popular information regarding insects that many who suffer most from their ravages fail to recognize their enemies at sight. Even the common white grub worm of our gardens is rarely known for its true self, the next summer's June bug, and the wrigglers so abundant in stagnant rainwater and shallow ponds do not always receive the honors to which the musical mosquito is justly entitled. These are two insects which are among the most common, and with which we all feel quite too intimately acquainted, yet close attention and some knowledge of scientific Entomology is necessary to make it easy to see the relation between their early incompleteness, and their later perfect development. We almost need to see the shining beetle emerging from his underground home, and the mosquito using his discarded wriggler shell as a support for his new long legs as he plumes his newly found wings for his first aerial voyage, to be sure that the books are not wrong about it after all.

For developing powers of exact observation, close watchfulness and attention to minute details, no branch of Natural History is more valuable than the study of insect life and ways. No where else do we find such an

infinitude of forms and at the same time such a general conformity to a very few leading types; nowhere else do we find organized beings passing through such a series of what might be called successive lives, and in each life assuming bodies varying so widely that the future form can never be predicted from the present one.

The earliest form of insect life is the same as the earliest form of all other animal life, and egg, but here all resemblance ends, for the moment the egg is hatched the insect differs from all other animals as widely as does the bird from the fish.

The eggs of all insects are minute, and the beings which are hatched from them are correspondingly small. Usually the product of the egg is a small worm-like creature, provided with a head and mouth and six legs under the forward part of its long body. Sometimes, but not always, this worm, caterpillar, grub or larva is also provided with eyes, small hairlike feelers, and several pairs of short wart-like legs to assist in carrying the bulky hinder part of its body. Other larvæ are destitute of either eyes or legs and spend their whole lives within a few inches of where they are hatched.

The one great object in life for the young larva seems to be the same as that of many animals of a much higher organization—it lives to eat—and eats, in some cases, as the larva of the silk moth, more than its own weight daily. Such a rapid consumption of food has a very natural tendency to an increase in size. When we were children and our arms grew to be too long for our sleeves and our increasing girth proved too severe a strain on our buttons, parental care furnished us with larger clothes—but the voracious larva when his skin is too tight for his daily dinner, splits it in the back and walks out clad in a new garment grown to fit his new

development, and so much more nearly ready for his final change.

It is during this larval or wormlike life that by far the larger portion of the total supply of the food for the insect is consumed and assimilated. Indeed many insects which, as larvæ, ravage large tracts of country and inflict incalculable damage are perfectly harmless when they reach their mature form, taking no food excepting perhaps an occasional sip of honey from the flower which happens to be their resting place, and in a few instances being quite unprovided with any means of taking nourishment. We see this in the army worm which sometimes takes its course over a whole state destroying everything in its way as completely as if the country had been swept by fire. When this insect reaches its adult or perfect form it is an innocent dusky brown moth, which never causes the slightest harm to any plant. I may mention here that although the army worm has been known and dreaded ever since the first settlement of the country, to this day no man knoweth whence they come or whither they go. They appear in vast armies, devastate a track of country and then disappear as suddenly and mysteriously as they came. Entomologists have captured the worms and kept them in confinement until they passed through their various changes and were transformed into moths, but with all the study and watchfulness which have been devoted to the subject it is not known when or where the eggs are laid which produce these destroying hordes.

The eggs of insects are almost invariably laid near where the young larva can find an abundance of food; indeed this is an absolute necessity, as, if the newly hatched larva, often not more than a twentieth of an inch in length, were compelled to travel any distance in search

of food it would inevitably perish from starvation. In some instances, as with bees, the larva is hatched and goes through all its changes to the form of the perfect insect without moving from the cell in which the egg was deposited, all its food being brought to it by the mature bees, usually however when the larva is fully grown it is quite active and frequently travels considerable distances in search of food.

This larval or wormlike stage of insect life continues for a variable length of time, ranging from a few days as with the silk worm, to one or two years, and even longer, as with the 17 year cicada, which receives its name from the time required for its development from the egg to the perfect insect.

At the conclusion of this second stage, or what might be called the preparatory life of the insect, it passes into its third or chrysalis form in which it bears little more resemblance to a living animal than does the egg from which it was hatched, and it still gives little promise of the beautiful moth or gaudily-colored butterfly, which a few weeks or months may bring from it; indeed it bears a much closer resemblance to the egg than to the mature insect. It is usually nearly round, somewhat pointed at each end, and sometimes a dim outline of the wings is visible and two small knobs may be seen near one end indicating the future position of the eyes. The chrysalis is entirely destitute of any means of locomotion and has no way of taking food, in fact, the only sign of life it is able to make is by slightly bending itself when disturbed.

The changes from the larva to the chrysalis, and from the chrysalis to the perfect form are two of the most interesting phases of insect life. When the larva feels old age approaching it seeks a suitable place, some-

times a branch of a tree, the under side of a board, a crack in a fence, or, perhaps, burrows into the ground. There it makes some sort of a covering for itself; if above ground and a moth it usually spins a cocoon of silk, fastening the webs together with a gum-like substance which immediately hardens on exposure to the air. This cocoon often contains more than a thousand feet of silk, its color, strength and fineness, depending upon the species of worm which spins it. The cocoon of the Cecropia, which is our largest American moth, and sometimes measures nearly eight inches across the wings, may be frequently found attached to the branches of apple and plum trees. If these cocoons are gathered during the winter and kept safely until May or June we can easily watch the moth as it bursts out into its new and perfect life, and leaves the silken walls that have protected it through the winter. For a day or two before the moth emerges it may be heard in its endeavors to escape, and finally its head will be seen peering through an opening in one end of the cocoon where the walls were simply glued together and were not as strong as in other parts. The moth slowly emerges, taking perhaps half an hour for the operation, and then it stands upon the top of its former home drenched with the fluid with which it was abundantly lubricated to assist it in its escape from the cocoon, and weary with its long struggle. The observer may possibly think the insect deformed, as, in the place of the gaudy wings which all are accustomed to see, our moth has only what appears like a bit of limp rag on each side of its body; but wait until it is rested and you will see it try to raise those shapeless wings, again it tries, and again, with no better success, but with each effort its wings have increased in size and begin to assume their natural form.

The moth continues its efforts and as the wings expand and dry, we begin to see the beautiful designs of the colors with which it is adorned. In the course of another half hour our moth is ready to fly—unless we prevent it by a few drops of benzine applied to its abdomen to stop its breathing and so kill it. It will be much safer to keep the cocoon in a box covered with mosquito netting or otherwise the moth may make its escape without our knowledge.

I have spoken of the cocoon of a moth because that is the largest and the most readily observed. Those insects which build their cocoons by gluing together bits of chips which they have bored from solid wood, or those which descend into the ground and there make for themselves a vault-like earthern covering, go through substantially the same changes.

After such a long time of development it would seem that the life of the mature insect should be correspondingly long. In nearly all other animals, certainly among all the higher animals, the period of youth and growth bears but a small proportion to the whole life, but among insects we find this rule reversed. However long the larval life may have been, the adult life is always very short, sometimes only a few hours, usually but a few days or weeks, and it is very seldom indeed that it reaches twelve months. Most of our moths live but a few days, and the Cicada which has spent nearly seventeen years in preparing for active life enjoys this life for only a brief month. The only object of the mature life seems to be the laying of eggs to provide for future generations, this done the insect has fulfilled its mission and is ready to make room for its successors.

What I have given is a brief outline of the life-history of *most* insects. Some acquiring their perfect form

without passing through all the preliminary stages.

Doubtless many in my audience are thoroughly familiar with the development of the grasshopper, which hatches from the egg a true hopper and perfectly able to travel, differing from the adult form only in being smaller and destitute of wings. The young hopper sheds its skin frequently, each time increasing in size, the first scale-like wings increasing also until in a few weeks it is fully grown.

So much of insect life history has been given because a knowledge of this is absolutely necessary for an understanding of many habits and actions which would otherwise be entirely unaccountable.

Darwin assuredly made a great mistake when he endeavored to find the missing link which should unite us with our unintellectual ancestors—the monkeys. He probably saw that physically *some* men bore a striking resemblance to *some* monkeys, and then jumped to the conclusion that all men were related, distantly it is true, but still related to monkeys. He should have remembered that mind is higher than matter, and he should have looked for mental rather than for merely physical resemblances. We have certainly copied more mental traits and physical habits from insects than monkeys ever thought of having. Almost all of our industries are copied from those of our insect friends; while many of our mental and moral characteristics seem to be but a higher development of the same qualities which may be found more or less prominent among these so-called lower organizations.

Here in our University we have a Department of Engineering, but I venture to say that even in the Faculty of that department there is not one who will claim the necessary knowledge, even when aided by unlimited

money and labor, for the construction of such suspension bridges as are built by the spider alone and untaught. As mining engineers insects rank far above poor weak and ignorant mankind. Ants have been known to turn broad rivers, rivers so broad that to turn the Atlantic ought, in comparison, to be an easy task to us with all our scientific aids. Who, among our miners, will ever attempt an excavation 500 miles in depth; but this would be no greater work in proportion to our size than is often performed by Texas ants. Were we provided with more instinctive wisdom and less acquired knowledge we might, perhaps, be able to do some great work which should rival those of our insect teachers. Some insects are masons, as the wasp, whose six or eight-roomed house of stone and mortar may be found fastened to the rafters of almost every old barn.

Carpenters are almost as plentiful among insects as among men, but with this difference, that their manner of working is usually the reverse of ours: we gather our materials and place them around the room, while the insect carpenter bores out the room and leaves the walls. As paper makers the wasps are decidedly in advance of us. They manufacture an article which is thin, light, durable and entirely waterproof, paper of which they build houses to withstand the rain and wind for years and which are more impervious to water than are our walls of brick and stone. Insects do not paint the interior of their homes, but many of them, nearly all of them when young, have their chambers hung with finer tapestry than was ever wrought by human hands.

In mental characteristics we find a strong likeness existing between ourselves and insects. We all know the necessity of providing for the future, of having something laid by for a rainy day—do not the ants set

us the example? Do the strong among us take advantage of the weak—many species of ants capture smaller species and keep them in subjection, depending entirely on the attentions of their captives to support their own lives, which lives are spent only in capturing fresh victims. Are we miserly—the bee spends its life in laying up treasure largely in excess of what it can by any possibility require for its own use. Have we devout hypocrites among us—there is the praying mantis, an innocent looking leaf-like insect which will sit for hours with its arms upraised to heaven in apparent supplication for forgiveness for its many offences, but let an unwary fly approach and the praying is instantly changed to preying of a different kind, as the fly learns to its sorrow.

The pernicious and dangerous habit of carrying concealed weapons was very probably adopted by some of our ancestors after an unsuccessful attempt to impose upon a yellow jacket.

Professional life seems to be entirely unknown among insects. So far as we can discover they have neither lawyers, doctors nor teachers. Their disputes are all satisfactorily settled by the duel; sickness is almost unknown and the young are as wise as the old.

Insects are not only our teachers, but are often our friends and benefactors. The cochineal, so extensively used as a scarlet dye, consists simply of the dried bodies of certain insects. Our best inks are manufactured from oak galls which once formed the leafy home of a gall fly. To the bee we are indebted for honey and for that more necessary product, wax. The Bible speaks of locusts and wild honey as articles of food—that locusts form a staple article of food among some tribes of American Indians, and during the invasions of 1874 and 1875 many frontier settlers were glad to subsist on a diet

of grasshoppers. One of the leading restaurateurs of St. Louis, under the direction of our State Etomologist, Prof. Riley, gave a large dinner where each course consisted of grasshoppers in some form. The dinner is said to have been excellent.

When walking in the woods or fields we almost never see a dead bird although we may see scores of nests, and we know that the birds which have been reared in these nests indicate very closely the number that have died during the year. The reason for this is very simple: the body of a dead bird has hardly fallen to the ground before it is surrounded by a number of sextons in the form of beetles who at once proceed to dig a grave, lower the body into it and then cover it as carefully as though it were the remains of a loved one. But this kind attention is due only to the maternal instinct which thus provides food for the young beetles which these busy sextons have buried in this new-made grave.

Even our common house flies, which are usually regarded as unmitigated nuisances, play an important part in domestic economy, acting as scavengers, clearing the decaying filth from the most minute crevises and corners where it would be undetected by the eye of the most vigilant housekeeper, and whence it could hardly be removed even by the most careful hands. The more neat the housekeeping the less need for these little housecleaners, and, wiser in their generation than many of the human race, they always know where they are wanted.

Silk is an article which is in almost universal use, and in many parts of the world the production of the silk fiber is obtained by carefully unwinding the cocoon made by the larva of a small white moth which is very nearly related to the cecropia and lunar moths, our largest American species and which frequently enter our houses

on summer evenings. The eggs of this moth can be preserved without hatching for months by keeping them cool. When the sericulturist wishes them to hatch they are placed in a room having a temperature of about 75° and there they are hatched in about five days. The room is usually provided with wide shelves about two and a half feet apart, and on these shelves the worms are reared. Mosquito netting is covered with a layer of fresh Mulberry or Osage Orange leaves and is then spread lightly over the young worms which soon pass upward through the meshes in order to reach the leaves —their food. Fresh leaves must be supplied at least twice each day from this time onward. Each time it is supplied by placing it on netting or lattice work screens and allowing the worms to leave their stale food for fresher pastures, and enabling the cultivator to clear the shelves of the dried leaves and litter which have accumulated. In about thirty-five days the worm spins its cocoon which is composed of a double thread of silk of such exceeding fineness that more than 625 miles of it are required for a single ounce. If the moth is allowed to mature the cocoon is ruined, and so, to secure the fibre uninjured the insect is killed by subjecting it to heat soon after it has entered the chrysalis state. For the production of an ounce of silk the lives of fully 3,500 insects must be sacrificed.

Sericulture is still in its infancy in this country, but interest in the business is rapidly increasing, and as it can be carried on with but a small amount of capital, and all of the work can be performed by women and children unfitted for more laborious tasks, it may be hoped that the time is not far distant when we shall raise our own silk as well as our own cotton.

Doubtless every insect has its use. Some one has

defined a weed as a plant for which no use has yet been discovered and our so called noxious insects may be like the weeds of which we do not know the value. Many insects certainly seem to be much more injurious than valuable, and if a few of these troublesome ones could be annihilated, so far as we can see the world would be much advantaged by their loss. Could mosquitoes be abolished we should hear very few regrets but in some inscrutable way they may be as essential to health as are the omnipresent house flies. If all insects are useful the usefulness of many of them is certainly given us at a very great cost. The products of the soil either directly or indirectly are our only sources of food and clothing but in order to harvest a crop of any kind we must wage a constant warfare with insects which also depend upon vegetation for their food.

Wheat is our staple article of food, but from the time the seed is put into the ground until it is eaten swarms of insects hover over it literally eager to take the bread out of our mouths. It has hardly made its appearance above the ground when the Hessian fly deposits her eggs on the tender leaves. The eggs soon hatch and the young larvæ make their way to the bottom of the plant, there to suck its juices and spend the winter. The larvæ mature and come forth as flies early in the spring and deposit another set of eggs on the leaves of such plants as have escaped the first attacks, and when it is time for the wheat to send up its grain laden heads its weak and consumptive look shows but too plainly that its life-blood has been sucked away by these countless vampires. If the Hessian fly does not destroy the crop the chinch bug will frequently take possession of the field a few days before harvest time and instead of the upright straw and well filled heads of grain we find

only broken stems and withered heads of chaff. The chinch bug may come too late and find that the army worms or grasshoppers have already harvested the crop, leaving nothing but the bare earth behind them. If the wheat escapes all these dangers any one of several species of weevils may attack the grain. If the crop is safely harvested and threshed and stored in the granary, still other weevils may find it there and soon leave nothing but empty shells in the place of the plump grains. Even if taken to the mill and ground into flour it will be very difficult to keep it for any length of time without having it ruined by the attacks of the meal worm. These are by no means the only insects which attack the wheat—the wheat beetles, the wheat joint-worm, the wheat ophis, the wheat midge and the wheat moth all depend on the wheat crop for their sustenance; and hosts of other insects visit the wheat fields for an occasional meal.

Corn is used largely on our tables and is the staple food for our domestic animals. The cut worm, the white grub worm and the wire worm attack its roots, the army worm, the grasshopper and the chinch bugs its leaves, and several species of weevils and moths the grain, both when in the field and in the granary. So too with all other crops; none are exempt from the danger of being entirely destroyed, and seldom or never does a crop escape more or less injury from insect depredations. Trees are no more exempt from such attacks than are herbaceous plants. During the last two years the Michigan lumberman are making loud complaints that the pine forests of that state are being destroyed by countless borers, insects which take their name from the manner in which the larvæ eat into or through the tree so as to render the lumber useless for manufacturing pur-

poses, and often to destroy the life of the tree. There is probably not a tree on our campus which does not contain a number of some species of borers. If a tree is vigorous it may withstand the attacks of these insects for a long time, but the less vigorous the tree the more liable it is to attack. Only last week one fine hickory was removed because the borers had killed it, and several other large trees must soon follow.

Fruit trees suffer severely from these insect enemies. Two species of borers infest the trunk of the apple tree, bark-lice the bark, the tent caterpillar and the canker worm the leaves, and in many seasons the codling moth permits us to gather almost none but worm-eaten fruit.

It is true that we seldom have all of these destructive insects to contend with in any one season, and fortunate it is for us that we do not. Some of them are with us constantly, but owing to unfavorable seasons, the presence of other insects which feed upon them or some other cause, they do but little harm and pass unnoticed perhaps for years, and then, without apparent cause, multiply so rapidly as to defy computation.

Other species seem to come in waves, appearing in overwhelming numbers for a time and then disappearing as suddenly as they came. Such was the case with the potatoe beetle which began its eastward march from the Rocky Mountains in 1859. This vast army reaching from Minnesota to Texas swept across the country at a rate of about 70 miles a year, reaching the Atlantic coast in 1875, more than doubling the price of potatoes as it advanced. This destroying hoard did not stop when the seashore was reached, but boldly plunged into the ocean and the shores of many of the islands bordering our eastern coast were in some places covered to a depth of several inches by the beetles which were

washed up by the waves. European seaports have adopted strict regulations to prevent the landing of this unwelcome traveler upon their shores, but it is greatly to be feared that it will yet gain a foothold there and prove as destructive as it has in its native land. For several years these beetles have been decreasing in numbers in the western states, and during the past two years we have seen almost none of them. They may return, but the wave seems to have passed over us for the present.

The grasshopper which has so devastated much of the country west of us is only an occasional visitor which cannot long endure the climate of the open plains, and when it leaves its mountain home can live but a few generations at the longest.

A number of our most troublesome insects, like our worst weeds, are imported species. The meal-worm, the dread of every miller, comes to us from Europe. So too does the Hessian fly, which is a part of the price we are paying for our National existence, it having been brought to this country by the Hessian soldiers during the Revolutionary war. Among the later importations we have the rose slug which made its first appearance in the east about 1830, reaching St. Louis in 1873, and Columbia in 1875. The cabbage worm was first noticed on this continent at Quebec in 1859 and last year we had no opportunity to mourn its absence from this locality. The wheat midge, the grain weevil, the codling moth and the clothes moth are all foreign species. Should the potato beetle succeed in reaching Europe it will do a great deal toward paying our debts in this direction.

Some insects, like some plants, have an extremely limited geographical range. The Tsetse fly of Africa, a single bite of which is fatal to a horse, has its range as sharply defined as is that of forest and prairie, but *why*

its range should be so limited there is no visible reason as no river or mountain chain separates its home from the surrounding country. In the United States there is a small white moth which lives in the flower of the Yacca, Adam's needle or Spanish bayonet as it is sometimes called—a common plant which is found in almost every garden here. The moth is found only where this plant is grown, and the plant bears seed only where the moth is found. The eggs of the moth are laid in the ovary of the flower—the flower cannot be fertilized without artificial aid, and in the act of laying its egg the moth transfers a portion of the pollen to the pestil and renders the flower fruitful. The plant is necessary for a home for the moth—the moth is necessary for the fertilization of the flower—which was created for the other? and which was created first?

The summits of the White Mountains in New Hampshire have a monopoly of some species of insects, and some of the valleys and lake basins in the Rocky Mountains monopolize other species, while still others, though very few are found from Maine to California and Brazil.

Concerning the numbers of insects but little is definitely known. Of other animals about 55,000 species have been described; of insects over 190,000 species have already been described and it is estimated that they constitute at least four-fifths of the animal kingdom. Hundreds of new species are being discovered every year and the insect found of many large tracts of country is still almost unknown. Until within comparatively few years but little attention was given to the subject of Entomology, and the science is now far behind most other branches of Natural History. Linnæus, so universally known as the father of Botany, might with

equal justice be called the father of Entomology also, for he was the first to make any general or scientific classification of insects, and his classification with but one slight change, dividing one of the orders into two—is the one now in general use. His classification was made in 1735 and it is since that time that nearly all of the present knowledge of insect life has been gained. Linnæus named and described many thousands of species. Fabricius and Latreille continued the work. Until the time of Agassiz little progress was made in the science in this country and it is largely to him that we owe our present knowledge of the insects of North America. Packard, Harris, Leconte, Thomas, Walsh and Riley have all contributed largely to our fund of information, and there is no other portion of the world of equal extent where insects are as well known as in the United States. But even here much remains to be done. During 1878 one young lady living in Illinois discovered no less than eighteen new species, all of them within a few miles of her own home. The botanist who discovers a new plant feels, and justly too, that he has made a valuable addition to scientific knowledge, but it may be doubted whether there is a botanist in Missouri who within the past year, or in the past ten years even, has discovered three hitherto unknown species of plants.

The life history and habits of all our more common insects have been published in the state reports by almost every state in the Union, but so much still remains to be done that no one has yet attempted to gather into one volume a compendium of what has already been accomplished. The insects of Missouri have been more thoroughly described than those of any other western state, but the descriptions are scattered through nine bulky and ill-arranged volumes which it is now almost

impossible to obtain. A bill is now pending in our State Legislature to have these reports revised, re-arranged and republished in a more available form, and certainly the small amount of money necessary for the work could not be more judiciously expended.

Among the more important things we need to know concerning noxious insects are: to recognize the insect whenever we see it. It is not sufficient that we recognize it at the time it is destroying the fruits of our labors, but we must be able to identify it at any time—when an egg, a larva or a chrysalis—as well as when it has reached its perfect form. We should know the food of the insect in order that we may know where to look for it. We must know when and where the eggs are laid that we may destroy them before the larvæ escape. We should know when the eggs are hatched so that we may know when to give up our search for the eggs and begin to look for the larvæ. We should know the food plants of the larvæ that we may know where to look for them. We should know the places sought for by the larvæ when about to enter the chrysalis state that we may set traps for them. We must know the chrysalids so that we may destroy them, and we must also know the mature insects that we may prevent the growth of future generations. We should be able to distinguish our insect foes from our insect friends. Many insects are carnivorous and prey upon others. Many insects are troubled with parasites which sooner or later destroy them. The presence of these carnivorous and parasitic species should be encouraged as far as possible.

While there is much that is curious and interesting to be found in the general study of insects which will amply repay the time spent by those who have it to spare, it is those insects with which we must contend for

the products of the soil which especially concern us, and it is their existence and their ravages which make the science of Entomology especially valuable to practical people. We must know the ways and habits of noxious insects before we can hope to meet them on anything like equal terms, but knowing them thoroughly we can do much to keep them in check, and in many instances can insure ourselves fully against any loss from their depredations.

ERRATA----PROF. FICKLIN'S LECTURE.

Page 115, line 8, from bottom—"sidereal" instead of "sideræl"

Page 117, line 14, from bottom—"leaving" instead of "learning."

Page 120, line 5, from bottom insert "the" before "search" and "an" before "order."

Page 122, line 14, from bottom, put quotation mark after "habits."

Page 127, line 1,—"quod" instead of "quad," and on same page, line 8 from bottom, "cultivation" instead of "cultivalion."

Page 128, line 14, "answer" instead of "anwser," and in last line on same page "form" instead of "from," and omit comma after "which."

On same page, there ought to be no paragraph at "At one time a writer," &c.

Page 141, line 5, from bottom, insert "train of satellites ; Saturn and his" between "his" and "wonderful."

MATHEMATICS.

By Joseph Ficklin, Ph. D., Professor of Mathematics and Astronomy in Missouri University.

Ladies and Gentlemen: In making up the programme for the present course of University lectures, one evening was given to the department of Mathematics. Soon after the adoption of this programme the question arose in my mind, how can I use the hour allotted to my department so as to accomplish the most good? Shall I take some branch of Mathematics, as Algebra, Geometry or Calculus, and discuss it in all its phases? Shall I undertake to settle that vexed question relating to the Doctrine of Limits, the Infinitesimal Method and the Method of Rates? I was not long in deciding to do none of these things. Then I thought seriously of an experimental lecture; but when I came to arrange the details I found insurmountable difficulties. Could I bring into this room the Surveyor's Compass, the Theodolite, the Level, the Sextant, Transit Instrument, the Alt-Azimuth, the Telescope, and Sideræl clock, and so handle them as to make the lecture interesting to my audience? There are obvious difficulties in carrying out a plan of that kind. After considerable deliberation I have decided to consider: 1. The value of the study of Mathematics as an exercise of mind. 2. The Relation of Mathematics to the other Sciences and its Practical utility. I have adopted this course with some hesitation, because,

during the first semester of this session there were about 320 students in my department (and still they come), and I fear that if I should do the subject full justice, there would be such a rush upon me and my assistant, that we could not accommodate the classes, and that other departments of learning might be neglected. I shall, therefore, on the present occasion, present my arguments in a mild form, holding a reserved force for any emergency that may arise.

The human mind is so constituted that doubt and uncertainty are disagreeable to it; but it delights in propositions about which there is no shadow of doubt. This longing for definite knowledge is more fully satisfied in the study of Mathematics than in any other department of learning; for in Mathematics the premises are definitions and axioms, and the conclusion follows with a force that is irresistible. On this point Dr. Charles Davies says: "The ideas which make up our knowledge of Mathematical science are all impressed on the mind by a fixed, definite and certain language, and the mind embraces them as so many images or pictures, clear and distinct in their outlines, with names which at once suggest their characteristics and properties. The reasonings are all conducted by means of the most striking relations between the known and the unknown. The things reasoned about and the methods of reasoning are so clearly apprehended that the mind never hesitates or doubts. It comprehends or it does not comprehend, and the line which separates the known from the unknown is always well defined. These characteristics give to this system of reasoning a superiority over every other, arising, not from any difference in the logic, but from a difference in the things to which the logic is applied."

If Dr. Davies is correct, then it follows that there is

no other science which is so well adapted to the improvement of the reasoning powers of man. Does one wish to think and reason correctly? Does he feel that he needs mental discipline? that he needs the power of concentrating his thoughts? the power of close and prolonged attention? Then, whatever his prospective calling in life may be, it is his duty to study the mathematics.

About the year 1836, Sir William Hamilton's celebrated article, "On the study of Mathematics as an exercise of Mind" was published at Edinburgh. This article was a reply to an article entitled: "Thoughts on the study of Mathematics as a part of a liberal Education," by Dr. William Whewell. Sir William Hamilton states the issue as follows: "Before entering into details it is proper here, once for all, to premise: In the first place, that the question does not regard the value of Mathematical science, considered in itself, or in its objective results, but the utility of Mathematical study, that is in its subjective effect, as an exercise of mind; and in the second, that the expediency is not disputed, of learning Mathematics as a co-ordinate, to find their level among other branches of academical instruction." With these premises before him Sir William undertakes to show by argument, by quotations from Mathematicians themselves, and from others, that the study of Mathematics is, if carried beyond a very moderate extent, injurious to the mind. This article made a deep and lasting impression, and was hailed with delight by a host of men who lacked either the ability or the industry to go very far in this department of learning. Quite a number of such men, it is said, easily reached the conclusion (an example of the *non sequitur*) that an incapacity for the study of Mathematics was a sure mark of a genius! Dr. Whe-

well never answered Sir William. Indeed it is supposed by many at the present day that the article is unanswerable. Now I do not pretend to be able to answer this article, nor have I time on the present occasion, if I had the ability. But I intend to show by some of the authorities quoted by him, by argument, and by Sir William Hamilton himself, that the study of Mathematics is very beneficial to the mind. D'Alembert, one of the authorities quoted by Sir William, says:

"The study of Mathematics and a talent for it do not then stand in the way of a talent for literature, and literary pursuits. We can even say in one sense, that they are useful for any kind of writing whatever; a work of morals, of literature, of criticism, will be the better, all other things being equal, if it is made by a mathematician, as M. Fontenelle has very well observed: it will exhibit that justness and that connection of ideas to which the study of mathematics accustoms us, and which it afterwards causes us to carry into our writings without our perceiving it and in spite of us." Sir W. H. quotes Pascal to show the "difference between the spirit of Mathematics and the spirit of Observation." I think a careful reading of the extract will show that Pascal was trying to state the difference between a *mere* mathematician and a *mere* observer; for in the closing part of it he says: "Mathematicians who are mere mathematicians, have thus their understanding correct, provided, always, that every thing be well explained to them by definition and principle, otherwise, they are false and insupportable; for they are correct only upon notorious principles. And minds of observation, if only observant, are incapable of the patience to descend to the first principles of matters of speculation and of imagination, of which they have no experience in the usage of the

world." Pascal is sound on this point, and I agree entirely with him. I have not much use for a *mere* mathematician, a *mere* observer, or a *mere* any thing else. I am not in favor of a one-sided education. I advocate with all the emphasis possible, *the general and harmonious development of all the faculties of the mind.* But I *do* claim that the Mathematics ought to stand prominent in any scheme of liberal education. Pascal is sound on another point: He says: "this science alone (mathematics) knows the true rules of reasoning in all things, which almost all the world ignores, and which it is so advantageous to know, that we see by experience that among minds equal and alike in all other respects, he who is a mathematician excels and acquires a vigor entirely new." "I wish then," continues Pascal, "to show what is a demonstration by examples from the Mathematics, which is almost the only human science which produces infallible ones, because it alone observes the true method, whereas all others are by a natural necessity in some sort of confusion which mathematicians alone can fully understand." Sir William Hamilton calls Pascal "that miracle of universal genius." Hence, whatever Pascal says on the subject under discussion ought to have great weight.

I quote next from M. Chasles: He says: "It is known how Descartes, Pascal and Leibnitz, as philosophers and writers, derived assistance from mathematics, and with what urgency they recommended the study of the science as infinitely useful to develop and to fortify the true spirit of method."

The next authority is Descartes, the founder of Modern Philosophy. Sir William Hamilton says of him: "Nay Descartes, the greatest mathematician of his age, and, in spite of his mathematics, also its greatest

philosopher, was convinced from his own consciousness, that these sciences, however valuable as an instrument of external science, are absolutely pernicious as a means of internal culture." Descartes must have been a wonderful man to be the greatest mathematician of his age and its greatest philosopher too, in spite of his Mathematics. If he accomplished so much in the department of Philosophy, under such adverse influences, what would he have done, if he had paid no attention to Mathematics? For my part I cannot tell. I have given Sir William Hamilton's opinion of Descartes in order to show you that he (Descartes) is good authority. He says: "In fact, it (mathematics) ought to contain the first rudiments of human reason, and to aid in drawing from every subject the truths which it includes; and to speak freely, I am convinced that it is superior to every other human means of knowledge, because it is the origin and source of all truths." Again he says: "Now when all the world knows the name of the science, when they conceive the object of it, even without thinking much about it whence comes it that they seek painfully the knowledge of the other sciences which depend upon it, and that scarcely any person takes the trouble to study the science itself? I would be astonished assuredly if I did not know that every body regards it as very easy, and if I had not observed for some time that always the human mind, passing by what it believes to be easy, hastens on to new and more elevated objects. As for myself, who am conscious of my feebleness, I have resolved to observe constantly, in search after knowledge, such order that, commencing always with the most simple and easy things, I never take a step forward in order to pass to others, until I believe that nothing more remains to be desired concerning the first. This is why I have cultivated

even to this day, as much as I have been able, that universal mathematical science, so that I believe I may hereafter devote myself to other sciences, without fearing that my efforts may be premature." I will ask Descartes to testify still further, for according to Sir William Hamilton he is a competent witness. This witness says: "More and more I continued to practice the method I had prescribed to myself; for, besides that I was careful to conduct all my thoughts generally by the rules, I reserved to myself from time to time some hours, which I employed particularly in exercising myself in the difficulties of mathematics, and also in some others which I could render almost like the mathematics, by detaching from them all the principles of the other sciences which I found not sufficiently firm, as you will see I have done in several which are explained in this volume." I will now allow Descartes to leave the witness stand, and while he is retiring and before the next witness is called, I will take occasion to modestly suggest that possibly this greatest philosopher of his age became such on *account* of his mathematics, and that Sir William Hamilton simply used the wrong sign. He used the negative sign when he ought to have used the positive sign. Some of our students will understand this remark.

The next witness is Dugald Stewart, of whom Sir William Hamilton speaks thus: "To this category we may also not improperly refer Dugald Stewart, for though not an author in mathematical science, he was in early life a distinguished professor of mathematics; while his philosophical writings prove, that to the last, he had never wholly neglected the professional studies of his youth. In other respects, it is needless to say that his authority is of the highest." Having such a testimonial

as this as to the competency of the witness, we are prepared to pay due respect to any utterances of his bearing upon the question under discussion. After giving the reasons for his conclusion Mr. Stewart says: "And hence the study of it (mathematics) is peculiarly calculated to strengthen the powers of steady and concentrated thinking; a power which in all the pursuits of life, whether speculative or active is one of the most valuable endowments we possess." But it may be said by those who have read the works of Stewart that he testifies just as forcibly on the other side. For instance he says: "This bias (the bias toward credulity) now mentioned is strengthened by another circumstance—the confidence which the mere mathematician naturally acquires in his powers of reasoning and judgment—in consequence of which, though he may be prevented in his own pursuits from going astray by the absurdities to which his errors lead him, he is seldom apt to be revolted by absurd conclusions in the other sciences. Even in physics, mathematicians have been led to acquiesce in conclusions which appear ludicrous to men of different habits.

Now let us examine this extract carefully. Does Mr. Stewart say, substantially, that the tendency of mathematical studies is toward credulity? He does not. His affirmations relate to the *mere* mathematician: that is, to a man who knows nothing but mathematics. It is easy to see why a mere mathematician should be somewhat credulous in other departments of learning. He is very careful in every step in his own reasoning, and he knows that his conclusions are correct. Now, such a man hears some laborer in some other department of learning make a statement as to some principle which he has discovered, and he believes the statement. Why does he believe it? Because he thinks that one is as

exact and as careful as himself in making his investigations, and when the principle is announced the *mere* mathematician reasons with himself about this way: That man has studied that subject very carefully, as carefully, perhaps, as I would study a proposition in mathematics, and he says the principle is true. Therefore, as I know nothing about it, one way or the other, I am inclined to accept it. But would not a mere anything else be equally credulous, out of his own line of thought? Take a man in any department of learning, and let him travel always in his narrow groove. Would he not be credulous as to the statements made by men in other departments? This would be true especially if he is an honest, careful man himself. But as I have already said, I have no use for a mere mathematician; away with him! Such a man resembles very closely an old bachelor, who is, at best, only a hemisphere. But I will ask Mr. Stewart if such a curiosity as a mere mathematician is likely to be found in this part of the Solar System. On this point he says: "It must be remembered, at the same time, that the inconvenience of mathematical studies is confined to those who cultivate them exclusively; and that when combined, as they now generally are, they enlarge infinitely our views of the wisdom and power displayed in the universe. The very intimate connection, indeed, which since the date of the Newtonian philosophy, has existed among the different branches of mathematical and of physical knowledge, renders such a character as that of the mere mathmatician a very rare, and scarcely a possible occurrence; and cannot fail to have contributed powerfully to correct the peculiarities likely to characterize an understanding conversant exclusively with the relations of figures and of abstract quantities. Important advantages may also

be expected to result from those habits of metaphysical and moral speculation which the study both of mathematics and of physics has so strong a tendency to encourage in every inquisitive and cultivated mind. In the present state of science, therefore, mathematical pursuits seem to lead the attention, by a natural process, to the employment of the most effectual remedies against inconveniences which they appear, on a superficial view, to threaten; and which there is reason to believe they actually produced in many instances, where education was conducted on a plan less enlightened and comprehensive than what now generally prevails." I will next call upon Sir William Hamilton to state what he thinks of mathematics "as an instrument of mental culture." He says: "Are mathematics then of no value as an instrument of mental culture? Nay, do they exercise only to distort the mind? To this we answer: That this study, if pursued in moderation and efficiently counteracted, may be beneficial in the correction of a certain vice, and in the formation of its corresponding virtue. The vice is the habit of mental distraction; the virtue the habit of continuous attention." Let us now put by the side of this statement, the judgment of Mr. Stewart, which I have already quoted. He says: "And hence the study of it (mathematics) is peculiarly calculated to strengthen the power of steady and concatenated thinking; a power which in all the pursuits of life, whether speculative or active is one of the most valuable endowments we possess."

The "power of steady and concatenated thinking" is simply the power of "continuous attention," so that Sir William and Mr. Stewart are agreed as to the value of mathematics "as an instrument of mental culture." It must be observed, however, that Sir William ex-

presses his views a little more delicately, and with a little more reservation than Mr. Stewart. Sir William Hamilton makes an additional remark on the value of attention as follows: "Nay, genius itself has been analyzed by the shrewdest observers into a higher capacity of attention." Now, if you please, put these three statements together and then ask what they prove. Do they not prove that the study of mathematics is calculated to strengthen the power of continuous attention, and that genius itself is simply a higher capacity of attention? Sir Isaac Newton himself admitted that it was his power to concentrate his thoughts on a single point for a long time, that distinguished him from other men. Sir William Hamilton names seven persons who had this "higher capacity of attention" in a remarkable degree, and five out of the seven, viz: Archimedes, Carneades, Newton, Cardan and Vieta, were great mathematicians. You see what this fact proves, I am sure. Possibly this great power was developed in them in "spite of their mathematics," but on mathematical principles, the probability is as 5 to 2 against such an hypothesis. Again in a work published in 1780, Condillac says: "There are four celebrated metaphysicians, Descartes, Mallebranche, Leibnitz and Locke." Three of these were great mathematicians, and one of them, Descartes, the greatest mathematician and the greatest philosopher of his age. We have here the data for the solution of another problem in probabilities.

In the next place I shall prove that the study of mathematics is very valuable as a means of mental culture, because it leads to a sound philosophy. My first argument, in proof of this proposition, is drawn from a statement made by D'Alembert, who was great both as a mathematician and as a philosopher. He says:

"But independently of the physical and palpable uses of mathematics, we will consider here its advantages under another point of view; it is the utility of this study in preparing, insensibly, paths for the philosophical mind, and in disposing an entire nation to receive the light which that mind may diffuse over it. It is perhaps the only means by which certain countries in Europe can throw off by degrees the yoke of oppression and profound ignorance under which they groan. The small number of enlightened men who live in countries of the Inquisition, complain bitterly, though in secret, of the little progress which the sciences have hitherto made in those sad regions. The precautions which they have taken to prevent the light from penetrating into them, have so well succeeded that philosophy there is very nearly in the same condition in which it was in the time of Louis, the Young. If mathematicians should spring up among these people, they are a seed which will produce philosophers in due time, and almost without its being perceived. The most delicate and the most scrupulous orthodoxy has nothing to contest with the Mathematics. Those who believe it is their interest to hold the minds of men in darkness, have sufficient foresight to prevent the progress of this science, and never fail of a pretext to prevent it from spreading. The study of Mathematics conducts to that of Mechanics; the latter leads, of itself and without obstacles, to the study of sound physics; and finally sound physics to true philosophy, which by the prompt and general light which its sheds, will soon be more powerful than all the efforts of superstition; for these efforts, however great they may be, are useless when the nation is once enlightened."

After such testimony as this I would be justified in

closing the argument with a *quad erat demonstrandum*, but to make the case still stronger I will pursue the train of thought suggested by this extract: I raise the question: In what countries and in what ages of the world has philosophy flourished? Why was Ancient Greece celebrated on account of her distinguished philosophers? It was because her people did not neglect geometry. The testimony of Plato, one of the greatest philosophers of any country or any age is in point here. In his Repub. Book VII, he uses the following language: "Therefore, then said I, it must be especially enjoined that those in your beautiful city shall in no manner neglect geometry, for it is the most beautiful of all sciences, and we surely know that one who has studied geometry, differs entirely from one who has not studied it." This extract shows not only that geometry was an established science in the days of Plato, but it shows that he considered it very unwise to neglect it. Plato founded a school of Philosophy, and in this school Geometry was made the basis of instruction. It is said that he placed this inscriptton over the door of his school: "Let no one who is ignorant of Geometry enter here." He, no doubt, believed that his instructions in Philosophy could not be understood and appreciated by one who was ignorant of geometry. But I need not multiply evidence on this point. It is well known that the Ancient Greeks surpassed all other nations in the cultivalion of geometry, and that the resulting crop of philosophers was correspondingly large. Look at Rome; who were her great mathematicians? She never had any. What little mathematics the Romans knew was derived from the Greeks, and its study was encouraged chiefly on account of its use in architecture and in the art of war. Who were her great philosophers? Cicero and Seneca

were perhaps the most eminent among them, and their philosophy, like their Mathematics, was borrowed from the Greeks. The Chinese, Turks and Japanese have never cultivated Mathematics to any great extent. Where are their philosophers? Look at Mexico and the States of South America, where little attention is paid to Mathematics. If you look for philosophers in these countries you will find them very scarce indeed. Why is this? I answer that in these countries the study of Mathematics, which lays the foundation for sound philosophy, has been neglected. If you fail to sow the seed, you need not expect a crop. I now repeat my question: "In what countries, and in what ages of the world has philosophy flourished?" You are ready to anwser: "Wherever and whenever the greatest attention was given to the study of Mathematics."

Again, the study of Mathematics is valuable as a means of mental culture, because it leads to a definite phraseology. Why is a definite phraseology desirable? In order that the reader may understand the writer; in order that the hearer may understand the speaker, and in order that either may understand himself. One great source of error in reasoning is due to the fact that words are used in a double or incomplete sense.

At one time a writer may use a word in one sense, and at another time, without being aware of it, he may use it in a different sense, on the same subject, and thus mislead the reader, and it may be, himself also. Now the study of Mathematics fortifies one against errors of this kind, for words are here used in a definite and complete sense. I shall ask Mr. Stewart to testify on this point. He says: "Of the peculiar and super-eminent advantage possessed by Mathematicians in consequence of those fixed and definite relations which, from the ob-

jects of their science, and the correspondent precision in their language and reasonings, I can think of no illustration more striking than what is afforded by Dr. Halley's Latin version from an Arabic manuscript, of the two books of Apollonius Pergaeus de Sectione Rationis. The extraordinary circumstances under which this version was attempted and completed (which I presume are little known beyond the narrow circle of mathematical readers) appears to me so highly curious, considered as a matter of literary history, that I shall copy a short detail of them from Halley's preface. After mentioning the accidental discovery in the Bodleian library by Dr. Bernard, Savilian Professor of Astronomy, of the Arabic version of Apollonius, *Peri logou apotomes*, Dr. Halley proceeds thus: "Delighted, therefore, with the discovery of such a treasure, Bernard applied himself diligently to the task of a Latin translation. But before he had finished a tenth part of his undertaking, he abandoned it altogether, either from his experience of its growing difficulties, or from the pressure of other avocations. Afterwards, when on the death of Dr. Wallis, the Savilian professorship was bestowed on me I was seized with a strong desire of making a trial to complete what Bernard had begun;—an attempt of the boldness of which the reader may judge, when he is informed, that, in addition to my own entire ignorance of the Arabic language, I had to contend with the obscurities occasioned by innumerable passages which were either defaced or altogether obliterated. With the assistance, however, of the sheets which Bernard had left, and which served me as a key for investigating the sense of the original, I began first with making a list of those words, the signification of which his version had clearly ascertained; and then proceeded, by comparing

these words wherever they occurred, with the train of reasoning in which they were involved, to decipher, by slow degrees, the import of the context; till at last I succeeded in mastering the whole work, and in bringing my translation (without the aid of any other person) to the form in which I now give it to the public. When a similar attempt shall be made with equal success, in deciphering a moral or a political treatise written in an unknown tongue, then, and not till then, may we think of comparing the phraseology of these two sciences with the simple and rigorous language of the Greek geometers; or with the more refined and abstract, but not less scrupulously logical system of signs, employed by modern mathematicians."

Another reason why the study of mathematics is valuable as a mental gymnastic is that it accustoms the mind to seek truth for its own sake, and to accept as true whatever is proved. Hence the tendency of this study is to eradicate prejudice.

In the *Southern Review*, Prof. Bledsoe, to whom I am indebted for some of my extracts, makes this statement: "The study of mathematics invigorates the will, and thereby increases the efficiency of all the other faculties of the mind." This is admirably said, and a little consideration will show that it is true. When one succeeds in demonstrating some difficult theorem, or in solving some intricate problem, he experiences, not only a high degree of satisfaction, but he realizes that he has acquired new power, that his ability to reason has been increased, and that he is better prepared to contend with difficulties and to overcome the obstacles that lie before him in the battle of life. When the great Newton had succeeded in demonstrating the universal law of gravitation, did he stop at that point? No! His mind seemed

to receive additional power, and he proceeded to develop his brilliant discovery in his Principia, "which," Arago says, "even in the present day, is regarded as the most eminent production of the human intellect."

The tendency of the study of Mathematics is to make one prompt and truthful. Many people are in the habit of making false statements, not through any desire to deceive, but on account of carelessness in the use of language, and many seem to think it quite unnecessary to meet their engagements. A man may promise to meet you precisely at 3 p. m., on a certain day, for the transaction of important business, but the average man would think he was doing remarkably well if he came to the station at half past five. The fact is, in most cases, when two men agree to meet at a certain time, neither of them expects the other to come to time, and this mutual distrust aggravates the difficulty. Now I claim that it is the tendency of mathematical studies to correct these evils. A man who has long been accustomed to the *exact*, *close* and *rigid* reasoning of mathematics, who has been compelled to give the closest possible attention to every point in the argument, and to state that argument in the most exact language, will surely exhibit the effects of his training in his daily walk and conversation. Such a man is almost certain to be truthful, prompt, and true to his engagements, for he has learned that guessing is out of order, and that "about right" or "somewhere in the neighborhood of the truth" will scarcely pass. It is true, that a young man may have the habit of carelessness so fastened upon him that nothing will save him; but, if he is not *totally depraved* in this respect, a severe drill in mathematics will do him some good. This remark is especially applicable to Astronomy, for if one wishes to see a certain star cross

the meridian, he must come to time; if he is a second behind time he finds the star is gone.

The study of Mathematics tends to cultivate the imagination. In proof of this proposition I present an extract from a series of articles on the imagination by Dr. Thomas Hill, formerly President of Harvard. He says: "In this Geometrical imagination, the utmost precision is necessary. From a muddy, ill-defined image, no consequences can be deduced. The geometric form is one of absolute perfection; from approximate forms nothing but approximate results can be obtained. * * * In cultivating Geometry, we prepare the pupil in the most effective way for any or all the practical arts of life; we aid efficiently in fitting him for painting, engraving, or sculpture, among the arts; and we give him the surest foundation on which to build scientific knowledge. Nay, even for those professions which deal with man, geometry is a fitting preparation, not chiefly because it trains the mind to logical reasoning, but rather because it leads to accuracy of conception, to clearness of perception, to precision of expression, to definiteness and fitness in the choice of imagery. All language, through which we deal with each other, even when discussing the most abstract themes, is figurative, borrowed from the outward world; and whatever leads to the most vivid imagination of the realities of the outward world, leads to the most vigorous expression of the facts of the inward world. Thus Geometrical training tends indirectly to cultivate the power by which the lawyer, the orator, the clergyman and the author convince, persuade, instruct and delight their fellow-men." It is true that Dr. Hill here refers more especially to practical Geometry, where the pupil has before him the actual forms, and where he is required to make drawings of them; but

when geometry is taught as it ought to be, the theoretical and the practical are combined; then the advantages enumerated will be greatly increased.

This "cloud of witnesses" and the arguments I have presented prove, I think, that the discipline acquired in the study of Mathematics is very valuable in this life; but when we reflect that every demonstrated proposition is an immutable, everlasting truth, and that it will be valuable to us during the endless cycles of eternity, in our investigations of the laws that govern the wonderful works of God, this discipline and this knowledge become valuable beyond conception. Other things being equal, the one who knows most about the works of God, as exhibited in the material universe, knows most about God himself. Who has a better conception of the power and wisdom of the Creator? one who, ignorant of mathematics, looks upon the countless host of stars and planets as mere shining points scattered here and there without design, without order, and without law? or one skilled in this science, who looks upon the universe as a grand machine, held together and governed by immutable laws; who is able to measure the diameters and distances of the sun and planets, to estimate their masses, and to predict all their movements?

This question is sometimes asked by students who do not expect to engage in any business directly involving the higher branches of Mathematics: What good will it do me to spend my time on Mathematical studies? What is the use of it? I answer: You ought not to devote your whole time to mathematics, for if you do, you will be a *mere* mathematician; but, if you expect to engage in any pursuit requiring accurate thinking, you ought to give a liberal share of your time to the study of the exact sciences, for reasons already given. On the

other hand, if you expect to stop thinking and reasoning; if you are satisfied to go through life guessing at results, you can be excused. The fact is there is no profession in which the discipline acquired in the study of Mathematics, will not be beneficial, except loafing, running a hand organ, and in the lower walks of politics.

There is a tendency in the present day to think lightly of a branch of learning which is said to give mere mental discipline. There is a disposition to estimate an education according to the amount of wealth it will yield. You have doubtless heard of Mr. "Thomas Gradgrind of Stone Lodge." He and others like him were the founders of this utilitarian system. "What I want," said Mr. Gradgrind," "is *facts*; teach these boys and girls nothing but *facts*; facts alone are wanted in life. Plant nothing else, and root out every thing else." Now, I do not admit that the study of mathematics is valuable *merely* as a mental discipline; on the contrary I intend to show that it is the basis of all that is practical in science; yet, for the sake of argument, let it be granted that it is valuable in this respect only. Is it necessary that the mind should be well trained in order to make the proper use of these facts, which we are to observe? Who is best qualified to arrange, to classify, and to embrace under one grand law, these facts? The mere observer? or the man who in addition to being a good observer, has been severely disciplined in the school of mathematics?

Without such discipline the deductions of the human mind are unreliable; it is apt to draw general conclusions from particular cases, and to be led, in various ways, into error. Let me emphasize the thought then, that mental discipline is as important to the thinker as manual skill to the worker in the mechanic arts, and that the study

of mathematics cannot, without serious loss, be neglected by one who would become an accurate, skillful and ready reasoner.

It is truly stated by Sir William Hamilton that "all matter is either necessary or contingent," and it is claimed by some philosophers that reasoning upon necessary matter, as in the pure mathematics, is not as beneficial to the mind as probable reasoning. I remark, in the first place, that the study of necessary reasoning is an indispensable preparation for the study of the probable, because the study of the necessary leads to a most careful scrutiny of premises, to clear and accurate thought, and hence to a definite phraseology; and, that the term mathematics includes both theoretical and applied mathematics, and in the latter, especially in Engineering and Practical Astronomy there is the widest field for reasoning upon contingent matter; for examples of this kind of reasoning I refer to the account in Loomis's Recent Progress of Astronomy, of the discovery of the planet Neptune, and to Prof. Newcomb's "Reduction and discussion of observations on the moon before 1750." In the third place, it is undoubtedly true that the sphere of necessary matter is rapidly enlarging and encroaching upon that of contingent matter, and this will continue as long as exact observations continue to be made.

Comte, in his Philosophy of Mathematics, affirms "that, in the purely logical point of view, this science (mathematics) is by itself necessarily and rigorously universal; for there is no question whatever which may not be finally conceived as consisting in determining certain quantities from others by means of certain relations, and consequently as admitting of reduction, in final analysis, to a simple question of numbers."

Again, the same writer says, that "every phenomenon is logically susceptible of being represented by an equation; as much so, indeed, as is a curve or a motion, excepting the difficulty of discovering it, and then of resolving it, which may be, and often times are, superior to the greatest powers of the human mind."

Having shown that the study of mathematics is indispensable as a means of mental culture, I come next to consider its practical utility. Is mathematics a practical science? The word *practical* is very imperfectly understood by the mass of mankind. It is supposed by many to be the very opposite of *theoretical*. Does any practical good arise from pursuing such a study? Would it not be better to learn facts? are questions often propounded. Let us examine this word *practical* a little: As generally used, this word implies the acquisition of knowledge by some short and easy process; in fact, it implies the use of a principle without knowing it to be true. The so-called practical man says: "Just give me the rule, and I will work by it; I merely wish to know how to apply the rule; I care nothing for the analysis that proves the rule to be true." If all men were practical in this sense, how long would it be before the rules would be forgotten, and not a man could be found to make one? Prof. Davies in his "Logic and Utility of Mathematics," commenting on the *true* meaning of the word practical, says: "But give to practical its *true* signification, and it becomes a word of the choicest import. In its right sense, it is the best means of making the ideal the actual; that is, the best means of carrying into the business and practical affairs of life the conceptions and deductions of science. All that is truly great in the practical is but the actual of an antecedent ideal." In this sense of the word I shall endeavor to show that mathematical science is eminently practical.

The mason needs geometry to estimate the quantity of material used; the architect needs it in order to adjust the various parts of the building; the mill-wright needs the mathematical principles of Natural Philosophy in order to estimate the amount of power required to overcome a given resistance.

If the Missouri or the Mississippi is to be spanned by a bridge, a great mathematician must be employed to take charge of the work. The form, size, and strength of every beam and bolt must be determined in the beginning, otherwise there would be a great loss of money, time and material.

Is the art of navigation practical? and does it depend upon mathematics? The vessel is constructed in accordance with mathematical principles, and it pursues its way through the trackless deep guided by the unerring results of mathematical formulae. When we consider the amount of life and property involved in navigation we see that mathematics is very useful, for, without its aid, ships would not venture far from the coast, and communication between continents would cease.

The laws established by Kepler, Newton, La Place, and others were at one time thought to be merely theoretical, and without any practical value whatever; and when Bowditch, the American mathematician, undertook the translation of La Place's celebrated work, the *Mechanique Celeste*," some thought it a great waste of time, and that old question, "What is the use of it?" came up again. Now I wish it understood that I do not object to the question. It is a good and pointed question, and ought to be answered. The answer is, that Bowditch having mastered the works of these celebrated men, was enabled to construct tables

for the navigator, by means of which the latitude and longitude of a ship could be determined with greater accuracy than had hitherto been possible.

The work of the United States Coast Survey is closely connected with navigation. The object of this survey is to make an accurate map of our thousands of miles of sea coast, to place upon charts the positions of the channels, the shoals, the reefs, and dangerous rocks. This is a work of great practical utility, for it diminishes the risk of the life and property involved in navigation, and thus diminishes the cost of imports. But the work of the Coast Survey has been extended, so as to include a trigonometrical survey of the whole country. This will form the basis of a complete topographical map, which, in turn will serve as a basis for Agricultural and Geological surveys. Prof. J. E. Hilgard, of the Coast Survey, speaking of the difficulties under which we labor in most parts of our country for the want of such surveys says: "In the attempt to put together the local plans of townships and counties, irreconcilable differences, often amounting to several miles, are encountered. The accepted geographical positions of capitals are found greatly in error when determined by accurate means. A river boundary, such as the Ohio, when drawn from the data available for one state will differ widely from that constructed for an adjoining one."

The ordinary land surveys cannot be made the basis of a topographical map, for these surveys were made on the supposition that the surface of the earth is a plane, whereas it is really spherical, and any attempt to fit together such surveys, so as to make a map of a state, will result in a failure, because a plane surface cannot be made to fit the surface of a sphere.

If we had an accurate topographical map of our state it would be of great value to us. If a new railroad is to be built, or if a town or city is to be supplied with water brought from a distant point by aqueducts, Engineers must be employed to survey two or three routes, and then the managers get together and decide which route is the cheapest and best. But if we had a topographical map of the state, an expert could sit in his room with the map before him, and in a few minutes locate the line of the road or of the water supply. Other illustrations of the advantages of a perfect map could be given but it is unnecessary. As a good house-keeper knows her house from cellar to garret, so a nation ought to know its own domain. I need not say, that unless a man is a good mathematician, he would have no difficulty in being excused from taking part in these surveys.

Again, our government has established Military and Naval schools in which mathematics is made the *basis* of instruction. The course of Mathematics in these schools is more extended than in any of the other institutions in this country. Why is this so? and why have other enlightened governments done the same thing? It is because there is a profound conviction, on the part of those in authority, that a severe drill in Mathematical studies is the best means for preparing men to command armies and navies.

The work of the civil engineer is practical. He builds railroads, tunnels mountains, and spans our great rivers with bridges, thus making all parts of the country easily accessible, and making near neighbors of states lying at opposite extremities of our vast territory. He has literally bound together the States of this union by iron bands, stronger than bayonets, bills of civil rights, or

constitutional amendments. It is impossible for us to realize, fully, the extent and advantages of the work of the engineer. We would indeed be in a sad plight without our bridges, our turnpikes and our railroads. It is needless to say that a thorough course of mathematics is the only road to success in engineering. In corroboration of this, competent judges have decided that our army engineers, graduates of West Point, stand at the head of the profession.

But at this point some one is ready to ask, are not Chemistry, Physics, Mechanics, Mineralogy, Natural History and Astronomy of practical utility? They *are* certainly, but you will soon see that Mathematics has complete possession of some of these, and that it has acquired large territory in the others.

The student of Chemistry soon finds that each element has a combining number, that atoms unite with each other in certain fixed and definite ratios. He does not proceed very far until he meets with equations to be solved, and before he can master the subject he will find use for the higher mathematics.

In Physics also mathematics is prominent. It has already almost complete possession of sound, light, and heat, and recently I saw the statement that Prof. Peirce of Cambridge was lecturing on the mathematical theory of electricity.

Mechanics treats of the parallelogram of forces, the theory of falling bodies, the parabolic path of projectiles, the motion of bodies down inclined planes and in curves; in fact, the student soon finds that Mechanics is simply applied mathematics, and that he will need both Analytical Geometry and the Calculus to understand all the principles.

In Mineralogy there is need of mathematics. There

are hexagonal prisms, tetraedrons, hexaedrons, octaedrons, rhombic dodecaedrons and other geometrical forms. Thus, in crystalization nature works by the rules of geometry.

The naturalist finds that the bones of animals are constituted in accordance with the mathematical theory of the strength and stress of materials; that the honey bee forms its cell in such a manner as to combine a maximum of space with a minimum of material.

Arago in his eulogy on LaPlace says: "Astronomy is the science of which the human mind may most justly boast. It owes this indisputable pre-eminence to the elevated nature of its object, to the grandeur of its means of investigation, to the certainty, the utility, and the unparalleled magnificence of its results." Some ambitious youth who does not like Mathematics, now comes forward and says: "Ah! that is just what I have always thought, I never did like arithmetic and algebra, and I wish to study the sublime science of Astronomy. He applies for admission to the class in that subject, but finds some slight difficulty in being admitted as "a member in good standing and full fellowship." Nevertheless he is admitted as a visitor. Very well. He goes into the Observatory, and, after looking at the instruments, he is more firmly convinced than ever that he will like Astronomy. He gazes with admiration upon mighty worlds moving in their appointed orbits in the depths of space; he looks with astonishment and delight upon some brilliant comet; he is enraptured with the telescopic views of Jupiter and his wonderful system of rings; he becomes still more interested when he turns the telescope upon our moon, and begins to examine its mountains and valleys; he imagines that in these remote regions of space, he will not encounter that measuring, syllogistic science

commonly called *Mathematics*. He observes *one* thing after a while, however, that renders him a little uneasy. If an eclipse of the Sun or Moon, or of one of Jupiter's satellites, a transit of Venus or Mercury, or the passage of a star across the meridian is predicted, he finds that the event verifies the prediction; it comes to time; it meets its appointment with a precision that is absolutely startling. This looks a little mathematical. But he proceeds. He has a desire to know how the diameters, distances, masses, orbits and times of revolutions of the planets are calculated; he would find the height of lunar mountains, the depth of lunar valleys, and the time of the comet's return. But here serious trouble begins; he finds that the planets are oblate spheroids; that they revolve upon axes variously inclined to the planes of their orbits; that they describe ellipses having the Sun in one of the foci. He hears something said about eccentricity, true and mean anomaly, precession of the equinoxes, nutation, aberration of light, centripetal and centrifugal forces; but he has no clear and satisfactory conception of these terms, because they involve geometry and the higher mathematics. The young man has made a great mistake. He supposed that "star gazing" was astronomy, and after gazing until he becomes satisfied, he ceases to attend the recitations *even as a visitor*.

The value of the study of mathematics as a preparation for Astronomy is admirably set forth by Sir John Hesschel in the introduction to his Outlines of Astronomy. He says: "Admission to its sanctuary, and to the privileges and feelings of a votary, is only to be gained by one means, sound and sufficient knowledge of mathematics, the great instrument of all exact inquiry, without which no man can ever make such advances in this or any other of the higher departments of science as can

entitle him to form an independent opinion on any subject of discussion within their range."

Mathematics is useful in history for the purpose of fixing dates. The astronomer can extend his calculations backward for thousands of years, and fix the time of every eclipse of the Sun or Moon. The historian finds among the imperfect records of antiquity the statement, that a great battle was fought at a certain place; but there is an uncertainty of three or four years, it may be, as to the time. A circumstance, however, enables the astronomer to find the time. It was stated that there was a total eclipse of the Sun during the battle. He examines the table of eclipses, and is at once enabled to fix the precise date of the battle, for a total eclipse of the Sun is a very rare occurrence in any one place.

Mathematics is a valuable adjunct in the Evidences of Christianity. McIlvaine bases a strong argument in favor of the truth of Christianity upon the mathematical theory of probabilities.

There is no doubt but that Political Economy will, in due time, be considered as a branch of mathematics, and, even at this time, no one should attempt to write on that subject, unless he has had a good deal of experience in discussing the relations of quantities.

Again, mathematics has done the world great service in ridding it of scientific romances. Many a beautiful theory has become a vanishing quantity as soon as mathematics looks it in the face. I might proceed to show that mathematics is useful in Geology, Botany, Music, Painting and Sculpture; but let this suffice.

An *individual* may neglect mathematics, but a *nation* cannot do so and remain properous; this is sufficiently proved by what has already been said; and let me say there are special reasons for encouraging the study

of mathematics in *this* country. Ours is a comparatively new country; our vast resources are only very partially developed; new roads are to be built; new mines opened; our rivers improved; and topographical surveys to be made.

These statements are especially applicable to our own great State. We are doing all we can in this institution, to prepare young men to do this work, and already some of the graduates of the department of Engineering hold important and responsible positions in our river surveys, and we intend to put more of them into such places. The young men of the West are just as good material, out of which to make skillful astronomers and engineers, as those of the East, and if there is a difference, it is in our favor; and I feel that if Missouri does not stand in the front rank, it is not for the want of ability.

While on the subject of the practical, I will say that it is my firm conviction that *all scientific truth is practical.* We may not be able to see the practical bearings of a principle as soon as it is discovered; but you may rest assured that some time or other it will be applied to the practical affairs of life. When the Greek geometers discovered the properties of the ellipse, they could not see that these properties were of any practical use. But Kepler proved that the planets revolve in ellipses having the Sun in one of the foci.

But let us now return to that young man who was excused from astronomy because he had neglected mathematics. He would like to know where he shall go in the study of nature to avoid mathematics. For my part, I cannot tell him, but, in Mansfield's lecture on the Utility of Mathematics, this very question is answered, and I here give that answer in full: "Yes, he who would

shun Mathematics must fly the bounds of flaming space, and in the realms of chaos, that

——— dark,
Illimitable ocean,"

where Milton's Satan wandered from the wrath of heaven, he may *possibly* find some spot visited by no figure of geometry, and no harmony of proportion. But nature, this beautiful creation of God, has no resting place for him. All its construction is *mathematical*; all its uses are *reasonable*; all its ends *harmonious*. It has no elements mixed without regulated law; no broken chord to make a false note in the music of the spheres."

ERRATA.

Page 127, line 1—QUOD instead of QUAD.

Page 127, line 8, from bottom—"cultivation" instead of "cultivalion."

Page 128, line 14—"answer" instead of "anwser;" and in last line on same page "form" instead of "from."

On same page, there ought to be no paragraph at "At one time a writer," &c.

THE THREE PRONUNCIATIONS OF LATIN.

By M. M. Fisher, Professor of Latin in the University of the State of Missouri.

The subject of my lecture was "Rome and Carthage on the Metaurus." My time out of the classroom was employed in preparing matter for the press, and, as a consequence, the lecture was delivered extemporaneously. When the manuscripts were called for to take their places in the present volume, leisure hours were still occupied in the same way.

Latin pronunciation has claimed unusual attention for years past and the discussion is likely to continue for years to come. The space due my lecture will be occupied with extracts from a work just from the press entitled, "The Three Pronunciations of Latin." The hope is entertained that these short extracts will not be unacceptable to those who are interested in a subject that receives marked attention from scholars both in Europe and America.

There are three methods of pronouncing Latin in use in the United States, all of which are regarded as scholarly, viz., the Continental, the Roman, and the English.

THE CONTINENTAL SYSTEM.

It is very common among the advocates of the so-called Roman method of pronouncing Latin, to speak of the so-called Continental system as a "natural ally" of the Phonetic mode; to affirm that "the united forces of the Roman and Continental methods are encroaching on the narrowing domains of the English system." Such statements may create a sympathy between the two systems, but they are not founded on fact, and their tendency is to mislead those who have not examined the subject with some care. Some ardent reformers would make the impression that if their system should prevail in England and America, then the "vexed question" would be settled, and an "international pronunciation" would at once become a reality. The truth in the case will at once make manifest the fallacy.

Harkness says: "Strictly speaking, there is no Continental method." Bullions and Morris speak of it as the "so-called Continental pronunciation." These statements are in accordance with the facts. For centuries the law of nations has been for each to pronounce Latin after the analogy of its own tongue. As there is such variety on the Continent, some of the ablest scholars in the United States, who use the so-called Continental mode, to make the matter explicit, state that they use the sounds of the vowels and diphthongs as heard in the Italian.

One of the chief arguments for the adoption of what scholars strangely enough call the Continental system, has been that it would enable learned men, by means of a common pronunciation, to make themselves intelligible all over Europe. This idea of grammarians and others is founded on an utter misapprehension of the facts. There is not now, and there has never

been, any international identity in the pronunciation of the Latin, and this is especially true of Continental Europe. There is a general agreement in the vowel sounds, but in the consonants, which make articulate speech what it is, there is very great diversity of sound. Each nation has its own phase, of what American scholars term the Continental mode. There is the French phase, the Spanish phase, the Italian phase, the Hungarian phase, the Swedish phase, and the German phase; and, strange as it may seem, there are sharply defined varieties of the Continental method in use in the different German States. What has just been said is a sample of an actual state of facts as existing on the Continent at this hour. Eschenburg, on page 550 of his "Classical Literature," says:—

"It is worthy of remark that the Frenchman, German, and Italian, in pronouncing Latin, each yields to the analogies of his own tongue. Each of them may condemn the others, while each commits the same error, or, rather, follows in truth the same general rule.

"Erasmus says he was present at a levee of one of the German princes where most of the European ambassadors were present; and it was agreed that the conversation should be carried on in Latin. It was so; but you would have thought, adds he, 'that all Babel had come together.'" All those speaking were using the Continental method.

How the native tongues on the Continent pronounce Latin, after their own analogies, may be seen from a glance at the Romance languages of Southern Europe, the French, Italian, Portuguese, and Spanish, to which the Latin stands in the relation of a common progenitor. The letters *c*, *g*, *j*, and *v* will be sufficient:

FRENCH.	ITALIAN.
c=s, before e, i, and y.	c=ch in cherry, before e, i, and y.
g=s in pleasure, before e, i, and y.	g=g in gem.
j=z in azure.	j=ee in fee (a vowel).
v=v, as in English.	v=v in English.
PORTUGUESE.	SPANISH.
c=s, as in French.	c=th in pith, before e and i.
g=s, as in French.	g=ch guttural.
j=z, as in French.	j=ch guttural, before all vowels.
v=v, as in English.	v=v, as in English.

Notice the German also:

c=ts before e and i.	g=g in go.
v=f.	j=y.

As an example of pronunciation in the languages named, take Cicero:

French, Cicero=*Seesayro.* Italian, Cicero=*Cheechayro.*

Portuguese, Cicero=*Seesayro.* Spanish, Cicero = *Theethayro.*

German, Cicero=*Tseetsayro.*

J. F. Richardson, one of the ablest of Roman Latinists, uses the following language:

"In the second place, it is an entire mistake to speak of the 'Continental method' of pronouncing Latin. There is, in fact, no common Continental system, but there are several Continental systems of Latin pronunciation, e. g., German, Italian, French, Spanish. These four agree, to be sure, substantially in regard to the vowels; but in other important points they differ decidedly both from the English and from each other, most of the diphthongs and some of the most important consonants being sounded differently in all five. The idea,

therefore, that he who combines the German vowel sounds with the English dipththongal and consonant sounds has the Continental system, or any Continental system of Latin pronunciation, is simply absurd.

"Of the six different systems of Latin pronunciation, then, prevailing in Western Europe and our own country, five are strictly national. Their differences find at once an original and an explanation in the fact that the scholars of each nation have followed, in their pronunciations of Latin, the analogies of their own vernacular. In this way, while making sure of mutual disagreement, all have departed more or less from the true Roman method, and the whole subject has been involved in uncertainty and confusion. Meanwhile the pseudo-Continental system, destitute alike of historical dignity and scientific accuracy, and lacking even the poor support of national prejudice and pride, is powerless to mediate and compose these differences. Although it undoubtedly avoids some of the grossest absurdities peculiar to the English system, it lacks the elements which command respect, and can never establish a claim to universal adoption and use."

Before passing to the next point, let attention be carefully fixed on several facts indisputably settled: 1. That no phase of the Continental system of Europe professes to be the true ancient pronunciation; 2. That no two of them agree in the sounds of the consonants; 3. That the so-called Roman pronunciation does not agree with a single one of them in either vowels or consonants, —as, for instance, Cicero, pronounced *Kee-ke-ro*, certainly differs from the French *See-say-ro*, the Italian *Chee-chay-ro*, the Spanish *Thee-thay-ro* and the German *Tseet-say-ro*; 4. That the so-called Roman differs more widely from the Italian than from the other Ro-

mance tongues,—a fact not a little significant when we remember that the Italian is spoken on the very soil rendered almost sacred to the scholar by the hallowed memories of the Latin language; 5. That when Americans use the Continental they do not sound the consonants like any nation or tribe on the continent of Europe. They approximate the vowel sounds of the Continent, but almost invariably pronounce the consonants as in English. Hence the so-called Continental of America is a combination of foreign vowel sounds with consonants uttered almost universally as in English words. Whatever the theories of teachers may be, this is a stubborn practical fact. We have in this country, therefore, the American phase of the Continental method, the conglomerate variety, differing from every other variety of that system on the globe.

ROMAN METHOD.

Twenty years ago there were only two methods used in the United States, the English and the Continental, and popular favor was rather with the former. In what is called the Latin, or Reformed mode, Prof. Haldeman, of the University of Pennsylvania, enjoys, and deservedly, the reputation of being the first explorer. His work was published as early as 1851. That mode now, however, is most intimately associated with the name of Corssen, in Germany, and Roby, in England, whose exhaustive works would be an honor to any nation. Both works have been published in the last twenty years. Prof. Lane, of Boston, introduced the Roman pronunciation in New England, and its introduction in the South is largely due to Prof. Blair, of Hampden Sidney, Virginia, and Prof. Gildersleeve, of Johns Hopkins University, Baltimore. Whatever conquests that system has made anywhere in the world, have been achieved within the brief space of ten years past.

But what does this new mode claim? Why, it claims to be the genuine Latin method, the true ancient pronunciation restored; to pronounce words as they fell from the lips of Cicero, Virgil and Horace. If this claim be well founded, then it is no new doctrine, but a very old one. Any dissent in this treatise from the opinions of others, however emphatic the dissent may be, is made with the profoundest regard for the distinguished scholars who have written in favor of the Roman method. But a system with such pretensions must abide, as it professes to do, the results of the crucible. Roby himself in his Preface says: "An inquiry into classical Latin is [an inquiry] into a pronunciation which has not been uttered by an accredited representative for the last seventeen hundred years." (Page 30, edition of 1871.) Yet they have gone back and brought down to our day a pronunciation which purports not to differ from that of Cicero "more than the pronunciation of educated men in one part of England would differ from that heard in other parts." (Roby.)

On what are these claims based?

1. The Latin grammarians: beginning with Varro, 64 B. C., and coming down to Priscianus Cæsariensis, who taught at Constantinople, 570 A. D. In reference to these grammarians, Prof. Blair, in his introduction, says: "To whose instructions we must now turn, in order to gather by inference, and not without great care and pains, the information which might have been easily and more certainly had by spending an hour with the Roman boys in their elementary school."

2. The information gleaned from grammarians is compared with three sources of probable proof."

(a) The traditions of scholars and the modern Romanic languages.

(b) The Greek mode of rendering Latin sounds into their tongue. The Greeks attempted to imitate the Latin sounds as perfectly as their letters would allow.

(c) The third probable proof is "the face of the language itself, as seen in its records which have been preserved to us."

For these three positions reference may be made to Prof. Blair's work, one of the best yet published on this subject in America.

A source of testimony much relied on by Roman Latinists is the modern Romance languages of Southern Europe,—a point which shall receive proper attention as we proceed.

But what kind of evidence is it upon which these lofty claims are based? The answer is, and must in the nature of the case be, "Probable evidence."

It is not at all our design in this discussion to undervalue probable or moral evidence. Far from it.

The countless facts of history, of the sciences, and of Christianity itself rest on this kind of proof.

The human mind is so constituted as to rest with as much confidence in probable evidence of the degree of moral certainty as in demonstrative or mathematical evidence. We do not object to the so-called Roman method because its basis is moral evidence, as from the nature of the case it can admit of no other kind, but because it is destitute of that measure of evidence of this kind which would entitle it to our acceptance; and our critics who drew a contrary meaning from our words fell into very strange misapprehensionsions of statements designed to be plain to all, viz.:

Probable evidence presents various degrees of strength. In the lowest form, it warrants only presumption; in the highest degree, it warrants moral certainty. In the face of the conflicting

opinions and difficulties to be shown hereafter, no scholar can make the least pretension that the resurrected system rests on any such basis as moral certainty Far from it. Many points are destitute of even presumptive evidence in their support.

What we object to is the hasty position taken by some enthusiastic scholars that there has already been made out even the lowest grade of probable evidence, even a mere presumption, in favor of the so-called Roman method over the Continental or English, which at once decides the question, and all, *nolens volens*, must logically fall into the ranks of the Roman Latinists and flout all who dare to differ and refuse to enter their air-castles, built or unvindicated, as wanting in logic and in regard for moral evidence. Such pretensions are hasty and unwarranted. We affirm boldly and explicitly, and hold ourselves responsible to prove, that while some parts of the resurrected system, but not peculiar to it, present a plausible claim to authenticity, other and essential parts are groundless, perplexing, and violently improbable. Instead of the new system being established in the judgment of the classic world, as is urged in certain quarters, its ablest advocates in Europe and America concede that some of its features are wholly unsettled. And yet the men who hold this position are the very men who have the right to recognition as the leading spirits in this reform movement. Some of those who are the most positive in their language are least known as classical scholars.

We now find ourselves face to face with two or three questions which are entirely distinct: 1. Do we know the true ancient pronunciation of Latin? 2. Shall we adopt the so-called Roman system? 3. A third question also is pertinent, If the new mode rested on a universally acknowledged foundation of moral certainty,

should it be adopted by English-speaking people? Most unhesitatingly and unequivocally we answer, "No," to all three of these interrogations. These inquiries put the case so plainly before the reader that it is hoped no one will misunderstand it. In regard to the first inquiry, Do we know the true pronunciation? the distinguished Latinist of Yale College, Prof. Thacher, in his Preface to Madvig's Grammar, affirms: "How the Romans themselves pronounced their language is not known, nor can it ever be known. Scholars may not agree in opinion in respect to the extent of this ignorance; but if it were in itself very limited, pertaining, for instance, only to the sound of a single letter, it might with reason be made an objection to any attempt to imitate the original pronunciation of the language; for the number of distinct sounds is so small in such a language as the Latin or our own, that every one of them runs like a thread through every page, and constitutes an important element of it. The difficulties which attend this subject are inherent in it, are such that there is no nation in Europe, the classical scholars of which agree in claiming that they can reproduce the pronunciation of the Roman forum, or in attempting to do so." Haldeman, on page 18 of his "Affixes to English Words," says, "The Latin alphabet is composed of the following twenty letters," naming them, and holding that only nine, B, D, F, H, N, P, Q, T, X, had the same power as in English. But suppose there is one sound, like the dipthong æ or œ, running "like a thread through every page," and in a multitude of words which is not known and about which there is a variety of opinions, will any man affirm that we know the pronunciation of a language when this multitude of words contains an unknown or at least a perplexing and unset-

tled sound, and yet eleven unknown sounds are conceded?

WANT OF HARMONY AMONG THE ADVOCATES OF THE REFORMED MODE.

That the reformers do not agree among themselves on some very important points is universally conceded, and is a matter claiming at the hands of every inquirer the most serious thought. Prof. Twining (*Western*, July-August, p. 417) uses this language: "That the advocates of the reformed pronunciation differ among themselves is of graver import, since if these differences are on vital points as Prof. Fisher claims, they not only discredit the evidence, but render impossible that uniformity of practice which it is one of the chief objects of the reform to secure." The consequence of a difference in vital points is well put by Prof. Twining. Let us examine some of these differences.

1. There is no harmony in their representation of the vowel sounds in general. Just here it should be carefully borne in mind that the reformers insist that their system is phonetic. Then "each elementary sound had its own unvarying sign, and each sign its own unvarying sound." This is, according to Prof. March, the essential idea of a phonetic alphabet; this, then, is conceded to be our criterion of judgment. Haldeman, quoting with approval G. Walker, says: "Every letter retained an invariable sound." Quoting from Scheller, he says: "The sound of the long and short vowels, though elementarily the same, were always distinguished in length." (Haldeman's Latin Pronunciation, pp. 17, 19.) Allen and Greenough say, "By the Roman (or phonetic) method, every letter has always the same sound." (Grammar, p. 7.) These are explicit statements of what is held by the new "Romans" throughout the world. The vowels did differ in quantity, they did not differ in quality.

Haldeman holds that:—

Long a=a in arm.	Short a=a in art.
" e=ey in they.	" e=ei in eight.
" i=i in marine.	" i=i in deceit.
" o=o in own.	" o=o in obey.
" u=oo in fool.	" u=u in full.

Here in this ideal scheme, the phonetic theory is substantially carried out.

Compare with this Tafel's scheme, which is identical, at least professedly so, with that of Corssen.

Long a=a in father.	Short a=same sound shorter.
" e=a in fate.	" e=e in then.
" i=i in machine.	" i=i in sit.
" o=o in hole.	" o=o in nor.
" u=u in rude.	" u=u in put.

A glance at this ideal scheme will show that it is not consistent with the theory in the short sounds of e, i, o and u. *E* in then, *i* in sit, *o* in nor, and *u* in put have not the same sound as *a* in fate, *i* in machine, *o* in hole, and *u* in rude. These words, as the least practised ear can detect, differ not only in quantity, but radically in quality. A glance too reveals the obvious truth that Haldeman—and J. F. Richardson agrees with him—does not agree with Tafel and Corssen, in representing the short sounds of *o*, *i*, and *e*. Who does not see that *ei* in eight, *i* in deceit and *o* in obey, are not the same as *e* in then, *i* in sit, and *o* in nor? If scholars on the side of the new pronunciation believe in the phonetic method and understand it alike, then failure to represent it harmoniously, even in their ideal schemes, is simply unpardonable. Roby tells us that *o* long=*o* in home, and *o* short=*o* in dot. Blair, that *o* long=*o* in potent, and *o* short=*o* in potation. Roby tells us that *e* long=*e* in met, lengthened, and that *e* short=*e* in met. Blair, that long *e*=*a* in gate, and short *e*=*a* in aerial.

We would fix emphatic attention on two things that are self-evident: 1. That these distinguished scholars do not agree with each other; 2. That their exhibition of their favorite pronunciation, as shown in many writers, is not consistent with their oft repeated theory. Any one who has any doubts as to the correctness of the statements here made is earnestly requested and urged to examine the subject for himself.

Before leaving this general want of harmony in regard to vowel sounds, long and short, it is worth while to notice how the followers of the so-called Roman method exhibit to us the long sounds of the vowels.

Blair affirms that *e* long=*a* in gate.

Roby, that *e* long=*e* in met, lengthened.

W. G. Richardson, in the Report published by the Bureau of Education, says that *e* long=the French *e*, or *e* in met, still more prolonged than *e* in *tres*. He speaks of fate as being "a convenient approximate sound." In his "International," published in December, 1877, he gives *e* long=*a* in fate. Now we confess our utter inability to understand how this able scholar, by the prolongation of the sound of *e* in met, to any extent, can reach as a result *a* in fate. Any one can test the matter by bringing to bear the organs of speech on the production of the two sounds. Before the speaker, when sounding *e* in met, can produce the sound of *a* in fate, he must stop and readjust the organs. The trial will make manifest the truth that there is not only a readjustment, but also a tension of the organs decidedly greater in sounding our genuine long *a*, which almost all the Romans make the representative of the long *e*, in their system.

But to descend more to particulars, take the diphthong æ.

Roby says *æ*=*a* in bat (lengthened), or bath.
Blair says *æ*=*ai* in lair, or *a* in late.
Harkness says, *æ*=aye=English *i*.
Gildersleeve says, *æ*=*æ* in Græme=*a* in fame.

That the vowel sounds as heard in *bat*, *late*, and *aye* =*i* long, are not the same, is simply beyond all controversy. We venture the assertion that no scholar, unless a foreigner, who looks at the case calmly, will risk his reputation as an orthoepist by affirming that these words do contain the same sound.

But why undertake to prove a want of harmony among those who insist on reform, when the fact is not only virtually but really confessed by some of the most enlightened defenders of the new system? For instance, the writer last quoted makes this admission: "Since phonetically, e lies between a and i, this difficulty seems to me to belong to the class of those to be settled by time, much in the same way as the dispute must be decided between English and American "half." Make a note of it that he confesses there is a difficulty to be settled by time. This is an ingenuous and truthful confession, and one that ought to be made by every Roman Latinist in America. There is no escaping it. Our point is made; there is a hopeless want of harmony upon the above issues which are vital to a phonetic system. The hope of a future harmony might be allowed were we dealing with an ideal case, but, unfortunately for the Romanist, our business in this discussion is with the past, to whose crystallized forms no additions of importance are likely to be made and from whose dead organisms the vocalization of living utterance has forever fled. The confusion of those ideal schemes leaves us in a state of bewilderment from which, it would appear, nothing less than the resurrection of a Roman

more perfectly representing the native language than even Cicero or Varro, if the Latin was settled in its phonetics, would be able to release us.

When reduced to practice in the class-room, observe how these differences become painfully evident. For illustration, take the nominative plural of hora, *horæ*:—

Horæ=*hoe-ray*. Blair, Gildersleeve, and others.

Horæ=*hoe-ryc*. Harkness, Richardson and others.

Horæ=*hoe-rah*. *A*=*a* in half=*a* in father. Roby.

Prof. W. G. Richardson, in criticising the "Three Pronunciations of Latin," makes this significant admission: "*Æ* is rather bad, but by no means a Cannæ." Coming from such a careful and accomplished scholar as he is, this means something.

Blair gives *oe*=*o* in world or *i* in whirl.

Gildersleeve, *oe*=*ae* in Græme=*a* in fame.

Harkness, *oe*=*oi* in coin=*oi* in coil.

Haldeman, *oe*=vowel sound in showy;

and says: "If showy and clayey were monosyllables they would contain the Latin *oe* and *ei*." Among others, he quotes these two lines from "Living Latin":

> "To these we add that English words like "showy"
> Contain the Portuguese and Latin "œ."

Is the vowel sound in world, fame, coil, and showy the same? Surely not. The differences thrust themselves on even a casual observer. But what do the advocates of the new system say about this? Roby says, comparing the Latin and Greek *oe* and *oi*, "But the Latin sound is much more doubtful." Again, "The sound of *oe* is somewhat perplexing." He finally concludes that the stress should be laid on the *o* rather than on the *e*. Peile says, "The nearest sound we have is perhaps that of 'boy.'" The word is perhaps. Prof. Twining is still more to the purpose when he uses this

language: "I do not wish to underrate the differences in these two cases (*ae* and *oe*), especially as I have within a few years changed my own practice and accepted probably archaic, but distinctive sounds as having better claims in theory than the past classical corruptions, and as being preferable in practice to such intermediate sounds as English organs do not easily make." Here the want of harmony insisted on is confessed, and a change in practice is frankly admitted. How does Prof. W. G. Richardson meet the difficulty? Here is his answer: "*Oe* is not worth a pinch of Napoleon's snuff, especially since our revised orthography has expunged it from those oft-recurring words *coelum*, *poenitet*, *coena*, etc." Truly, this modern Alexander wields a Damascus blade in cutting his Gordian knots in the Latin pronunciation. If the reformers can only eliminate *oe* from the language, then truly this one difficulty has been removed. Will Mayor and Roby, Haldeman and Blair, and others, meet a difficulty in this way? We venture a decisive negative. But Prof. Richardson (*Courier-Journal*, April) says: "A brand-new type of philology has been let loose on this planet, a thing of life and joy forever." Yes, and an infinite pity it has been let loose at all, if it proposes to remove difficulties in the way indicated above. This accomplished linguist does not propose to settle all disputed questions in this manner. It may be, however, that this is a philological pleasantry. The truth of history entitles us to expect of antiquarians that the monuments of the past shall not be mutilated or transmuted so as to respond to modern notions, as thereby their actual value as teaching monuments is destroyed.

Schliemann does not venture to change the relics he finds in Hissarlik or Mycenæ, but simply reports them as they are, whether he understands them or not. Were

these diphthongs transmitted from the ancient Latin as unintelligible as the whorls Schliemann finds, as viewed in their relation to ancient Aryan customs, still historic piety must dictate their literal preservation.

The enigmas of the past are not to be trampled under our feet, nor rudely pushed aside, as we know not what revelations may ultimately be made to us through the very perplexities to which they give rise.

The difference in regard to *oe*, indicated above, will appear in pronouncing the word *coelum*.

Coelum=*kuy-loom* (u=vowel sound in whirl.) Blair.

Coelum=*kay-loom* (*a*=a in fate). Gildersleeve.

Coelum=*koy-loom* (oy=oi in coil). Tafel, etc.

Coelum=*kowy-loom* (owy=owy in showy). Haldeman.

Again, notice the difference of opinion and usage in regard to the letter *v*. The question among the new "Romans" is whether *v* shall be pronounced like *w* or like the labio-dental *v*. Unquestionably the difference is a wide one, and rests mainly on diverse phonetic theories. The two parties among the Romanists, resting on diverse theories, have from the beginning held their ground so tenaciously as to render agreement simply impossible. Difference in theory, and also in usage, is confessed by all scholars throughout the world. Hence it seems wholly unnecessary to discuss this point at any length. Those wishing to examine the matter may refer to Roby's Grammar, Peile's Greek and Latin Etymology, and Prof. Twining's article in *The Western*, already mentioned. A very brief examination will verify the remark of A. J. Ellis, in his work on "Early English Pronunciation": "The sound of *v* in ancient Latin is a matter of dispute."

Gildersleeve says the sound was nearer our *w* than *v*; and still more like *ou* in the French *oui* (we).

Blair gives as a result of his investigations, that *v* =English *v*, when it began a word or syllable; but after *s*, *g*, and *q*, and followed by a vowel, it had the sound of *w*, e. g.:—

Validus=*val-i-dus*.

Vulgus=*vul-gus*.

Servus=*ser-vus*. V=English v.

But suavis=*swa-vis*.

Lingua=*lin-gwa*.

Quamquam=*qwam-qwam*.

Roby gives *v* invariably the sound of *w*. He uses these words by way of illustration:

Crevi=*kreh-wee=cray-wee*.

Jovis=*Yo-wees*.

Civitates=*kee-wee-tah-tace*.

Veni=*weh-nee=way-nee*.

Vidi=*wee-dee*.

Vice=*wee-kee*. (See Blair's Pronunciation and Roby's Grammar.)

v=English *v*. Tatel.

v=*w*. Bartholomew.

v=English *v*. J. F. Richardson.

v=*w*. W. G. Richardson.

Corssen seems inclined to the belief that *v* sometimes sounds like our *v*. (Roby, p. 42.) As might be expected, usage in the American schools lays no claim to uniformity.

But pause a moment. Some of the Continental nations cannot make the sound of *w* at all, hence if English and American scholars insist on sounding *v*=*w*, then the idea that the Reformed Pronunciation is to become universal is worse than Utopian; ay, it is a physi-

cal impossibility over a large part of Continental Europe. If the enthusiastic reformers are right and have found and resurrected the real *Ancient Pronunciation*, is it not a pity that whole nations, some of them the most learned on earth, will never be able to use it? In French, Spanish, Portuguese and Italian, *v*=*v* in English. These languages look back to a common ancestor, the stately and imperial Latin, but they can never fully utilize the results of this "new philology that has been let loose" in the last twenty-five years.

This perilous condition of affairs is relieved by the proposition of A. J. Ellis (Academy, No. 19), who advises that English speakers of Latin should not pronounce *v* like *w*, because it is needless to adopt a sound which Continental nations cannot produce. Whatever their theories may be, though demonstrated, whatever their arguments may be, even if unanswerable, those who hold that v=w, must abandon their ground, sacrifice the results of laborious research, and adapt themselves to nature's order of things on the Continent. Thus only can uniformity be attained with the Romanic nations. Is it not a little strange that these nations have lost the power of uttering one of the sounds used by a common progenitor? Let it be remembered here, that those who urge that v=w, tell us that they are producing the sounds as they fell from the lips of Cicero, Virgil, and Horace.

To return to our proposition. At present, there is no harmony. If harmony is ever to be realized in the future, one party in this controversy over *v* must abandon their ground, whether right or wrong. As the case now stands, some phases of the discussion are not far removed from the ludicrous. Either English and American scholars must abandon v=w, or the Continental nations must learn to pronounce w.

There are other differences, not so striking it may be, but such as demand consideration on the part of those who have adopted the "Roman reform" and especially on the part of those whose faith, under the eloquent and daring intrepidity of the reformers, has been at all shaken as to the comparative fixedness and superiority of the English system.

The following, from the principal of Eton College, Windsor, England, dated Feb. 8, 1879, contains information and arguments of the highest value to all English-speaking people:

ETON COLLEGE, WINDSOR, ENGLAND, Feb. 8, 1879.

DEAR SIR:—We have made no change in the pronunciation of Latin in Eton. A movement was set on foot a few years ago for bringing in a new system of pronunciation; and the Latin professors at Oxford and Cambridge drew up a syllabus, based on the best knowledge of the day. This attempt to revert to the old pronunciation of their language in its best days has a great interest doubtless for scholars, but its use in the practical teachings of the language to boys is by no means evident; and though for a time it found some favor, I think it is on the decline in England. It seems open to these objections:

1st. That our knowledge is far too meagre to enable us really to recover the old pronunciation of Latin as it existed (say) in the time of Cicero.

2nd. That there seems to be but little hope of inducing other nations to adopt any such scheme as that proposed by the two professors.

3rd. That the introduction of a new pronunciation would add to the difficulties of the early stages in teaching Latin.

4th. That there would be something painfully incongruous in attempting the pronunciation of Latin without altering that of Greek; and there seems to be almost insuperable difficulties in adopting the modern Greek pronunciation in English schools.

5th. That though in following the general practice of foreign nations, which is to pronounce these dead languages according to the laws of their own living tongue, we in England are doubtless further from the true pronunciation than the Italians, or even the

Germans (not to mention others), no practical inconvenience seems to result from this, except the difficulty of speaking intelligibly to a foreigner in Latin,—a difficulty which is not often felt, and which would not be obviated or greatly diminished by adopting the new pronunciation. I cannot help also feeling that there is a sort of pedantry in having one pronunciation of such names as Cicero or Virgil for a school lesson, and another for the intercourse of ordinary life; and I doubt whether the new system would ever take root in general society. I believe that on the whole the more thoughtful and liberal-minded men at Oxford, to speak of my own university which I know best, are not favorable to the abandonment of our present system.

Believe me, dear sir, very truly ever,

J. I. HORNBY.

PROFESSOR M. M. FISHER,
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THE ENGLISH SYSTEM.

Of the twelve extended reasons for the use of the English mode, space will allow extracts from two only.

Ten years ago I entered upon an investigation of the so-called Roman method with a view to substituting it for the English, if the new system should be found to rest on a basis of truth. This examination has continued until the present, using all the helps that have come from the pens of able scholars both in Europe and America; the conclusion reached in these pages, therefore, is the result of careful reading and study, and the preference given to the settled English pronunciation is the one that has been forced upon me by the stubborn facts on both sides of the question.

Let it be clearly understood that no one claims that the English method is the true ancient pronunciation of the Latin language, though it has been used for three hundred years in England. Let it be admitted that the so-called Roman system, as advocated by Corssen and Roby, sandy as its basis is, at least in vital parts is theo-

retically correct. Let its claims, based largely on probabilities, all be conceded; still, admitting the correctness of a theory and reducing that theory to practice are radically and vitally different. My position is, therefore, most unhesitatingly taken that for English-speaking people the English pronunciation is the best. Some of the reasons will be briefly stated:

1. The last edition of Webster's Dictionary claims 120,000 words. Of these, according to the highest authority, only about 23,000 are of Anglo-Saxon origin. De Vere (page 43) says that the English is the only European idiom that so combines the classic and Gothic elements as to make the Gothic the basis and the Latin the superstructure.

According to Prof. Whitney, in his "Life and Growth of Language," nearly five sevenths of the words contained in our large dictionaries are of classical derivation and only about two sevenths native Germanic. Far the greater part are from the Latin. The same author says that our scientific and philosophical vocabulary comes mainly from the Latin.

The number of words derived from the Greek is considerable, especially in scientific use, but far less than from the Latin. Take some of the richest Latin prefixes found in our language. With co or con as a prefix, we have 5,600 words, in or im, 2,900; re, 2,200; di or dis, 1,800; ad, 1,600; de, 1,600; sub, 700; pre, 700; pro, 600; per, 350. From the single root fac we have about 604 derivatives, according to Prof. Haldeman. (See his "Affixes," pp. 14-16.)

The author last quoted is of the opinion that there are not three hundred roots in any language. ("Affixes," p. 13.) In view of the fact that such a vast majority of our words are from the Latin, either mediately or im-

mediately, in view of the fact that of these three hundred stems very many are from the same classic tongue, we are vitally interested in recognizing the prefixes and stems which make our English what it is. It matters not whether the English system of pronouncing Latin has been used one hundred years, three hundred years, or one thousand years: what we are concerned with is that the English language as it is now stands has been founded on the old-fashioned pronunciation of Latin. This is indisputably true. Philologic and antiquarian research is one thing; the progress of a language, like that of nations, is quite a different thing.

For centuries the Latin has been making its rich contributions to our noble English. These additions to our language are being made to-day, as they will be made in the future, and that from necessity. One thing of inestimable value to every student is a thorough knowledge of his mother tongue—a matter sadly neglected in many of our colleges and universities.

The question for English-speaking people to settle is as to which pronunciation leads most directly to a vigorous and thorough use of our mother tongue. We answer unhesitatingly, the English. Let us have one thing at a time. The bearing of the new pronunciation on comparative philology will receive due attention hereafter. Now we are concerned with the vernacular. Prof. Haldeman says: "Sounds and not letters furnish the material for etymology." This is true, and we wish no better basis for our present argument. The English method assists the student, even in his early Latin course, in his etymology; and the derivation of words, in a multitude of instances, becomes manifest from the very pronunciation itself. Take the word *circumjacent*, for example, from *circumjaceo*. Pronouncing this word by

the English method, *sur-cum-ja-se-o*, at once reveals to the pupil the origin of *circumjacent*. The likeness is clear even to a child.

But pronounce the same word by the Roman system, and *circumjaceo* becomes *keer-koom-yah-ke-o!* The connection can be seen only by advanced scholars, and is very likely not seen then. Take the words rupture, rustic, social, rumination, from *ruptum*, *rusticus*, *socius*, and *ruminatio*. When these Latin words are pronounced by the English mode the origin of the word is clear; but let the Latin be pronounced *roop-toom*, *roos-tee-coos*, *so-kee-ooss*, and *roo-mee-nah-tee-o*, and the origin is obscured by foreign sounds. Try vicinity, vital, citation, equation, civil, and equity, from *vicinitas*, *vitalis*, *citatio*, *aequatio*, *civilis*, and *aequitas*. The English mode reveals the truth, for "sounds furnish the material for etymology." Apply the so-called Roman and say *wec-kee-nee-tahs*, *wee-tah-leess*, *kee-ta-tee-o*, *aye-kah-tee-o*, *kee-wec-leess*, and *aye-kee-tahs*, and English etymology is offered a sacrifice to a revolutionary innovation. Again, look at the common verbal stems jac, val, dic, duc, pel, and so on through the list. Whenever these stems occur in our language, the English system of pronouncing Latin gives a clew to both the origin and meaning of the words, as, for example, ejaculatory, valid, diction, induction, compel. It does not require an advanced scholar to verify and apply the statements just made. The most diligent scholar of any age who has not made the trial, will be surprised to find in how many of our words these Latin verbal stems form the permanent home of the idea.

The student of Latin can easily be induced to form the habit, from the very start, of tracing up the derivation of words, and the habit thus formed may be of in-

calculable benefit in other directions. On the other hand the Roman method confuses the student in both derivation and signification, or so entirely conceals them, that the beneficial results to genuine English scholarship are almost totally sacrificed. Loyalty to what some are pleased to call the "demonstrated rights of the Latin" may be a good thing, but loyalty to a masterly understanding of our own tongue is a far better. The Roman mode abandons one of the strongest incentives that can be brought to bear in the classroom,—that of enabling the pupil to see and hear at once and easily the intimate relation between the Latin and the English.

5. The sweeping change advocated by the new pronunciation tends to a complete revolution in the pronunciation of our own language. Professor Thacher, of Yale College, uses the following language: "For, to speak of Latin words which we have adopted, how long will Cicero maintain his place in English pronunciation after the rod shall have banished him from the lips of all Anglo-Saxon boys and girls who thumb the little Latin histories of the men of Rome, and shall have substituted the classical *kee-ka-ro* in his place? How long will Cæsar stand against Kaisar, Scipio against Skee-peeo, Fabricius against Fah-bree-kee-oos, Cyrus against Kee-roos, Tacitus against Taketoos, and so on through a long list of proper names which make a familiar part of our English language. *Prima facie* evidence will become preemah fahkeeah evidence, the *quid pro quo*, keed pro co; the *genius loci*, a ganeeoos lokee; the *mens conscia*, a mans conskeeah (o ás in cone); *scilicet*, skee-leekat; *et cetera*, at katarah."

Let *v* be pronounced like *w*, and note the way the most common expressions will be transformed:

viva voce becomes *wee-wah wo-kay.*

per centum becomes *par kane-toom.*
jure divino " *yoo-ray dee-wee-no.*
jus civile " *yoos kee-wee-lay.*
verbatim " *wayer-bah-teem.*
vivat regina " *wee-waht ray-gee-nah.*

And hopeless confusion is made of the many Latin words incorporated into English, as *utile dulce* must be *oo-tee-lay dool-cay;*

vale, *wah-lay.*
vice versa, *wee kay wayer-sah.*
ceteris paribus, *kay-tay-reess pahr-ee-boos.*
statu quo, *stah-too koe.*

This illustration might be prolonged indefinitely, for the material is abundant, but there is no necessity for it. What has been given is a fair sample of the radical change the so-called Roman must introduce to our class-rooms, and, in fact, in all the walks of life where Latin is at all employed.

MOSAIC COSMOGONY.

By A. Meyrowitz, Professor of the Shemitic Languages and Literature, in the University of the State of Missouri.

In entering upon the subject of Creation, we meet three classes of objectors to this doctrine: 1. The Atheists; 2. The Antiquarians, and 3. The Infidels. The answer to the first class we give thus: That the material universe, of which our globe forms a part, is not eternal—consequently the world which we inhabit is not eternal. Or we may argue thus: 'I exist,' this is self-evident. 'I am not the author of my existence;' this is also self-evident.' I therefore must be a created being. That being to whom I owe my existence derives his from himself, or, like me, owes it to another. If he exists himself, he must be the eternal God. If not, I argue about him as about the former. Thus I ascend, thus I must ascend, till I arrive at that being who does exist of himself, and who has always existed. Dr. Grosvener says the Christian's creed is: "I believe in God the Father Almighty maker of heaven and earth." The Atheist's creed is: "I believe in nothing the origin of all things." Which do you think is the most philosophical?

The second class, the Antiquarians say: "Remote

authentic antiquity ascribes a vastly greater age to this globe than that set forth by the inspired historian Moses. We answer, that the cosmogony of Moses contemplates simply a history of the origin of the human species; all the other parts thereof being incidental. And I maintain that the first verse is but an introductory passage, solving the great problem of "whence the existence of all that which we see?"

(B'reshith.) In the begining of time, when time was yet not; for things existing measure time. It does not limit to any period, or calpa, put it at what extent you will.

(Bara)—Created, brought into existence what was not before. Upon comparison of this Mosaic record with the most ancient system of heathen philosophy, there can be traced tolerable marks of correspondence. Orpheus says: "In the beginning the heavens were made by God, and in the heavens there was a chaos, and a terrible darkness was on all the parts of this chaos, and covered all things under the heaven." Almost literally Biblical. Anaxagorus says: "All things were at first in one mass, but an intelligent agent came and put it in order." Aristotle, though he believed in a *materia principia*, says: "All things lay in one mass for a vast space of time, but an intelligent agent came and put them in motion and so separated them from one another."

(Elohim)—God, the creator being infinite can not be comprehended by the finite. All that man knows of the Creator, is, that He exists. Therefore when Moses asked this Being "What is His name?" (Exodus iii-13.) that Being answered: (*Ehejeh asher ehejeh*) I shall be who shall be (English version I am that I am) i. e.: All that you mortal can know of me is, my existence. And

so the word Jehovah means Existing, which the Jews never pronounced, except the high priest in temple on the day of Atonement. God in English, we know, is formed from the adjective *good.* Elohim the plural masculine from *El*, *strong*, signifies, the concentration of powers; the intelligent forces to produce the things created. You will find therefore in this first chapter of creation only the name *Elohim.*

(Hashomayim)—the heaven, it is a word, or noun, in the dual form, made of the adverb *sham*—there, i. e. space, sphere, and as the sphere is divided in two, one above the horizon and the other below, the word heaven or sphere is in Dual. Moses speaks only of the visible atmosphere as Aben Ezra explains it.

(Hoorets)—the earth, the terrestial globe in its gaseous state. Maimonicles, and other Jewish Metaphysicians understand the word heaven to be form, and earth materia. At any rate is this heaven not to be confounded with the heaven described in the first chapter of Ezekiel or the heaven so often spoken of in the New Testament, which is the heaven of beatitude.

(V'hoarets hoytho touhu vobouhu)—And the earth was desolate and empty. There are acknowledged believers in Christianity who nevertheless believe in a *materia principia* like the learned Gratius and Vatabulus. They understand the words "touhu, vobouhu" to represent chaos; and read thus: "Before God created the heavens and earth, everything was contained in the chaos." Chaos was also not created. But such a reading cannot possibly be correct. In the first place, the verb must stand in infinitive construction, "B'rou" instead of "Boro" in preterit. Secondly the words "touhu vobouhu" are adjectives, *asratos*, *inanis et vaena*, without form and void.

(V'choushech al p'nai th'houm) — And darkness upon the depth. In Deuteronomy v-4, we read, "mitouch hoaish," out of the midst of the fire, and in verse 20 in loco, we read "mitouch hachoushech," out of the midst of the darkness, which means the same. Hence I understand that the word darkness here also means fire, and the idea is, that after the creation of the gaseous globe the element of fire was surrounding it.

(V'rooach Elohim m'rachefeth al p'nai hammoyim) —And the wind of Elohim was (brooding) hovering upon the face of the waters. I am well aware that Christology understands the word "V'raach," and the Spirit, the third person in the holy Trinity. There is even a most remarkable saying in Jewish literature: "The spirit of God, that is, the spirit of Christ (Meshiach)." But I am giving you a simple textual lecture. The word "m'rachefeth," translated moving, is beautifully adapted here for the idea of activity in creation. It is used to express the hovering of a bird over its nest in brooding its eggs. The Cabalah says: "The spirit hovered like a dove, touching and not touching." The simple meaning in the text is, the cooling off of the globe after its creation. The first verse of Genesis speaks of the creation of the substance, or *prima materia* of the heavens and earth. The second of the vital energies of a supernatural agency, in preparing the primordial elements for subsequent organization. And the third and following verses to the end of the chapter of arranging those elements in their proper form.

(3 verse. Vayoumer Eloumin y'hi our)—And Elouhim said: "Let there be light." The word "amar" means also he thought, he wished, as in Ecclesiastes ii-1. "I said in my heart." Elohim wished, and it was. Or, light; it seems most rational, by this light to understand

those particles of matter which we call fire, which the Almighty Spirit' that formed all things, produced as the great instrument for the preparation and digestion of the rest of the matter; which was still more vigorously moved and agitated, from the top to the bottom, by this restless element, till the purer and more shining parts of it, being separated from the grosser and united in a body fit to retain them, became light. The Talmud says: "By the light which God created on the first day, men could see from one end of the world to the other end." It means to say, that this light was diffused over the whole globe, not being concentrated. This light is to be carefully distinguished from that of the fourth day, when it was concentrated in the receptacles of light, i. e. the sun.

(4 verse.) This celestial fluid in a state of activity, is called "or," light, and the same in an inactive state is called "choushech," darkness. As the darkness, or rest is the negative of activity, or light light, the text mentions first evening and then morning. Mephistophiles, in Faust by Goethe, says: "The light which darkness bare."

(5 verse.) Youm echod—one day. The question whether it means a natural or solar day of twenty-four hours, or a period of vastly greater length is difficult to decide. If we reason that nature and Providence are gradual in their operations; not like man, who is always for subitaneous violence, but deliberately proceeding by gradual evolutions, the six days must mean periods of stupendous length. But when we suppose that creation involves the intervention of a miracle in giving existence to the material universe; and if by the intervention of a miracle, then why extend it continuously through periods of stupendous length? We come now to the

work of the second day, the separation of air and water. The word "rokia" signifies expansion, a gaseous fluid, and not firmament, as the English version, which is taken from the Septuagint. This constituted the next step of advance in the organization of the chaotic aqueous matter. For till there was an expanse, or atmosphere, the particles of water thrown off by the continued action of fire on the primeval elements, could not ascend. This expanse provided, the process of evaporation could go on, the smaller particles being raised above by exhalation, and the larger body of water remaining below. Thus the atmosphere, and which is the same material heaven, through which the birds of the air wing their devious course, "divided the waters which were above them from the waters which were below them." Water, "mayim," has for this reason the Dual form.

On the third day, sea and land were disunited, and the earth was made to produce vegetation. Each successive process in the conformation of the primeval aqueous matter to the purpose designed, should be sedulously kept in view. The chaotic element had by the organization of the first two days, produced successively and in the following order, darkness, light, the atmosphere and a division of the exhalated particles of water, from the denser fluid. This fluid, however, was subject to another process, that of bringing together its granitic and earthly elements; the former consisting of the primitive rock, or skeleton of our globe, the latter, the soil with which they were covered, as indispensable to the purposes of vegetation. Hence the division of earth and water, or land and sea, and the production of grass, herbs and trees.

On the fourth day a more perfect division of dark-

ness and light into day and night was produced, by placing in the material heavens, the sun, the moon and the stars. Thenceforward, the diurnal revolutions of the sun and moon, established the divisions of time into days, months and years, and the seasons into those of of summer and winter. These luminaries are called "m'ourouth," light-bearers, receptacles of "or," light created at first.

On the fifth day, was the formation of fishes, and of birds. By the formation of the sea-monsters, in reason of their enormousness, the word "Boro," to create, is employed by the writer.

The work of the sixth day was appropriated to the formation of the various species and genus of beasts and reptiles, and finally of man. Here again the verb "Bora," to create, is used, referring to the soul. His body was made out of the dust of the earth, but his soul was a new creature, a portion of God from above.

(26 verse.) (Naasseh Odom)—Let us make man. This plural form of the verb has given rise to many speculative exegesis, but without entering into the merit or demerit of these various speculations; I believe that the Deity addressed here his material creation and said: Let us, Me and the earth, form man. Thou earth give the matter, and I will create the mind, and both combined will make man. He will then be in both our image, and like unto both of us. The carnal body will bind him to earth, and his soul will make him God-like. And this God-like nature will make him lord of all lower creation, but not lord over their life; animal food was not allowed him.

(31 verse.) (Vayaar Elohim)— And God saw, means, and God approved, as, "I see he is right." (Toub m'oud)—vero good; in Hebrew is "m'oud," the superla-

tive the best. The world created was the best that God could have created. The Bible teaches the doctrine of "Optemismus," fallen men are the pessimists.

(II 2 verse.) (Vaychal Elohim)—And God finished. The finishing on the seventh day has caused the Septuagint, and other manuscripts to write "And God finished on the sixth day. But the word "Vaychal" can also have the meaning and "he liked" (See Psalm 84-2). The reading would be thus: "And God liked on the seventh day. His work which he made."

When the order of the Mosaic Cosmogony will be compared with the geological strata of the globe (as the lecturer compared it at the end of his lecture with a geological Chart which he exhibited to his honorable audience) it will be found, that the order described by Moses 1650 B. C. (3500) agrees most accurately with it. And is not this one of the grandest proof, that this book called the Bible is of none else but Him who declares at the beginning what will happen at the end of time, the only true wise God to whom be all glory and majesty. Amen.

THE FALL OF THE DECEMVIRATE—THE LEGEND OF VIRGINIA.

By Philemon Bliss, LL. D., Professor of Law and Dean of the Law Faculty in the University of the State of Missouri.

Before coming to the story which I propose to recite to you upon this occasion, and that you may understand its legal and historical bearing, I must call your attention to a few preliminary matters which are considered more in detail in the class room, when treating of the constitutional and legal history of early Rome, but which I can but merely allude to to-night. According to the Roman Annals, the Tarquins were expelled two hundred and forty years after the foundation of the city, and five hundred and eight before the Christian Era. This was twenty years before the battle of Marathon and some fifty years after the beginning of the restoration of the Jews and the rebuilding of the Temple. Before that event, in league with the Cognate Hernicians and with the thirty cities of Latium, and as the head of the Confederacy, Rome had acquired a prominent position among the powers situate upon the Mediterranean. A portion of a commercial treaty with Carthage has been preserved which indicates the importance of its foreign relations, and the great works built by the

later kings, show its internal strength. The wall of Servius Tullius was looked upon as a marvellous work in the days of Pliny and the *Cloaca Maxima* is one of those Cyclopean structures which were built as if for eternity. Its triple walls, each of huge blocks of uniform size, in all some eleven feet in thickness, are as solid as when built, its area is greater than that of any similar work in Europe and is only inferior to the great Mill creek sewer of St. Louis.

These kings, except perhaps the last, were the protectors of the commons. The Patricians were exorbitant usurers, denied the Plebians any interest in the public lands, and habitually availed themselves of the right to sell their insolvent debtors into slavery. The kings desired to save their peasant soldiers and sought to protect them from falling into the hands of their remorseless creditors. This was chiefly done by usury laws limiting interest to ten per cent, and by giving to each Plebian a homestead, thus creating a self-dependent, free and hardy peasantry, interested in defending their own homes as well as the great possessions of the lordly patricians. The later kings, at least Servius Tullius, also sought to give them some voice in the state through the complicated organization of the centuries of which I have now no time to speak.

But Patrician avarice and ambition, Patrician pride and arrogance could not endure the idea that the descendents of emancipated clients, of slaves, of strangers who had voluntarily domiciled in, or who had been transported to the city as captives, should be exempted from any burden, should enjoy any political rights, or receive any portion of conquered lands. They might fight—indeed there could hardly have been an army without them—but every victory must be for the exclu-

sive benefit of the privileged order; and for reversing this policy, for seeking to give some four or five acres to each peasant-soldier, for desiring to clothe the centuries composed of the more prosperous plebians, as well as patricians, with some civil power, Tarquin the first and Servius were assassinated, and for laying his heavy hand upon patrician as well as plebian, the last Tarquin was driven from the throne, and a republic, so called, was established.

Upon the expulsion of the kings, the gentile class determined to establish a pure and narrow aristocracy. At first, a somewhat liberal constitution was adopted, but as soon as the fear of Tarquin had passed away, it was trampled under foot and the struggle continued for nearly one hundred and fifty years before there was anything like political equality between the orders. This was a sorry period in the history of the imperial city, and for a portion of the time its habit, if not its dream of conquest was abandoned and it became content to struggle for a very existence. The acquisitions of the Tarquins and of Servius were soon lost, the alliance with the Latins and Hernicians came to an end, the citizens who had been planted in Etruria were driven back across the Tiber, the northern boundary of the ager Romanus came down almost to the Anio, and on two memorable occasions the city itself fell into the hands of the enemy. It was first conquered by Porsena and compelled to pay tribute to the Etruscans, and after the days of the Decemvirate, of which I am about to speak, barbarous hordes of Gauls then occupying the banks of the Po, poured over the Apennines down through Etruria, scattered the Roman army sent out to meet them, and took possession of and burned the city—the Capitoline hill with its priceless historical and legal treasures alone being saved.

During this long era of depression five or six generations passed away, the city was constantly engaged in external wars with the small powers that surrounded it, but the great war was within its walls. No danger, no patriotic impulse, no law or compact, conceded as they often were by the patricians when driven to the wall, could divert them from their determination to establish and maintain their aristocratic constitution. The fathers, the patristic class, alone in their view composed the state, and they assumed that the great majority of the free inhabitants, although native citizens and soldiers, were but strangers having no rights, but bound to work and to fight for the orthodox order. They were forbidden to intermarry with this order, were rigorously excluded from every office involving the administration of law, were shut out from lands won by their valor, were often involved in hopeless debts by the usury wrung from their necessities and, with their families, were sold into slavery to satisfy them. Religion came to the aid of selfishness. The gods of the city, as well as those of the gentes and curies, were patrician gods. The fathers, the patristic class were alone under the divine care, they alone could offer sacrifices, they were a sacerdotal as well as an aristocratic order. Without an orthodox worship, the commons were simply impious for aspiring to equality with the sacred caste.

As the fruit of the long struggle with pride and superstition, the plebians had wrung many concessions and would perhaps have been contented had their rights, under these concessions, been respected. Their legal disabilities were still bad enough, but, as is always the case with classes who cannot protect themselves, their sufferings from unlawful outrages, from the oppression of magistrates, and the perversions of law were far more

severe. The constitution of the good king Servius had lived in their hearts and hopes and they had not ceased to struggle, and with some success, for the relief which he had sought to give them. Before the days of the Decemvirs they had acquired small homesteads, their place in the centuries, with the increasing political power of that organization, had become undisputed, and the assembly of the tribes, composed at this time exclusively of plebians, had become a legal body with important political powers. This body could initiate laws, but the patrician Curies and Senate always ignored every unpalatable proposition, and patrician mobs were wont to interrupt or break up their assemblies. They were practically without protection even in the few legal rights which were conceded to them, for they were without magistrates who possessed any power outside their own order. In view of this want, the commons, by the first secession to *Mons Sacer* had obtained the celebrated Tribunate, an office which would be the source of endless confusion, if not anarchy, in a government of equal laws, but which, in the antagonist populations of Rome, became their only efficient protection.

I have no time even to allude to the many and long struggles which resulted in the emancipation of the plebians, in the opening of that career of conquest, and in the successful establishment of little Romes, throughout the conquered territories, that have made Rome, though so long dead, still the active, the moving power among men. But my subject to-night, 'The fall of the Decemvirate,' demands that I briefly speak of the creation of that celebrated magistracy, chosen, like the Archonship of Solon, to reform the laws and which resulted in the adoption of the XII Tables, a code of commanding importance in its bearing upon the jurisprudence of the world.

I have alluded to the fact that the law was administered exclusively by the patricians and have also alluded to their rapacity and disposition to grind the face of the commons. At this period, except occasional enactments for special objects, there were in Rome no written laws; and it is not likely that written codes were known in any of the neighboring states. Controversies were determined in accordance with certain generally received rules or customs, recognized but not ordained, customs which had existed more or less settled and developed, for hundreds, perhaps thousands of years, before the foundation of the city. Those which at this and subsequent periods were common to the Italian cities with which the Romans held intercourse came to be called the *jus gentium* or *jus naturae*, while the *jus civile* pertained to Rome alone. The complaint of the plebians in regard to legal administration was two-fold. First the law was uncertain and was often perverted in the interest of the ruling class. They demanded a written code so published as to be known to all and with severe penalties upon any recreant magistrate who should disregard it. What some of those penalties were, we shall presently see. They also desired a system of laws that should apply equally to all classes of citizens: hitherto there had been one law for the patrician and one for the plebian. They demanded also an equal participation in the magistracy. It had become very apparent that so long as all the great offices were held by their enemies, so long as, when appealed to for redress of injuries, they could make the law whatever they saw fit to call it, so long as, even in theory, the two classes were not equal before the law, it would be in vain to strive for other reforms. Dispairing therefore of justice without a revolution in the judicial system, they dropped all oth-

er demands, and in the year 293 from the foundation of the city and forty-eight years after the expulsion of Tarquin, the Tribune Terentelius brought before the assembly of the Tribes a *lex*, an act we should call it, for the election of ten magistrates to be taken equally from both classes, to supercede the Consuls, the Tribunes, the Quaestors, the Ediles, and whose first duty should be to codify and publish the laws and provide for the political amalgamation of the orders. This proposition aroused every passion of the aristocrats. It would be interesting and instructive, as showing that human nature is the same in all ages, that political ascendency and class privilege are never surrendeaed without a struggle, to note in some detail the fierce and bloody strifes over the Terentilian law during the next decade. But I have no time to-night. Suffice it upon this occasion to say that after a struggle of nine years, after every device lawful and lawless had been interposed in opposition, the patience and perseverence of the commons was rewarded with success. The Senate and the assembly of the Curies so far yielded as to authorize the election of the Decemvirs to supercede all other magistrates, and directed that they should codify and publish the laws.

The work of the first Decemvirs was highly satisfactory. In framing the code, they took to their aid the Greek philosopher Hermodorus, made him their secretary as we would call it, drew up the first ten Tables, and caused them to be engraved upon brass and exposed in the Comitium for public inspection. These laws were well received and no complaint was made of the civil administration.

One of the ablest of the Decemvirs was Appius Claudius. Aristocrat by birth and instinct, he thirsted for power and had labored to make himself popular by

seeming to be the chief instrument in gratifying the commons through the adoption of an excellent code. He belonged to the celebrated Sabine Claudian family, which, a generation before, had been adopted by the Curies and incorporated into the Roman aristocracy. Almost every generation of this family, from its first entrance into the city until the imperial Claudius, had furnished men of marked ability. They were never soldiers, were rather distinguished as orators and adroit political managers, were always remorseless patricians without a spark of sympathy with the commons, though upon occasion they made very successful demagogues. It takes a heartless aristocrat to make a genuine demagogue, and nothing so pleases him as, while subjecting the people to his will, to degrade them by flattering their vices and by exciting their jealousies against those who would elevate and ennoble them.

At the end of the year the work of the Decemvirs was not completed and another election became necessary. Niebuhr thinks they were to be a permanent magistracy and that the new election was in regular order, while others suppose that they were chosen for a special purpose, and that this election was only to complete their work. But we know that a new election was had, and Appius Claudius was the only one of the old body who was re-elected. Finding himself secure in his position, that his new colleagues could be controlled by him, and hoping for nothing more from the plebs, the demagogue threw off the mask, made his peace with his own order, and managed to render this administration the most infamous known in the Annals. Two Tables were added to the code containing, as Cicero says, some unequal laws, among which was the provision that if a patrician should wed the daughter of a plebian, the fruit

of the marriage should belong to the lower order. For this the commons cared but little, it served only to strengthen their own class, but they cared much for the oppressive orders and unjust judgments to which the new Decemvirs subjected them. For some forty years they had enjoyed the protection of their own Tribunes, —the arm of the Consul was often paralized by his veto and they had succeeded in banishing some of the most illustrious patricians—but now the office is superceded and there is no one clothed with legal authority to shield them from outrage. The patricians could not look upon the Decemvirs with favor, for they had been forced upon them by the plebians, but still they delighted to see this fruit of the popular victory brought home to the commons, and stood aloof, or encouraged the tyrants. The year run out and no new election was called: it seemed that the Council of Ten had determined to follow the example of the tyrants of the Grecian cities and hold on to their power. How long this state of things would have continued but for an attempted outrage by Appius cannot be known, but, as the immediate cause of their overthrow, the Roman Annals, or perhaps the Roman Legends, have left us the exciting story of Virginia. In giving you this story to-night, I hope it will not be considered any the less truthful if I do not tread in all the steps of Livy; at least I will not, like him and Macaulay, put long speeches into the mouths of the excited actors, when their words must have been short and sharp.

I must detain you from the story a little longer, for it cannot be well understood without some idea of a Roman court of justice. At this period the famous basilicas had not been built and all suits were instituted, the nature of the controversy was ascertained, and usu-

ally the final trials were had in the Forum, in the open air. This celebrated place, on which for more than a thousand years were acted scenes of greater public significance than in any other spot on earth, was but an oblong public space in the heart of Rome of about four acres of land, extending south from the base of the Capitoline hill with diminishing width to near the eastern slope of the Palatine. The Senate Chamber overlooked it from the Capitoline and the assembly of the centuries —the exercitus—was held in the Campus Martius outside and north of the walls—the army, as such, not being suffered in the city. The importance of this little area will appear when we consider that, except the Senate and the centuries, no legal public assembly, whether of the curies or the tribes, no elections, no legislation by the commons or by the patrician body, and no courts of justice could be lawfully held except in the Forum Romanum. The judicial power in early Rome was vested first in the Kings, afterwards in the Consuls, and at the time of which I am speaking, in the Decemvirs. The plaintiff, in bringing his action, did not, as with us, sue out a summons, or a capias, to be served upon his adversary by a public officer, but himself seized and brought him before the magistrate. The defendant was bound to yield, for the plaintiff was as the sheriff in the case and could enforce obedience. The Consul, or at the time of which I am speaking, one of the Decemvirs, and in after centuries the Praetor sat in the open Forum to hear complaints, and when the parties came before him, an early day was fixed to make up the issues as the lawyers call it, that is, to ascertain the real nature of the complaint and defense. At this second appearance the character of the controversy was ascertained, and the whole matter was referred to a judex, who was instruct-

ed to hear the evidence, to decide upon the facts and to render judgment in accordance with the directions of the magistrate upon the question of law involved. Long after the age of the Decemvirs the formulary system, so celebrated in Roman jurisprudence, was adopted by the Proetors, by which all issues were made up in writing according to exact formulas and the directions of the Proetor were also in writing; but at this period the allegations of the parties were verbal and the instructions to the judex were also delivered to him verbally by an officer sent with the parties for that purpose. Had I time to-night it would be interesting to go more into detail in regard to these trials, but from what has been said you will perceive that in them was embodied the fundamental idea of our own jury system, the determination of the questions of law and of what should be the issues between the parties being made by the magistrate with a submission of the facts to a lay citizen. At the time of which I am speaking no one but a Senator could be a judex, and though the class from which he might be chosen was afterwards extended, yet it was always confined to the highest rank of citizens. The judicial function, whether exercised by the Proetor or judex, was with the Romans as it is with us, the highest in internal administration, with this difference, that with them such service was gratuitous and no one could be entrusted with questions affecting life, liberty or property, unless he had a large pecuniary interest in the state.

THE LEGEND.

An unsuccessful war was being waged against the Equians and Sabines, two legions were in the field under eight of the Decemvirs, leaving in the city as the sole magistrates, the tyrant Appius Claudius and his col-

league Oppius. Lucius Virginius, belonging to the better class of the plebians, a centurion and abroad with his legion, left at home a beautiful daughter who had been betrothed to Icilius, a distinguished leader of the commons. As, with her maid, she daily came to her school adjoining the Forum, Appius fastened his eyes upon her. His allurements were disregarded. Piqued and inflamed by the obstacles in his way, and not doubting his own omnipotence in the city, he determined to secure her person through the fraudulent exercise of his legitimate power as magistrate. To this end he suborned one of the clients of his house to demand the fair Virginia as a child of one of his female slaves, to claim that she had been adopted by the childless wife of Virginius and imposed upon him as her own. A client in Rome was something higher than a slave and something less than a freeman. He could hold property, but owed more than feudal service to his patron, and could never act in any public matter against his will. One day, on the way to her school, the lass was seized by this client, her pretended owner, but the crowd, which was drawn together by the outcries of her maid, on seeing her beauty and learning the names of her father and affianced husband, promptly interfered and rendered forcible abduction impossible. They were somewhat appeased by the apparent fairness of the tool of the Decemvir, who disclaimed violence, and was only about to institute his claim to the girl in a strictly legal manner. Accordingly he was suffered to bring her before the magistrate, then in his judgment seat surrounded by his lictors, before whom he made his formal demand. Such was Roman slavery, that, had his statement been true, or had a judex, perhaps corruptly, found it to be true, no limitation of time which bars all other demands, no

refinement of manners which elevates their possessor above servile employments, no affection of family or friends who would retain her in the sphere in which she had been reared, no offer to the claimant of pecuniary compensation, which heals all wrongs and satisfies all other claims, could have availed the poor girl. As the property of the demandant, she was absolutely and forever subject to his will. But there was also a law in Rome that made the condition of servitude an affirmative fact to be established, and it was expressly re-enacted in the Twelve Tables that, until final trial, persons claimed as slaves, should be left in possession of their freedom, although they were required to give bail for their appearance. It would certainly seem that Virginia was in no danger, for the story of her birth was a fiction; it of course could never be substantiated and in the mean time the law preserved her from the hands of the claimant. It was not yet known that the whole proceeding had been set on foot by the magistrate himself, nor could it be imagined that even Appius would disregard one of the provisions of his own code which he had just caused to be engraved upon brass and placed in the comitium. To prevent the violation of law by such magistrates as he, was one of the objects sought by Terrentelius, in demanding that the laws be reduced to writing and published.

So far the pretended master of the girl had only presented his formal demand, the selection of a judex and the trial were to be at some future day to be named. By a later enactment, the time for the second appearance was fixed at thirty days, although now, it was left to the discretion of the magistrate. Appius was too considerate to hurry on the proceeding and kindly consented to its postponement, but the girl was under the paternal

power, and inasmuch as no one except the father could give lawful bail for her appearance, he directed the claimant to take her to his house and give security for her forthcoming when the father should answer the summons. Imagine the import of this. She was to be taken by this dependant of Appius, both living perhaps within the same walls, and taken as his slave, legally subject to his absolute control even to the taking of life. The bystanders, if by this time they did not see the object of the whole proceeding, clearly saw the effect of this order, and sent up a groan of indignation. Icilius, who had just heard of the conspiracy against the honor of his affianced, pressed forward through the lictors, took his stand by her side, was followed by a crowd of sympathisers, and the hounds were for the time balked of their prey. Meeting with this unexpected obstacle, the Decemvir was forced to temporise, and, trusting to the cooling effect upon the crowd of a little delay, and to his ability to bring upon the ground a force sufficient to overcome all resistance, announced that he would take bail for her appearance in the morning when he would decide the preliminary question as to the custody of the young girl, until the time for sending the parties before the judex.

While Icilius detained the court in arranging as to sureties, two friends of Virginius secretly withdrew and rode with all speed to the camp, well knowing that a little delay would result in his being prevented from returning to the city, The brave centurion thus notified, at once obtained leave of absence, and was on his way to the rescue of his child before the messengers of the Decemvir had reached the army with a command for his detention. Thus the wings of friendship were swifter than those of lust. There was little sleep that

night in the house of Virginius. The animus of the Decemvir must have been suspected and if the suspicion should be verified there was little room for hope. The implicit obedience given to the orders of our own courts furnish but an imperfect idea of the power of the Decemviral tribunal. This man was not only the highest judge, but he was as a very king. His curule seat or throne, his robes, his eagle-mounted scepter, his lictors were all royal. He sat precisely as had the Tarquins, lacking only the crown. In him was centered for the time the power of the Consuls, the Proetors, the Tribunes, the Quaestors, the Ediles; any resistance to his authority was not simply a contempt of court, it was rebellion and death.

Early in the morning came the Decemvir prepared to meet any resistance. Also came Virginius in the attire of a suppliant, followed by a great company of Roman matrons and friends, and, as he led his daughter into the forum, appealing to the bystanders, showing that his cause was the cause of all, Icilius joined him and also invoked his friends and the Roman mothers who had followed them, added their tears to the general sorrow. The multitude were moved by the scene, but Appius had prepared himself for any emergency by bringing to the Forum—into court as we should say—a band of armed patricians to aid his regular lictors in enforcing any order he might make. The client and pretended master Marcus Claudius, renewed his demand and the ermined scoundrel, eager for the possession of her person, hastened to decree that until the cause should be remanded to a judex, the maiden should be delivered as a slave into the possession of her master. All were shocked by so bald a defiance of law. I say all, but I do not include those bands of patrician ruffians who

were always ready to second any outrage upon the commons, or upon the honor of plebian families. Marcus went to lay hold of the girl, Virginius threatened, the matrons wept aloud, and the friends of the centurion hurled back the despot's minion. This was an open defiance of the court, was rebellion, illegal in form, though in the interest of law. In Republican and Pagan Rome trials happily were public—secret tribunals were reserved for another age and another faith—the reverence for law which pre-eminently controlled the Roman commons—that conservative instinct, so essential to the life of a free state—had rendered these trials, although held in the open market place, as orderly as in any modern hall of justice. And even now, under a provocation that would justify any resistance, the habitual reverence and respect felt for the law and its administration by those who thus witnessed their fearful prostitution, served well the purpose of the tyrant. The power of the Tribunes had been suspended, Consuls and Proetors and Dictators had all given way to the Council of Ten, and Appius sat in the forum, in the accustomed seat of soverignty, as the sole representative of the majesty of the law. Rising in his robes of office, seeing on either side his lictors with their axes, and behind them his bands of retainers and of armed patrician youth, all ready to do his bidding, his heart was re-assured. Stretching forth his scepter, he boldly doomed to death all who should resist his mandate and, pointing to the trembling maiden, loudly ordered the lictors to disperse the mob and deliver her to her master. As the officers stept forward to obey, the people instinctively recoiled, leaving the father and lover alone with the unhappy girl. They saw that it was impossible to resist, and also saw, and with terrible distinctness, the fate

that awaited her. As Virginius looked upon his daughter, a terrible anguish and uncertainty overspread his face. But as he looked again at Appius and at the approaching lictors, the cloud rolled away and was followed by a strange exaltation. He asked permission to take his daughter and her maid one side to learn from the latter whether the story of Marcus was true, and the tyrant, seeing it to be impossible for them to escape, and not wishing to seem wantonly severe, granted the request. The poor girl was bewildered, could hardly take in the import of what was passing, but with childish faith clung to her father, while almost recoiling from the unwonted fire that lit his eye. He led her to the side of the forum, where was a butcher's stall, seized a knife and, huskily saying,"This my daughter will keep thee free," plunged it to her heart. Raising the streaming blade and turning to the baffled Decemvir he exclaimed, "Upon thy head, tyrant accursed, be the blood of this child," and boldly marching through the Forum, all giving way and the lictors themselves too paralized to obey the orders of Appius to arrest him, he mounted his horse and rode for the camp.

Icilius had rushed to the side of Virginius and received the slain maiden from his hand. By the aid of his friend Numatorius, he improvised a litter and raised the body to the view of all. No mother was there, she had long since died, and sisters she had none, but the young brothers, the kinsman and a multitude of friends, all crowded round. Some wailed, some cursed, some only wept. They deplored the fatal beauty of Virginia, the dire necessity of the father. "Is it for this" exclaimed the matrons, "that we rear our daughters in virtue?" A sad procession started for the home of Virginius upon the Aventine. Icilius was known to all; he was too full to

weep, almost to speak; as he led the procession and recognized his friends he could only point to the body and to the forum where Appius still sat. To young Vetruvius, just coming in from the country, known to be betrothed to a friend of Virginia and clamorously wondering what all this meant, he could only say: "Your turn my friend will come next." In threading the Velabrum and passing under the Palatine, the first home of the robber band that founded the city and the continued home of their robber descendants, Icilius could but hurl a half smothered curse at the gloomy houses of the tyrant caste, as their dark walls frowned down upon them. But soon the procession rose from the valley and the body was tenderly deposited in the house of Virginius. "Dearest," said the patriot lover as he stooped to imprint a fevered kiss, "thou shall yet rest in peace! the tyrant shall die! Let thy shade attend me until sweet revenge shall open to thee the gates of the blest!" and tearing themselves away he and his friend left for sterner duties.

They were not allowed to begin the fight. Appius had ordered Icilius to be seized, and he himself, leading his lictors and the band of young patricians that surrounded him, rushed forward to make the arrest. But in the mean time Valerius and Horatius, leaders of the small band of patricians, who had always sought justice for the plebians, had appeared upon the scene and rallied the people around Icilius. Their appeals fell on willing ears. The shopman who had daily smiled upon the young girl, as, in her fresh beauty, with pencil and tablet, she passed on her way to school, the father who thought of his daughters at home, the lover who knew not but the turn of his own betrothed would come next, the citizen who, after having obtained the codifica-

tion of the laws and their equal application to all, had fancied himself secure in his rights, all felt that the cause was theirs, and placed themseves under their new leaders. The fasces of the lictors were broken and the patrician band was driven back. Appius again mounts his throne and demands obedience. Valerius, speaking with the authority of a senator, pronounces him a usurper and orders his guards to leave him. But by this time the story of the Decemvir's crime had run through the city; the whole body of the commons had become aroused and the mad murmur of the thick gathering crowd, like the roar of approaching breakers, paralized the lictors and the young bravos who had come to see the sport and to enforce the degradation of a plebian house, slunk out of sight.

Appius is left alone with his lictors. See the aristocrat, the demagogue, the tyrant, as, now pale, now red, he crouches with terror at some fresh burst of popular wrath, or, assuming courage as the storm may seem to lull, pours out anathemas in the name of the gods and of Rome, or, struck by a fresh missile, pales again, stretches out his scepter, wondering that the emblem of sovreignty to which all were wont to bow, should no longer protect him! What now to him are the royal robes, what the ivory scepter, the curule chair! See Icilius, the pale stern lover, the peoples, friend, as, under the wing of the two senators, he leads them on! Hear him shout the curse of the blood stained father, "On thy head, tyrant accursed, be the blood of this child!" Ah, sir; this is not the couch to which you invited yourself, nor the dalliance which you craved! Look! The missiles come thicker and faster. Bruised and bleeding, covering his head with his robe of state, the Decemvir bids the lictors hurry him off, and he succeeds in hiding

himself behind a near and friendly wall.

History repeats itself. Almost in our own day we have seen a Jeffries, the browbeating, the cruel, the unjust judge, cower in abject terror behind prison walls, as he hears the people cry for vengeance upon his guilty head.

Oppius, one of the Decemvirs, finding his colleague Appius already driven from the seat of power and the city in an insurrection which he was impotent to quell, called together the Senate. This seems to be the only body whose authority at this time was not superceded by that of the Decemvirs. Its constitutional existence, with great but somewhat varying authority, was, at all times and by all parties, treated as a matter of course. The Senate met; it was not disposed to hurry in its deliberations, thinking perhaps that the popular fever would cool; the army at least was secure.

We left Virginius on his way to the army stained with blood and bearing the bloody knife with which he had delivered his daughter. He was followed by many who had witnessed the scene. The story of her sad fate, of the passion and cruel judgment of Appius, flew through the camp. Had there been no other ground of complaint, this might not have been sufficient to drive the citizen soldiers to extreme measures. But as we have seen, immediately upon the election of the last Decemvirs, Appius had deserted those who had chosen him and reconciled himself to the aristocracy. To earn its favor he had at all times abetted or winked at the customary outrages upon the commons, a favorite one being the profanation of their families. It is related also that a distinguished soldier, whose body showed scars from wounds received in more than a hundred battles, but who had offended the Decemvirs, had been found dead near

the camp, and that circumstances pointed clearly to those in command as having procured his assassination. Under these circumstances it is no wonder that the story of Virginius was like a spark to a magazine. The legion rose as one man, threw off the authority of its commander, marched to Rome, entered the Colline gate in martial order, threaded the chief streets and camped on Mount Aventine. They elected ten military tribunes and refused to receive any message from the Senate unless sent through their friends Valerius and Horatius. In the mean time Icilius and his friend Numitorius had gone to another camp of the Romans at Fedinæ and the same story produced the same effect. This army also expelled its commander, chose other ten Tribunes of the soldiers, marched to Rome and joined their brethren upon the plebian hill. Here the Tribunes chose two to represent the twenty, and all waited to hear from the Senate. But that body temporized, it had no love for the Decemvirs, nor can we believe that the senators approved of the personal indignities from which so many of the commons had suffered, but it hated the Tribunate and the Tribunate was just what the people wanted. Every other scheme for protection had failed, while this seemingly anarchial magistracy had usually been successful, and the Senators had no hope, if the present government should be suppressed, of being able to avoid its restoration.

The Senate made no movement toward pacification and the commons saw that they must do something more than appeal to its sense of justice. For nearly a hundred years the struggle had been going on. Two of the later kings had been murdered because of their desire to recognize the plebs as part of the State, to protect them from the rapacity of the patricians; the

last king had oppressed both orders and the subordinate one had been induced to unite in his expulsion by being promised a constitution that should guard their rights. In many subsequent struggles the plebians succeeded in procuring the passage of laws, which, had they been observed, would have given them reasonable protection, but in every case they were trampled under foot or rendered nugatory by patrician perfidy. Finally, after a ten year's struggle, they had obtained an excellent code of laws, to whose protection they, as well as the patricians, were entitled, had surrendered their own special magistracy—their own separate existence as it were—that the Romans might be one people and had elected one which they supposed could be trusted. But this panacea for all their ills had turned to ashes on their lips. Their old enemies had seduced the magistrates; the most sacred of laws was trampled under foot; they could no longer look to the Tribunes for protection, and they seemed more helpless than ever. While the remembrance of these things inspired only despair of justice at home it also nerved their will and turned even their patriotism into hate. "Why," exclaimed they, "should we longer hold connection with an order bound by no oaths, subject to no laws, bent only upon monopoly and oppression? We form the great body of the army,—without the solid cohorts composed of the peasant freeholders of Rome it would be weak and worthless—why not march out, carry with us our little moveables, but especially our newly won laws, and establish a new Rome? Why not leave the lawless patricians with their clients and slaves to defend territory which they insist on monopolizing and to pursue alone their career of conquest." Thus reasoned the commons, and they again determined to leave the city. "Ho for the

sacred mount!" was shouted from the hills and rang through the plebian quarters, and the legions again marched down the Aventine, through the Velabrum, up the valley, crossing the forum, threading the Subura, passing up to the plain behind the Quirinal and Viminal hills and out through the Colline gate. They were followed by their families and such of their order as could leave, and the whole proceeded to occupy the sacred mount just beyond the Anio. The pomerium of a new city was traced and the walls began to rise. The Senate, seeing the seceders in earnest, took the alarm. Whatever the fate of the new city, the old would certainly be ruined. Mons Sacra was within the Roman territory, the seceders were the stronger of the two parties, they would not be likely to surrender their holdings outside the city walls or to permit their enemies to continue to hold the common territory of the Republic. A delegation was at once sent to the sacred mount to learn what was demanded. The messengers were Horatius and Valerius, to whom alone, as before announced, would the commons listen. Their absolute demands were very moderate: First, the restoration of the Tribunate; second, the right of appeal to the Centuries or Tribes from the criminal judgments of the patrician magistrates; third, that the Decemvirs be given up to be burned with fire, and fourth, amnesty. These were the ultimatum, although it is probable that the messengers were given to understand that the commons would demand in a regular way new constitutional concessions substantially like those embraced in what were shortly known as the Licinian Laws. They were induced to forego their demand for the blood of the Decemvirs and, as a pledge that the others should be complied with, possession of the Capitoline Hill, embracing not only

the citadel but the *sacra* of the state, was to be surrendered to them. On the return of the commissioners the Senate was but too glad to accept the proffered conditions, directed the Decemvirs to abdicate, which was done, and the commons returned, took possession of the Capitol, and, if they had ever wholly given it up, reoccupied their own Aventine, and elected their Tribunes.

In this connection, to make the story of Virginia complete, I may be permitted to speak of the fate of Appius, although it was not met until after the adoption of the Licinian constitution, which was next in the order of time.

Although the leaders of the seceders had waived their demand that the Decemvirs be outlawed, it is not to be supposed that any idea was entertained of exempting Appius Claudius from responsibility for his crime. Under our system, a judge cannot be held responsible by a civil or criminal proceeding for errors, even though malicious ones, committed in discharging the duties of his office, and impeachment only removes him from office, although in England it may have a much more serious result. The Tribunes were empowered to impeach before their own constituents, the plebian tribes, any patrician, although a Consul or Senator, who should violate the laws enacted for the special protection of the commons or their officers, and under this power, distinguished citizens like Coriolanus, and Keso Quinctius, the son of Cincinnatus, had been driven into exile. The tribunate is now restored and Virginius and Icilius are two of the Tribunes. It is too much to expect that they could forget the recent outrage upon the law under which the former felt compelled to take the life of a dear daughter in order to protect her from the ruffianly arms of a judge whom the law made her shield and pro-

tector. Appius the tyrant is impeached by Virginius his victim. Instead of quietly submitting to his fate, or perhaps avoiding it by a modest bearing, he accelerated it by appearing in the Forum surrounded by his patrician bravos, as if to overawe the tribune. The first question in all cases of arrest is that of bail. Most offences were then, as they are now, bailable. Ordinarily, then as now, capital offenses were not. For a magistrate during a trial to wilfully violate a plain law involving life or liberty, was, especially under impeachment, a capital offense. Virginius therefore ruled that an issue should be made up, to be tried before a judex as a preliminary question, whether Appius "had not in a question of personal freedom, assumed that the presumption was in favor of slavery, in having adjudged Virginia to be regarded as a slave till she was proved free, instead of regarding her as entitled to her freedom till she was proved a slave." He of course could not meet this issue and pending his trial was ordered to the terrible Mamertine prison. Before being committed his uncle, not only a very respectable citizen, but an opponent of the mad schemes of his nephew, appeared and besought the Tribunes to accept bail. It would be a disgrace to Rome said he to throw into the dungeon with burglars and robbers, one who had been chief magistrate of the city, but they all sternly refused. The prison into which he was cast was built near the Forum by king Servius Tullius, and its lower vaults are as gloomy and solid to-day as they were twenty-five hundred years ago. Appius never came out. Before the day of trial he was found dead and it was reported that in dispair of the result, he had taken his own life. Oppius was also thrown into prison and shared the same fate. Marcus Claudius, the tool of Appius, and the rest of the Decem-

virs were suffered to go into exile, and thus in the language of Livy, "The shade of Virginia, more fortunate after death than when living, after having roamed through so many families in quest of vengeance, at length rested in peace satisfied that all the guilty were punished." And we may well believe that this stern retribution not only gave rest to the ghost of the fair maiden, but that fathers and mothers felt safer in Rome from the outcome of this conspiracy against the honor of the family of Virginius.

CORRECTIONS.

"Plebians" read "Plebæans," *passim.*

"Terrentelius" read "Terrentilius," *passim.*

"*jus naturæ*" page 186, line 15, read "*jus naturale*," and in next line insert "citizens of" before "Rome."

"The legion rose as one man," on page 201, lines 3 and 4, read "The body of the legion rose."

"ultimatum" page 203, 8th line from bottom, read "ultimata."

"was" page 187, line 9, read "were."

unfortunately for themselves, they were forced to call a halt. Could they have proceeded one step father, and made the animal talk, or utter so much as a single word, they might have claimed a grand victory for themselves and the monkey; but the monkey held his peace, and the scientists perceived that, leaving the spark of immortality out of the question, the beast was of an entirely different family; that between him and themselves there was a great gulf fixed; that they could neither pass to him nor he to them. Darwin, and Huxley, and

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LINGUISTIC CURIOSITIES.

By David R. McAnally, Jr., A. M., Professor of English Literature in the University of the State of Missouri.

With a zeal worthy of a better cause, the disciples of Darwin have labored long and earnestly to show how a scientist of the modern school may be evolved from a lower order of animal. Taking a monkey as raw material, they have driven back his jaw, elevated his nose, broadened his forehead, enlarged the capacity of his skull, shortened his arms, lengthened his legs, turned his first finger over to represent a thumb, endowed him with one faculty akin to reason, a second something like memory, the idea of property, and a distant conception of the notion of right and wrong; but here, unfortunately for themselves, they were forced to call a halt. Could they have proceeded one step father, and made the animal talk, or utter so much as a single word, they might have claimed a grand victory for themselves and the monkey; but the monkey held his peace, and the scientists perceived that, leaving the spark of immortality out of the question, the beast was of an entirely different family; that between him and themselves there was a great gulf fixed; that they could neither pass to him nor he to them. Darwin, and Huxley, and

their like, have made interesting discoveries in natural history, but the investigations of many a long lifetime, given up to experimenting and speculating, have unearthed no more curious fact than the one known from the beginning—that language belongs to man alone. Commonplace as the idea has become, through millions of repetitions, it is yet worthy of careful consideration; and, beyond all question, the closer the examination of it, the more curious will it appear. From the savage bushman of the South African plains, whose vocal clicks sounded so much like a combination of the syllable "hot" with "tot" that more civilized men called him a "Hottentot," to the Parisian of to-day, who derives the name of his race and country from the most generous people known in history; from the Digger Indian to the occupant of an English palace; from Peter, the wild boy, to Shakspeare, the possession of language unites, as with an iron band, the human race in one vast family. Existing before society, without it society would be an impossibility; and a band of men would have no more permanent bond of union than would a herd of cattle, or a school of porpoises. It enables the merchant to get lawful gain, the miser to accumulate unlawful gold; it helps the farmer to sow his wheat, and the miller to grind his grain; it is the doctor's chief assistant, and the lawyer's reliance. Without it, our fellowmen could not care for our bodies, nor our clergymen for our souls. "Therewith bless we God, even the Father; and therewith curse we men, which are made after the similitude of God."

It is a perfectly natural consequence, therefore, of the universality of language among men, that it should constitute a sure index to character. A great diplomatist of the past has had the credit of saying, "Language

was given us to conceal rather than to reveal our thoughts," but he belied his own words. There is a wide difference between being deceitful and indicating character by unguarded utterances. Many deceive others, and even themselves, by saying what they do not mean; but the manner, the tone, the general characteristics of the utterance, far more than the matter, furnish a criterion so infallible that no one, save by his own fault, need be deceived or mistaken. The man who carefully weighs every word before he utters it, who considers its purity, its adaptation to the case before him, and its application in the conveyance of the idea he wishes to express, is, as a rule, a man of order, of system, whose acts will be the subjects of such deliberation that, with him, an error in conduct will be extremely improbable. On the other hand, the heedless, incautious, careless fellow, constantly saying ten times as much as he means, and meaning ten time as much as he feels, the Alfred Jingle of society, jumping from one subject to another, as capricious as the mountain goat, from which this adjective takes its name, is a man really deserving of pity. He uses millions of words laboriously to say nothing, and though possessed of two ears, two eyes, two hands, and but one tongue, persists in violating the law of nature by talking more than twice as much as he hears, observes, or performs.

Passing by a natural gradation from the individual to the aggregation of individuals in a nation, we find the same general index of character in a nation's language as in that of an individual. The modern Italian is smooth, flowing in an even stream, without the ripple of a single disturbing consonant; the natural language of lyric poetry and of the opera, and did we not know

the fact, we might, from the language, infer that the nation using this tongue is a nation of opera singers. French, the language of polite conversation, is another illustration of the general statement that national language is a reflex of national character; while German, the language of speculation and philosophy, and English, the language of science and business, are, perhaps, unneeded examples. The statement has been made that the national salutation furnishes a key to the national peculiarities of character, and there really seems to be some ground for the assertion. The Spaniard, haughty, proud of his nationality, independent, caring for nobody but himself, enquires: *Come sta?*—"How do you stand?" Erect, unbending, he stands for himself, and hopes you do the same. The French, little Mousieur and Madame, are carrying themselves here, there, and everywhere, in an effort to find something new, or to extract a little more amusement from something old. They imagine that you must do the like, and consequently ask: "*Comment vous portez-vous?*"—"How do you carry yourself?" as if carrying one's self about was the chief end of man. One German asks: "*Wie befinden sie sich?*"—"How do you find yourself?" since he likes to find himself without much hunting; while another enquires, "*Wie gehts?*"—"How goes it?" as being perfectly satisfied to let it go if it wanted to, since it makes no difference to him. The English, "How are you?" is solid and substantial, while the American, "How do you do?" is strongly indicative of the driving, bustling character of our people, who are content neither with standing, sitting, carrying themselves, finding themselves, nor letting it go; but must, as one of their representative men has said, "be up and doing, with a heart for any fate."

The learned and pious Dr. Richard Trench has taken so much pains to discover the hidden property of words, has forced so many of them to stand and deliver their concealed goods, has burrowed into so many out-of-the-way nooks and corners of the English language, and dragged thence into the light so many illustrations of the principles he laid down, that, in spite of his occasional flights of imagination, and of his proneness to see a little more poetry in the history of a word than is visible to the average eye, his works must long remain standard. From him we have the idea that language is "fossil poetry;" that some words are themselves storehouses of poetic thought and fancy; that, however trite they may now appear to us, by reason of constant use, they once were triumphs of lovely imagery, and perchance displayed more of the spirit of the muses than many a labored production in iambics or hexameters. Take, for example, the illustration he gives of the word "sierra," originally meaning a saw. The application of the term to the irregularly jagged ranges of Spain shows a poetic fervor of high grade. As Trench further remarks, "For us, very often, the poetry of words has in great part, or altogether, disappeared. But had it not existed, Margaret had not been for us 'the pearl,' nor Esther, 'the star,' nor Susannah, 'the lily,' nor Stephen, 'the crown.' " So soon, however, as we enter the fairy region of word-poetry, examples multiply so rapidly as to defy mention or enumeration. From the mass, two may be selected, not as samples, but by reason of their pre-eminently illustrating the fact that there really may be poetry in a name. The one is "topaz," so called, according to Pliny, from the Greek word *topazein*, to guess or conjecture, because men were able only to conjecture the geographical position of the mysteri-

ous, cloud-covered island on which the jewel was supposed to be found; the other is "carbuncle," from "*carbunculus*," a "little, burning coal." None but a man of lively, poetic imagination could ever have applied such names to these jewels, and the continuance of their use and correct understanding of their signification gives an additional attraction even to the beautiful gems they designate.

Upon entering the realm of the beautiful, as represented by flowers, the poetry becomes more plainly manifest. An old Persian poet, having his claim to the title of bard questioned, declared: "I love God, flowers and little children," and considered that he had fully established his right. Certain it is, that poetry and flowers are always mentally associated, and it is not, therefore, strange that the beautiful imagery of the one should be found in almost every name given to plants. Take, for instance, the beautiful name, *arbor vitæ*, "the tree of life," and how naturally and poetically it is appropriated to that shrub, which, in winter snows, and under circumstances of much adversity, still presents to our view a cheerful green. "The catch-fly," "the fly-trap," the "snap-dragon," the "snowball," the "love-in-a-mist," the "love-lies-bleeding," the "trumpet-flower," and the "Venus'-looking-glass," are but further illustrations of the poetry to be found in the names of flowers; and the list may be indefinitely extended by any one who cares to refer to a floral dictionary. The "sun-flower" and the "daisy" furnish a curious example. The former is so named from the fact that its yellow center is supposed to bear an imaginary resemblance to the sun, and the white border to the corona or glory surrounding that luminary. The daisy is named from the same general resemblance, but as Chaucer gives it, the name is

much more poetical. He calls it the "day's eye," or the "eye of day."

> "That well by reason it men callen may
> The daisie, or else the 'eye of day.' "

And it cannot be denied that, in a poetic way, we gain much by this designation.

Leaving flowers for more practical affairs, it will not be questioned that the German who first conceived the glove to be a shoe for the hand, a *hand-schuh*, while he who imagined a thimble to be a hat for the finger, a *finger-hut*, might, in point of imagination, have put to the blush many an aspiring poet. With regard to the *hand-schuh*, while it may not be difficult to recognize the fitness of the term, all difficulty of every character will instantly vanish when we recognize that the authorities tell us that the first gloves worn in the north of Europe were simply bags, into which the hands were thrust for the purpose of warmth. The addition of a thumb in the present mitten fashion was regarded as a wonderful innovation, while the separate compartments for the fingers were of comparatively modern invention. Thus the old bag-glove bore a more decided resemblance to the covering for the foot than might at first be supposed.

With regard to the morality of words, Trench is essentially a pessimist, and consequently takes the worst view of humanity, as illustrated by language, that he can persuade his conscience to allow. While, however, the reader may not be disposed to accept in full the conclusions of Trench, it cannot be denied that, to no inconsiderable extent, man has degraded his language with himself, or, to speak more properly, certain classes or conditions of men have so uniformly demonstrated their low standard of morality, that the name of the

class has long been applied to designate individuals who, in a greater or less degree, possessed the predominant quality of the class. Thus, a "knave" was once a boy; then a boy-servant, then a scoundrel, and a curious commentary on the universality of roguery among boy-servants might be written in tracing the gradual change in the history of this well-known word. A "boor" was once a farmer, and not an ill-mannered man; a "villain" once a peasant, and not a cut-throat; a "varlet" was a servant, and not a rascal; a "time-server" was an honorable man, and not a disgusting truckler; "tinsel" was formerly made of pure gold; "voluble" was a complimentary expression, and not a term of reproach; "prejudice" was a previously-formed opinion, whether good or bad; a "black-guard" was simply a scullion; an "idiot" was not a natural fool, but, as Jeremy Taylor uses the word, a private citizen as opposed to an office-holder. The word "heathen," now used to designate a worshiper of idols, shows a curious bit of linguistic history. It was formerly applied solely to the dwellers on the German heaths, and as these were uncultured people, and among the last to adopt the doctrines and practice of Christianity, the people of the latter creed came little by little to consider the name of a heath-dweller as synonymous with that of an unbeliever, and to lose the original application of the word required then but little time. In an invaluable note at the end of the twenty-first chapter of his "Decline and Fall of the Roman Empire," Gibbon gives a somewhat analogous case with regard to the word "Pagan." *Pagus* originally meant a "fountain," and by easy stages the word and its successors came to designate the village built near or around a fountain, next any village, and finally the inhabitants. The fountains were supposed to be under the special

care of some goddess or nymph, and the people of the neighborhood were, as a rule, so tenacious of their local worship, and so reluctant to adopt Christianity, that the word *Pagani*, or "villagers," passed through all the changes already detailed in the case of the word "heathen." Gibbon says the first official use of the word in the sense of "unbeliever," is found in an edict of Valentinian, in the year A. D. 365, and from that time the secondary signification of the word has been most common.

It will hardly do to pass unnoticed a class of words and expressions formerly of serious meaning, but which, by some change of circumstances or ideas, have come to be regarded as having something of the ridiculous about them, and consequently are no longer used, save with a droll signification. The word "pate" once stood in a serious sense for "head," and is so used in the seventh Psalm; while Wycliffe, in his translation of the Bible, uses "sconce," "nowl," and "noddle," in the same way. "To punch," "to thump," "to wag," and "to buzz," now considered verbal tramps, out at elbows and down at heel, were formerly in good standing in religious society, and had nothing of the ridiculous about them. Wycliffe translated Acts XIV, 14: "Paul and Barnabas rent their clothes and skipped out among the people;" while Miles Coverdale rendered a passage in Canticles: "My beloved cometh hopping upon the mountain;" and in another place, assured us that "the Lord trounced Sisera and all his host." Tyndale spoke of a "sight of angels;" while the phrases, "through thick and thin," from Spenser, "cheek by jowl," from Sylvester, and "hand over head," from Bacon, have served their time on the serious stage and now do duty as clowns. "In doleful dumps," "in the wrong box," "gone to pot," and many

other phrases had formerly nothing of the ludicrous about them; and, with the examples already cited, are illustrations of the melancholy fact that the disposition of the average man is to belittle and drag down to his own level everything above him. Were heroes the rule, this would not be so; but unfortunately, in this work-a-day world, as Shakespeare calls it, the unheroic prevails to an extent that prevents a full recognition of the heroism that really exists.

The next curiosity worthy of note, is the remarkable slowness with which, under ordinary circumstances, changes in language are effected. This is a point noticed by all the authorities. It matters not whether the change be in regard to the orthography, the pronunciation, or the grammatical forms of the language, the principle is the same, and the statement holds good. It is usually extremely difficult to convince any one that such changes are going on during his own lifetime, but there is no sort of doubt of the fact. Ten lifetimes will more than cover the five hundred years between us and Chaucer, and what a remarkable difference between the English of his day and that of our own. Twenty lifetimes will take us back to Alfred the Great, and yet his language bore a closer resemblance to German than to English, and all the change necessary to bring it to its present condition must have been effected during those lifetimes. The truth is, nothing is slower, more insidious, or less noticed in its action, than the change that is constantly going on in a language. One generation of men passes away; another generation comes, and each man, with all the earnestness of conviction, believes that he speaks the language of his ancestors; when, in fact, he does nothing of the kind. He does not speak, even, the language of his youth, much less that of his father's

youth; for in his own mouth, and without his knowledge, the change is being effected. The pronunciation of words, for instance, is constantly but slowly changed. No one now says *greet* for great, yet a hundred years ago it was always so pronounced; and Pope invariably rhymes it with such words as replete, complete, and their like. Old men sometimes say *obleeged*, and young men smile at the expression; but in the beginning of this century it was always so pronounced; while key was *kay*, tea was *tay*, Rome was *Room*, and the rhyming dictionaries classed "bough," "chough," "plough," "trough," and other words of the "ough" formation together as allowable rhymes. Gold was *gould*, and Swift is reported to have once enquired: "If I may be so *bould*, I should like to be *tould* why you do call it *gould?*" These are but a few of the numerous examples that might be cited; any one with a little industry could easily collect instances by the score.

With these changes in pronunciation have come changes in the grammatical form of the language, though, of course, the latter are much more slow to run their course than the variations in spelling and pronunciation. The laws that govern the changes mentioned are, for the most part, past our finding out. That there are laws, may be set down as a self-evident fact, and that they will be discovered as soon as the comparative study of language has reached a point where a sufficient number of illustrations have been collected to admit of the deduction of general rules, may also be considered beyond all question; but as yet, most that has been said on the subject amounts to little more than speculation. A hint that may hereafter prove of value in this connection is this: The general tendency of language is toward abbreviation; and, consequently, all superfluous

letters, syllables, terminations of nouns, adjectives and verbs, together with all unnecessary forms of expression, are being gradually dropped. This is especially to be observed in the case of silent letters, which, in not a few instances within the recollection of living men, have disappeared from the most common words of the language. Horne Tooke expresses the idea very happily by saying, "Letters, like soldiers, are apt to fall off and desert in a long march," and the most extensive research has but served to confirm the truth of the statement. The process of change in the other particulars mentioned is very slow, requiring ages for its consummation, and in order to ascertain the full extent of these changes, the language must be compared at periods centuries apart; but that this change has been going on in English ever since the time of Chaucer is easily demonstrated. Take for instance, the substantive-adjectives of our language, and to-day comparatively few of them end in *en*, while formerly this was the regular adjective ending: "Steelen," "floweren," "rocken," "rosen," "stonen," and hundreds of others may be cited as examples. The tendency to abbreviation is now leading to the substitution of "gold" for "golden," "silver" for "silvern," "brass" for "brazen," and so on, *ad libitum*. *En* used to be the common ending for verbs, and in "lengthen." "strengthen," "broaden," "deepen," and a few more, the termination is still retained, but those which have lost the *en* are thousands, while those which have retained it are but tens. The plural of nouns was also once formed in *en*, but at present "oxen," "chicken," "kine," (kien,) "brethren" and "children" almost exhaust the list. The writers on the subject predict, with some apparent confidence, that the apostrophe and letter *s*, which indicate the possessive case, must go next; and

urge, in proof, that to denote possession, the objective construction with *of* is becoming much more frequent, and its additional clearness gives it an advantage not to be despised.

Illustrations of the fact that linguistic changes of some consequence have occasionally taken place in comparatively brief periods of time are furnished by several historical circumstances of undoubted authenticity. The most curious of these is probably the well-known story of the "Refugee French." After the revocation of the Edict of Nantes by Louis XIV, in 1685, large numbers of Huguenots fled from their native country, and taking refuge in the cities of Holland and England formed colonies, the members of which associated almost altogether with each other, and by means of agents carried on the purchase of material they needed and the sale of the products they manufactured in their special lines of trade. They thus, in many cases, almost isolated themselves from their surroundings, and persisted in speaking the French language. This state of things continued for two or three generations, when it was discovered that while the French language at home had undergone material change, the French of these refugees remained in *statu quo*, with the exception of an occasional and accidental foreign word. Its growth had ceased, while the growth of the language at home had continued, and when some of these refugee people went home a century later, their pronunciation and grammatical constructions were as antiquated as would be for us the English of a hundred years ago. Another fair illustration is furnished by the history of a party of Germans from a minor state of the confederation, who settled in a mountain valley of Pennsylvania before the American Revolution, and during that war and the wars of the

French Directory remained without intercourse with their German friends in Europe. So remarkable was the result of this comparatively brief isolation that, when Prince Bernhard of Saxe-Weimer, while on a tour through this country about 1825, visited the settlement, though he found German still spoken, the pronunciation and dialect were of a previous age. It was German, but the German of his fathers that had remained unchanged which was the language of these settlers.

A remarkable instance of the slowness with which a language undergoes any changes, save those which originate in its own vitality, is furnished by the Polish. Ever since the partition of Poland by Russia, Prussia and Austria, in 1764, the attempt to suppress the language of the unfortunate Poles has been going on in that portion of the country which fell to the lot of Russia, and, in spite of the fact that every means has been resorted to by the barbarous conquerors of the unhappy nation, Polish is still spoken, and allowing a small margin for natural change, with substantially the same accent, pronunciation and grammatical forms, as when Warsaw still held out against the armies of the three robber nations.

We need not, however, go as far as Poland to find an example of the reluctance of a language to yield to foreign pressure. The history of our own tongue furnishes a parallel case. The long reign of Edward the Confessor, from 1042 to 1065, by its introduction of French manners and customs, and Norman influences generally, prepared the way for the Norman conquest; but when William came the English people were, by no means, ready for the consequences of his accession. The Seven Years' war which followed the apparent calm, after the great battle of Hastings had been fought and

lost, completely broke down the spirit of the Anglo-Saxons. Their king had been killed, their noblemen were either murdered, imprisoned, or banished; their priests and bishops were forced to retire from their livings and sees, and either take refuge in the obscurity of private life, or fly to the continent. The Norman-French became the language of the court, of the camp, of the cloister, of the bar, of the schools, of the counting rooms, of the shops. When an aspiring, ambitious young man sought promotion in any walk of life, his first step was to learn French. French priests by the hundred were brought over from the continent, and preaching in Anglo-Saxon was forbidden. Anglo-Saxon could not be taught in the schools, for the foreign masters, usually ecclesiastics, knew nothing of it, and children were required to translate their Latin into French, regardless of their mother tongue. All business transactions were carried on in French, and if a man desired to avoid being cheated at every turn, his sole protection was a familiarity with the language of the merchants. In spite, however, of the rigid system of persistent tyranny, which for three hundred years sought to force an alien language upon an entire people, the Anglo-Saxon tongue was equal to the emergency, and doggedly held its own. It suffered terribly, and came out of the three-century contest so changed that it could hardly be recognized as the same language that had entered the battle, but for all that, it survived, and in the end overcame all opposition. The whole case is clearly stated by Professor Earle, late professor of Anglo-Saxon in the University of Oxford. "Great and speedy," he says, "must have been the effect of the Norman conquest in ruining the ancient grammar. The leading men in the state, having no interest in the ver-

nacular, its cultivation fell immediately into neglect. The chief of the Anglo-Saxon clergy deposed or removed, who should now keep up that supply of Anglo-Saxon religious literature, of the copiousness of which we may judge even in our day by the considerable remains that have outlived hostility and neglect? Now that the Saxon land owners were dispossessed, who should patronize the Saxon bard, or welcome the man of song in the halls of mirth? The shock of the conquest gave a death-blow to Saxon literature. The English language continued to be spoken by the masses who could speak no other, and here and there a secluded student wrote in it; but its honors and emoluments were gone, and a gloomy period of depression lay before the Saxon language as before the Saxon people. The inflection system could not live through this trying period. Just as we accumulate superfluities about us in prosperity, but in adversity get rid of them as incumbrances, and we like to travel light when we have our own legs to carry us, just so it happened to the English language. All the sounding terminations that made so handsome a figure in Saxon courts, superfluous as bells on idle horses, were laid aside when the nation had lost its own political life and its pride of nationality, and had received leaders and teachers who spoke a strange tongue."

Before leaving this branch of the subject. it is noteworthy that one of the most potent agencies in the injury of Anglo-Saxon was the system of abbreviation adopted by the Normans when they were forced to use it, in their intercourse with their new serfs. The niceties of the language were utterly disregarded, and everything superfluous in speech and expression was ruthlessly cut away. The grammar suffered, as also did the vocabulary, so much so that of some classes of words

not a single representative survives. In regard to this general subject, the authorities have always been divided as to the question whether the English language gained or lost by the admixture of Norman. When doctors disagree with as much vim as in this case, the expression of an opinion is a delicate matter, but a careful examination of the evidence on both sides will probably satisfy an unprejudiced mind, that the loss is fully balanced by the gain. Inflections were done away with, but philologists are gradually coming to the conclusion that this loss is for the better, while the vast influx of new words and forms of expression has certainly rendered the language a service which cannot be too highly estimated.

The next point of curious interest with regard to language, is the manner in which linguistic changes of more gradual character than those already mentioned are effected. There appears to be with words, as with animals, a constant process of what Darwin would call "natural selection," going on, by which the weaker are driven to the wall and die, and the stronger part the property of their late companions among themselves, and thus still more augment their strength. The laws which govern changes of this kind are inscrutible, but the changes, nevertheless, take place, and speak for themselves. With regard to losses of this kind, Trench is very explicit. He says: "We hardly realize to ourselves the immense losses which we have suffered, till we take the extinct words of some single formation, and seek to make as complete a list of these as possible. Then, indeed, we perceive that they are thick as leaves in Vallambrosa." This point he proceeds to illustrate by giving a long list of words ending in *full* which have at different times been used by the best English writers and speakers, but are now pronounced obsolete.

It is, of course, out of the question to make extended reference to a list of this kind, or to extract from it; but the most casual examination of the work of Trench in this department, will satisfy any one of the immense apparent loss that the English has, in this respect, sustained. The loss may be only apparent, but it is none the less conspicuous. In regard to this "natural selection" of words, Dwight, in his "Modern Philology," says: "Great, silent, yet determinative laws of criticism, and so, of general acceptance or condemnation, are ever at work upon words, deciding their position among mankind at large, as if before a court without any appeal. Their action is certain, though indefinable to our vision, like the seemingly blind laws of the weather; which yet' however multiplied in their sources or subtle in their action, rule infallably, not only the questions of human labor and of human harvests, but also, to a great extent, those of human health, power and enjoyment."

Thus does Dwight look at the matter; but it may be observed that since he wrote, the laws of the weather have, one by one, been slowly yet surely deduced from millions of observations made in every part of the world by thousands of skilled scientific men. Thus, in time, we may expect that the laws in obedience to which language changes, shall be discovered and laid down with as much accuracy. Language does not change by chance or haphazard. No matter how far-caprice may influence the actions of an individual, it cannot control the movements of a community or nation in matters involving the habits of a lifetime. Occasionally the change may be easily accounted for, as in the cases already given; at other times the reason lies beyond our reach, because we have not yet sufficient data to justify the de-

duction of any principle. Once in a while the extinction of an art, science, or amusement, has caused the death of most or all the words and terms connected with it. The practice of bear-baiting, as a popular sport, has long since gone out of fashion, and, as a consequence, scores of terms used by the bear-fighters have dropped from the language and disappeared. Hawking, as an amusement, was abandoned long ago, and a book of "Hawking Instructions," or rules for taming and controlling falcons is consequently untranslatable; so many of the expressions have passed entirely from use that no signification whatever can be attached to them. These are but two out of many illustrations that might be cited. The common-sense view of the whole matter seems to be, that when men do not need a word they cease to use it, and the word dies. This is illustrated in the cases just given. When hawking no longer existed as a sport, men had no need of designating by words things which had no existence, and therefore the names themselves became extinct and passed from the vocabulary of the language. What proportion of words first used in a technical, and afterwards in a more general or secondary sense, survived the death of their accompanying objects, we have, of course, no means of knowing, but the number must be by no means small. A single illustration may suffice. There is, probably, no belief so utterly dead as that in the so-called science of astrology; but "mercurial," and "jovial," and "saturine," and "moon-struck," still offer themselves for our use in describing human character, although their primary signification has been entirely lost; while "influence," and "disaster," "ill-starred," and "ascendancy," are but a few out of the many that survive the would-be science they once helped to explain. Why whole classes of adjectives, such as

those in *ful*, already mentioned, and others in *some*, why duplicate words and entire families of compounds should yield to the law of nature and die, when there appears no reason that they should not last as long as their neighbors, is not yet determined; but certain it is, that in several of these quarters the English language was formerly rich, and is now comparatively poor. "Mightful" is as expressive as word as "mighty;" "wordful," as "wordy;" "senseful," as "sensible;" yet in each case the one has been taken, the other left, and the tendency constantly is to increase the use, even of such words as "wrathy," in preference to the older—"wrathful." Men speak now of a "miser," but, according to Trench, he used also to be called a "gripe," a "huddle," a "smudge," a "clinch," a "micher," a "pinchpenny," a "pennyfather," a "nipcheese," a "nipscreed," a "nipfarthing," a "clutchfast," and a "kumbix," besides other terms not sufferable by ears polite. The cause of the extinction of these names is certainly not to be found in any diminution of the race of misers, and though we at present may be at a loss in what direction to look for a reason, we may feel very certain that there is one, and that it will be discovered.

In very marked contrast to this diminution in the number of words of certain classes in the English language, is the extraordinary power that English has manifested upon occasion of taking in words at wholesale. Half a dozen times in the history of our language it has shown the appetite of an ostrich, and to its credit be it said, it has succeeded in digesting everything it has managed to swallow. The century beginning with the accession of Elizabeth, in 1559, may be mentioned as one period of remarkable growth. The spirit of enterprise that then characterized the English nation as a

whole, and the sudden rise of the British naval power, together with the acknowledged pre eminence of the English fighting qualities, as illustrated in the defeat of the Armada in 1588, combined to put England to the front of European nations, and the discovery of America and consequent explorations, furnished employment for the boldest spirits. The labors of the hardy Englishmen of that day, whose names are to be found in every school history, introduced a vast number of new words into the language, by the introduction of new objects and ideas into the English life, and this increase was assisted by the English renaissance, which did as much from another point of view as did the foreign explorations and discoveries. In short, to conclude this branch of the subject, it may be affirmed that the introduction of an art or science, the establishment of a new manufacture, the inauguration of a novel industry, the publication of a new invention, and even a new way of doing an old thing, are sure to be attended by either the invention or introduction of new words. The terminology of every science is peculiar to itself, and in the fact that so many of the most common articles of to-day are things of recent discovery or invention, may, perhaps, be found an explanation of the remarkable growth of our language during the last hundred years. The use of labor-saving machines, the invention of the steam-engine, the application of electricity to practical use, and a hundred other adaptations of the forces of nature to the wants of men, have each called into being a host of words and expressions suitably describing the novelties thus presented to the human mind. As a last hint in this direction, it may be observed that on some occasions words are literally forced upon the people, and are used, not because they are the best words, but by dint of their

constant repetition. An example of this is seen in certain words now creeping into public favor, such as "suicided," "burglarized," and the like. The telegraph companies, by charging by the word for transmission, have caused such abreviations as these in place of the usual phrases: "Committed suicide," or "committed burglary." The only conceivable excuse for these and such as these, is found in the fact that they cost just half as much as their synonyms, but being just as expressive, there is little doubt that they will ultimately be admitted into the language family as legitimate children. The men of learning may protest in the future, as they have protested in the past; the scholars may denounce, the universities may condemn, and the lexicographers may omit, but the people will do as they have done, and use such words as express their ideas with most brevity and accuracy. In the end, such words, no matter how slangy they may at first be deemed, will be received and used by everybody. There was a long controversy over the word *its*, the possessive of the neuter pronoun, and for a great while the best writers and speakers avoided its use. Bacon and Spencer never used it, and it occurs very seldom in Milton, Shakespeare, and the King James translation of our English Bible, published in 1611; but though the first recorded use of the word was by Florio in 1598, in much less than a century writers were finding fault with their opponents for employing "his" or "her" in place of "its." The contest had, therefore, been previously decided in favor of "its," a result certain to happen in every case when a new word supplies a real want in a language. In truth, as a distinguished writer on this subject has already said, the English language is like the English institutions, "Just as the character of our governmental regulations is such that

strangers and refugees from every land under heaven can come and make their home with us, and forget that they are strangers, so foreign words, singly or in crowds, may come and be received, and become acclimated, and the next generation will be utterly oblivious of the fact that they were ever other than orthodox English."

There is another branch of no small interest to the curious, and well deserving careful enquiry. The domain of proper names is so extensive and so suggestive that to do it justice would require volumes rather than paragraphs. It may be stated that, as a rule, aboriginal proper names are never devoid of meaning, though a change of circumstances has often caused the meaning to be lost. Dr. Isaac Taylor says: "In many cases the original import of local names has faded away, or has become disguised in the lapse of ages; nevertheless, the primeval meaning may be recoverable, and whenever it is recovered, we have gained a symbol that may prove itself full-fraught with instruction, for it may indicate emigrations, immigrations, the commingling of races by war and conquest, or by the peaceful processes of commerce; the name of a district or town may speak to us of events which written history has failed to commemorate. A local name may often be adduced as evidence determinative of controversies that otherwise could never be brought to a conclusion. The names of places are conservative of the more archaic forms of a living language, and they often embalm for us the guise and fashion of speech in eras the most remote. These topographical words, which float upon the parlance of successive generations of men, are subject in their course to less phonetic abrasion than the other elements of a people's speech. What has been affirmed by the botanist as to the flora of limited districts, may be said, with

little abatement, concerning local names—that they survive the catastrophes which overthrow empires, and that they outlive devastations which are fatal to everything beside. Invading hosts may trample down and extirpate whatever grows on a soil, excepting only its wild flowers, and the names of those sites where man has found a home. Seldom is a people utterly exterminated; for the proud conqueror leaves the poor of the land to till the globe anew, and these enslaved outcasts, though they may hand down no memory of the splendid deeds of the nation's heroes, yet retain a most tenacious recollection of the names of the hamlets which their own ignoble progenitors inhabited, and near which their fathers were interred."

The individual who endeavors to gain an idea of the curious facts ascertainable by a study of local names, cannot do better than follow the footsteps of Dr. Isaac Taylor, whose admirable work on this subject has never been surpassed, either in extent of research or accuracy of detail. With regard to the tenacity with which local names are retained, he says: "There are many nations which have left no written records, and whose history would be a blank volume, were it not that in the places where they have sojourned they have left traces of their migrations sufficient to enable us to reconstruct the main outline of their history. The hills, the valleys, and the rivers are, in fact, the only writing tablets on which unlettered nations have been able to inscribe their annals, and the great advances in ethnological knowledge which have recently taken place are largely due to the decipherment of the obscure and time-worn records thus conserved in local names. From them we may also decipher facts that have a bearing on national movements and the history of ancient civilization. With regard, for exam-

ple, to Saxon England, we may, from local names draw many inferences as to the amount of cultivated land, the state of agriculture, the progress of the arts of construction, and even as to the density of the population and its relative distribution. In the same records we may discover vestiges of local franchises and privileges, and may investigate certain social differences which must have characterized the districts settled respectively by the Saxons and the Danes; may collect relics of the heathenism of our fathers, and illustrate the process by which it was gradually effaced through the efforts of Christian teachers." But names may do even more than this. In another place Taylor continues: "Local appellations may either give aid to the philologist, when the aspect of country remains the same, or, on the other hand, where the face of nature has undergone extensive changes; where there were forests that have been cleared, marshes that have been drained, coast lines that have been advanced seaward, rivers that have extended their deltas or formed new channels, estuaries that have been converted into alluvial soil, lakes that have been silted up, islands that have become gentle inland slopes, surrounded by fertile corn flats—in all such cases these pertinacious names have a geological significance; they come into use as a record of a class of events as to which, for the most part, written history is silent. In this manner the names of places become available as the beacon-lights of geological history. In truth, there are instances in which local names, conserved in places where little or nothing else that is human has endured, may be adduced as evidence of vast physical mutations, side by side with the most massive physical vouchers of the changes on our globe."

It will be seen from the foregoing liberal extracts

that the study of local names is capable of throwing light on geography, history both political, civil and military, archæology, ethnology, philology and geology. Illustrations of the manner in which the study of each is assisted by a consideration of the proper names involved, would be both lengthy and tiresome, but a general glance at the distribution of the proper names of various nationalities, as illustrating national movements, may not prove altogether unprofitable. It may be set down as preliminary, that whenever the occupation of a country by foreign conquerors was slow and interrupted by long intervals of peace, during which intercourse was carried on between the two warring nations, the old names of localities were preserved in much larger numbers, and with much less change in form, than when the conquest was rapid and attended by the extermination of the vanquished. It should also be remembered that when two nations, the one barbarous and the other more or less civilized, come in hostile contact, and the former is overrun, the enlightened nation is likely to re-name the centres of population, the towns and cities of the conquered territory, while the native names of natural objects, such as rivers, mountains, and the like, are almost certain to be adopted by the conquerors. When a barbarous nation strives with and overcomes one partially civilized, the points of strategic importance in a military view will be named by the barbarians, while the other names will be very slow to change. So much for explanation; now for illustration. England was first inhabited by a nation of Celts. The Romans invaded and conquered the island, and during an occupation of five centuries founded and named many cities, constructed roads, and other works of public utility. The bulk of the nomenclature, therefore, in England became

Latin; but in spite of so long an occupation, here and there throughout England proper there still remain names of mountains and rivers which can claim a Celtic origin. Wales and the Scotch Highlands were never conquered by the Romans, and consequently, to this day, the local names in these two countries are almost wholly Celtic, while the town names of England, in spite of all the changes the country has undergone, retain not a few traces of their Latin origin. The Anglo-Saxons, as a race, succeeded the Romans, and the curious fact is observable, that while many of the larger cities kept the names given them by the Romans, the villages, where the Saxons mainly established themselves, took on new appellations, Anglo-Saxon in character. But for hundreds of years the Saxons were subjected to the periodical inroads of the Danes, and these free-booters of the sea, coming in vessels, were forced to frequent portions of the coast where the harbors were good, and in their inland forays, to travel up rivers for the sake of the assistance and protection afforded by their attendant ships, The theory, therefore, would be, that the names in such localities should be Danish; and this theory we find substantiated by the facts in the case. The Norman conquest introduced feudalism into England, with all the concomitants of chivalry, knights, and castles, and we would, therefore, expect to find that the sites of the inland castles and fortresses constructed for three hundred years after 1066, would bear Norman-French names. This is exactly the state of fact in the case, and hundreds, if not thousands, of illustrations might be cited to demonstrate the truth of the statement. The same general condition of things exists under similar circumstances in the south of Europe. Wherever the Saracens or Moors, as they were called, went, they stayed and

called the cities they occupied or built after their own pleasure. Accordingly, we find that in Spain, the portions of the country longest inhabited by the Moors, possess most Arabian names of places; and in the south of Spain, where the Moors made their last stand, there is hardly a genuine Spanish name to be found. The universality of the rule is so well admitted, however, that illustration is almost unnecessary. The point in question is so remarkably well set forth by the history and local names of our own country, that a few illustrations may not be judged inappropriate. Everybody knows how the West India Islands, Mexico, Florida, and the most of South America were settled by the Spanish; how the Mississippi Valley and the region of the great lakes down to the Gulf of St. Lawrence, embracing a vast semi-circle of territory, were claimed and partially settled by the French; how the New England colonies were established by one class of Englishmen, Maryland and Virginia by another, and Pennsylvania by a third; how Manhattan Island was settled by the Dutch; and how a solitary Swedish settlement was made near New York. These are historical facts, demonstrated by authentic and reliable documents; but were all written history on the subject lost, it would be quite possible to trace the settlement of the various nations mentioned by the local names still in daily use. But we can do more than this. If we knew nothing whatever of the nations who conquered and possessed the New World, we would still be able to infer a number of curious facts. We might, for instance, from the remarkable number of saint's names applied to localities in Spanish America, legitimately conclude that the Spanish possessed a romantic valor born of chivalry, and a strongly imaginative religious element in their mental

constitution, enabling them to overcome all obstacles by the help of their guardian saints. The overflowing gratitude of Columbus to the Saviour, who had guided him through so many difficulties and protected him through such a maze of perils, inspired him to name the first land he found after that Savious, and "San Salvador" will therefore go down into history an eternal memorial of the profound piety of the man, while such names as "La Trinidad," "Vera Cruz," "Santa Cruz," and hundreds of others similar in character remain to attest the well known fact that other Spanish explorers were as pious as he. We could also judge of the other extreme of piety manifested by the Puritan settlers in New England, whose "Salem," and "Concord," and "Providence," remain indubitable witnesses of their faith. We might conjecture the aristocratic spirit of the Southern colonists, whose "Virginia," and "Jamestown," and "Kings County," and "Norfolk," and "Suffolk," and "Cape Charles," and "Cape Henry," tell of a time when colonization was the pet sport of the English sovereigns. So, also, might the "City of Brotherly Love" be subpœnaed to give testimony to the genuine Quaker spirit; while the numerous aristocratic or royalist names in East Tennessee, such as "Bristol," "New Market," "Knoxville," "London," "Loudon," and others, contribute their mite to the explanation of the fact that the tories of Virginia and North Carolina preferred "going West" to taking service in the American ranks during the Revolutionary war. Scattered over the whole country, however, are the beautiful Indian names of rivers and mountains, the "Missouri," and the "Mississippi," the "Tennessee," and the "Alabama," the "Alleghany," and the "Monongahela," the "Ohio," the "Nolichuckee," the "Chattahoochee," the "Chattanooga," and the

"Apalachicola," all tell their story, and refer us to a time when, step by step, slowly and unwillingly, sometimes peaceably and sometimes by force, the Indians retired before the axe and the rifle, but tarried long enough to teach the white man the names of the objects most prominent in the physical constitution of the country.

In regard to the geological significance of proper names, it might at first seem that nothing is more enduring than "the everlasting hills, the vales in quietness between, and old ocean's gray and melancholy waste," but beyond all question, the language of man, in one form or another, has shown itself even more changeless than the face of nature, and strange as it may appear, the geological changes of given districts may often be elucidated by a reference to the names of localities in those districts. One or two illustrations must suffice. Taylor says that there is no sort of doubt that the whole valley of the Thames was once an estuary, which, in the last thousand years, has silted up; and this fact is beautifully demonstrated by the name endings of almost every city in the Valley. *Ea* or *ey* is a Saxon termination signifying island; and Putney, and Osney, and Moulsey, and Whitney, and many others, are cited as showing that the towns so designated formerly occupied island sites. The island of Thanet, where the Angles and Saxons first landed, is now joined to the mainland by broad pastures, while the harbor, which formerly sheltered Roman galleys, is now converted into beautiful farms. A better illustration may be found in the North of Italy. The whole plain of the Po is rising with considerable rapidity, so that at Modena, the ruins of the Roman city which occupied that site twelve hundred years ago are now found forty feet below the present surface. Ravenna two thousand years ago was a seaport; it is now

two miles inland; Adria, which, two hundred years before Christ, was the chief port of the Adriatic, and gave its name to the sea, now stands twenty miles from the coast. Other cases, illustrating the longevity of names, may be cited. The "New Forest," established by William the Conqueror for the benefit of his game, still claims the title, though an oak here and there is the sole representative of the former dense woods. The "Black Forest" of Argyle has now nothing of the forest but the name, while such local names as "Beverly," "Beverstone," and "Bevercoates," led philologists to suspect, before geologists ascertained, that the beaver was once as common in England as the deer.

In a smaller way, an illustration of the manner in which names continue to be used after all their significance is lost or has been forgotten, is seen in the name of the now celebrated "Gramercy Square," in New York city. For a long time this name was supposed to be of French origin, and nobody knew what it did mean, until, not long ago, some antiquarian, delving among the city archives, unearthed an old Dutch chart, and where this "Gramercy Square" is now situated, there was formerly a long, irregular pond, called by the honest Hollanders *Der Kromme Zee*—the crooked sea—and the whole difficulty vanished. Opposite St. Louis, Mo., there was formerly an island known as "Bloody Island," from the number of duels fought there. It has for many years been a part of the Illinois mainland, but it is "Bloody Island" still, and likely to remain so. Near the southern portion of the same city, there was once an island in the Mississippi called "Duncan's Island." For nearly twenty years it has been a part of the Missouri shore, and men live over what was once the bed of the stream; but the limits of "Duncan's

Island" are still as strictly defined as when the Father of Waters surrounded it on every side.

An attempt has thus been made to impart some idea of the meaning wrapped up in the husks of the English language. A brief recapitulation of the principal points must now answer for a conclusion. Language in general is exceeding slow to change, but under some circumstances is capable of swallowing, digesting and assimilating anything that may be offered. It has been shown that language is an index to character so infallible, that the human countenance itself, with all its variety and beauty of change, is not more sure. It has been shown that there is poetry in words as well as in stones, brooks and flowers; and morality in nouns and adjectives as well as in men and women. It may be considered settled that the destruction of a national language is an impossibility, and that even the proudest nations of conquerors are forced to enrich their vocabulary with the language of their slaves. The "natural selection" of words has been touched, and the fact elicited, that one word dies and another lives; not by chance, but in obedience to laws as yet little understood. History has demonstrated that a name is more enduring than a monument; that the former will be remembered when the latter has crumbled to powder; that a local appellation will outlive a mountain, and will be on the tongues of men when the valley has become exalted; and that the language of men, changeless, yet ever changing, identical, yet never at any two periods the same, like the river in Horace, flows on, and will so flow on forever.

ARNOLD OF RUGBY.

By Miss Grace C. Bibb, Professor of Pedagogics and Dean of the Normal Faculty of the University of the State of Missouri.

"All history" says Emerson is a record of the power of minorities, and of minorities of one. Again, "The measure of greatness shall be usefulness in the highest sense—greatness consisting in truth, reverence and good will."

Tried by this test, Arnold was preeminently great. Born in the true Apostolic succession he was to all within the wide sphere of his influence a minister of strength and of comfort, of courage and of consolation. Governed by motives so lofty as to be frequently misunderstood, he was yet a man of strong practical good sense and rather a worker than a theorist about work. In some points, it is probable, that he would be set down by the latitudinarianism of to-day as intolerant, but if he were intolerant it was of that which he believed to be wrong, and from the same spirit in which the martyrs of old suffered for their convictions. There was in him a gravity that approached sternness and a sense of justice that blazed, sometimes, into indignation, yet withal a tenderness which through all anxieties and cares gave to his life freshness and to his heart power to cherish all holy affections and sweet charities, all pure aspirations.

Thomas Arnold, the great head master of Rugby,

the reformer we may almost say, of education in England, the typical teacher, was born in the Isle of Wight, June 13th, 1795. His father died suddenly before the boy had completed his sixth year, perishing of a disease of the heart which was unfortunately inherited by the son, whose life, in the early maturity of his manhood and in the midst of a happy and most beneficent career, it was destined to destroy.

His biographer tells us that as a young child Arnold was under the instruction of his aunt, Miss Delafield, a a lady of wise judgment, affectionate feeling and strong intellect, but that, when still a little fellow of perhaps eight or nine, he was sent to Warminster School and four years later to Winchester, most celebrated for its historical associations. This school owes its foundation to William of Wykeham and perhaps to a taunt. We are told that Wykeham having been spoken of for a bishopric was derided for his lack of scholarship—not a very astonishing lack in a man of his time—and that he thereupon made answer thus: "I am unworthy, but wherein I am unworthy myself, that will I supply by a brood of more scholars than all the prelates of England ever showed." Bishop of Winchester and later Lord Chancellor Wykeham, after numerous vicissitudes, established his College of St. Mary Winton at Oxford, as a little earlier he had founded his preparatory college and preliminary Grammar School at Winchester, provision being made for the education of seventy boys.

"And still his seventy faithful boys in these presumptuous days,
Learn the old truth, speak the old words, tread in the ancient ways.

* * * * * * * * * * * *

Still in their Sabbath worship they troop by Wykeham's tomb,
Still in the summer twilight sing their old sweet song of home."

Thus sang Sir Roundell Palmer, himself a Winchester boy, as quoted in the work, "The Great Schools of England," to which I am indebted for most facts concerning them.

There are, indeed, those who trace the foundation of the school at Winchester, upon whose site the college was erected, to the time of the conversion of Britain to Christianity, saying that here Ethelward, son of the great Alfred, received the rudiments of education, and that shortly after the Conquest the school was well known. However this may be, its undoubted associations are most romantic, and it claims for its own many illustrious names both civil and military. Besides Dr. Arnold himself, it numbers on its bead roll of fame many another hero, bishops and archbishops, as well as poets and prose writers innumerable—Young, Collins, Otway, Somerville, Sir Thomas Browne, Sydney Smith and many another worthy of our literary history.

We like to think of the boy Arnold, with his practical yet enthusiastic nature, and his tendency to hero worship, as possessed to some degree of the freedom of Winchester, a town so old that its history goes quite back into Celtic times, the capital alike of the Briton, the Roman and the Norman. Here Alfred held his council; here is still shown what devout believers may accept as the veritable "Round Table" of King Arthur; here Henry II began "a noble palace." It was to Winchester that Henry VI journeyed to meet his Queen, during this and other visits, bestowing on the college many valuable gifts. Henry VII too visited the place, and here Henry VIII entertained Charles V. Here Philip and Mary were married and were received at the college. Queen Elizabeth, too, paid the students a visit upon which occasion having asked one of the boys

for some information with reference to the birch, a representation of which appeared on the wall above the motto not infrequent in public schools: "*Aut disce; aut discede; manet sors tertia caedi*," is said to have received answer thus, the student being fresh from Virgil and the woes of Troy: "*Infandum Regina, jubes renovare dolorem.*"(*)

Residence in a town like this whose every stone had its history, with its old walls, its noble cathedral, its celbrated schools and its dignified charities, could not fail to impress deeply a nature like that of Arnold; to this residence is, doubtless, partly traceable his fondness for history and its lessons, as well as his disposition to judge things upon their real merits and men by their real worth uninfluenced by tne popular verdict in respect to either. For Winchester is a town where walls and streets and palaces preach eloquent if voiceless sermons on the vanity of earthly glory and the transitoriness of human fame. Arnold's later attachment to Oxford was deep and fervent; his appointment to the Regins professorship of History was the realization of the dream of his whole life, and yet always, with the fondness of tenacious memory, his thoughts reverted to the happy and suggestive years of his Winchester residence.

In his sixteenth year Arnold was entered at Oxford his college being that of Corpus Christi, which was though small a college of high reputation. Here his mental development was rapid though it is doubtful if his scholarship could ever, with justice, be made the measure of his ability. Since his taste led him into the society of the Greek philosophers and historians rather than into that of the poets, it was difficult to estimate his

(*) Great Schools of England.

knowledge by popular standards or to balance it with the college requirements. His stay at Corpus Christi had, however, a most salutary influence on his intellectual life for its methods were admirable. It was noted for the impartiality of its examinations and for the University honors it had gained; it carefully adapted its mode of work to the age of its students and to the degree of their mental development, combining individual with class instruction in such a way as to further most effectually intellectual growth. It did not at once throw its students upon their own resources, but very gradually prepared them to assume, relatively, the control of their own education and of their own action. The boys, bright and active in intellect, had the true English courage of their convictions and the time was one of agitation in which they naturally sympathized. Dean Stanley, his biographer to whose "Life and Letters of Arnold" we are indebted for most of the facts of his life gives at length a letter from one of his contempararies which bears upon his Oxford career; from this letter we may be permitted to make the following extract:

"We might be, indeed, were somewhat boyish in manner and in the liberties we took with each other; but our interest in literature, ancient and modern, and in all the stirring matters of that stirring time was not boyish; we debated the classic and romantic question; we discussed poetry and history, logic and philosophy; or we fought over the Peninsular battles and the continental campaigns with the energy of disputants personally concerned in them."

In all these discussions, it is said, Arnold took an active part. What then or later he believed, he believed with heart and soul as well as intellect; what seemed to him worth argument seemed, therefore, worth defence against all attack, or worth as vigorous urging where there was hope that its validity might be acknowledged.

Spite of his fondness for history and of his devotion to that most tyrannous "master of them that know," Aristotle, his mental attitude was always aggressive. He was intolerant of the existing order unless that order were plainly founded in Divine right. A fierce democrat and an ardent reformer he believed himself, doubtless, as is the wont of young and ardent spirits, a veritable champion to whom was entrusted the sword of the Lord and of Gideon. The affectionate nature of the boy, the fact that he argued only for truth and that when overborne with reasons he was always ready to admit himself vanquished and to acknowledge the jnstice of the defeat, tempered the asperity of conflict and kept almost undisturbed those fraternal relations with his associates out of which grew some of the strongest and most lasting attachments of his life.

I have said that Arnold, at this time, cared little for the poets; then and for a long time afterward, he held tenaciously to the theory that form in literary composition is a matter of so inconsiderable moment as to be unworthy of serious consideration. To him thought was the important, the only important thing. His own style during his earlier years was, perhaps by reason of this theory, exceedingly uninteresting. Fortunately for those of us who delight in the charm which his elegant pen has thrown about the "History of Rome," his practice at least, was finally very greatly changed. It is possible, indeed, that the beauty of his later style may be due to the admiration, which in despite of his theory, he early manifested for the picturesque narrative of Herodotus, of which author and of Thucydides he was very fond. His Oxford training, if it gave him no special reputation for profound scholarship, yet served, admirably, to develop the originality and self-reliance

out of which, together with his stern integrity and extreme conscientiousness, his great influence grew.

Alike as boy and man Arnold was delighted by athletic sports and vigorous physical exercise. He had, too, as a native of the Isle of Wight should rightfully have a strong and enduring love for the sea. To his deep and passionate fondness for external nature in her various forms is no doubt due much of the youthfulness of spirit which throughout a life not ignorant of care and much disturbed by misconstruction and hostile controversy, kept his mind open as that of a child, to impressions of beauty and caused his heart to throb with new emotion at every instance of heroism or of self-devotion. No human soul, I imagine, ever more fully realized the depth that is to be found in those well-known lines of Wordsworth:

> Nature never did betray
> The heart that loved her; 'tis her privilege
> Through all the years of this one life, to lead
> From joy to joy; for she can so inform
> The mind that is within us, so impress
> With quietness and beauty, and so feed
> With lofty thoughts, that neither evil tongues,
> Rash judgments, nor the sneers of selfish men
> Nor greeting where no kindness is, nor all
> The dreary intercourse of daily life,
> Shall e'er prevail against us, or destroy
> Our cheerful faith that all which we behold
> Is full of blessing."

To his love of nature and to his fondness for athletic sports we may perhaps trace that preeminently healthy tone which was a characteristic of Arnold's mind and out of which so much of his influence over boys, undoubtedly, grew; this healthy and vigorous mental state seems never to have been disturbed except during a brief period when he was led into serious

doubts on several points of religious belief. These doubts dispelled, his character settled into deep and serious earnestness, which thereafter was its leading characteristic and which endowed him with that serenity and patience in effort, as well as that sympathetic knowledge of mental suffering, which gave him such control of the spiritual nature of those, who, in after years, came under his wise instruction. The same friend from whom I have already quoted, says of his Oxford career:

"At the commencement a boy, and at the close retaining, not ungracefully, much of boyish spirits, frolic and simplicity; in mind vigorous, active, clear-sighted, industrious, and daily accumulating and assimilating treasures of knowledge, not adverse to poetry but delighting rather in dialectics, philosophy and history, with less of imaginative than reasoning power; in argument, bold almost to presumption and vehement, in temper, easily roused to indignation, yet more easily appeased and entirely free from bitterness; fired, indeed, by what he deemed ungenerous or unjust to others, rather than by any sense of personal wrong; somewhat too little deferential to authority; yet, without any real inconsistency, loving what was good or great in antiquity the more ardently and reverently because it was ancient.

* * * * * * * * * * * *

"In heart, if I can speak with confidence of any of the friends of my youth, I can of his, that it was devout and pure; simple, sincere, affectionate and faithful."

With this character he began his work in the world, that of training young minds to wisdom and virtue; in which work over the lives of so many boys, his private pupils first, and afterward the great school-community of Rugby, over the very flower of England's young manhood, he exerted an influence for good so potent and so lasting. It is verily a true dictum of Carlyle that "mind grows only by contact with living spirit and that the quality of its growth depends on the quality of the spirit by which it is touched."

Leaving Oxford as a student Arnold yet lingered in its classic shades for four busy years so loth was he to tear himself from the libraries; to these he devoted long days of thoughtful reading which bore fruit eventually in his general literary work and in his class lectures; during this time of study and reflection he began, with some private pupils, that labor which so soon growing into a settled calling demanded his utmost devotion and called out all the enthusiasm of his enthusiastic nature—the work indeed which came to him as to one supremely qualified to perform it. So, I think, to each one of us our life work would come, at one time or at another, could only our eyes be annointed with such power of vision as would enable us to recognize our deeply disguised angel of benefaction.

About 1819 Arnold settled, as he thought, permanently, at Laleham, with his brother's family having been, in the preceding year, ordained as deacon. He was married in 1820 to Mary Penrose, whose brother had for a long time been numbered among his dearest friends. Until his election in 1827 to the head mastership of Rugby he continued at Laleham his school for the preparation of young men for admission to the universities. His life here seemed in all respects happy and useful, though it could not give scope to all his powers; in his own development it seems to have been a period of transition in which crudities of character disappeared and aims became definite, the whole nature maturing into such a manhood as was afterward to prove the assertion of the greatest of the Greek dramatists that

> "Only in God's garden men may reap
> True joy and blessing."

Arnold had found, as I have already said, while still very young his true office in the ministry of man: for-

tunate as was this fact for him it was doubly fortunate for his influence in education; he was near enough in age to his pupils to be able actively to sympathize with them in their boyish trials as well as in their amusements, at the same time that his inherent earnestness and devotion to duty together with the external responsibilities he had assumed endowed him with a wisdom beyond his years. In his married life he was most happy and the influences of his home were always extended to the boys immediately under his care. Upon this period of his life full of interest though it is, time forbids us to linger, and I will close this epoch with a quotation from one of his own letters written, I believe, during its continuance and expressing some of his views of the nature of the education demanded by our period of civilization:

"The difference between a useful education and one which does not affect the future life, rests mainly on the greater or less activity with which it is communicated to the pupil's mind; whether he has learned to think, or act, and gain knowledge by himself or whether he has merely followed passively as long as there was some one to draw him."

A gentleman associated with Arnold in the Laleham school, said of it:

"Everything about me I at once found to be most real; it was a place where a new comer at once felt that a great and earnest work was going forward. Dr. Arnold's great power as a private tutor resided in this that he gave such an intense earnestness to life. * * * * * * * * *

"This wonderful power of making all his pupils respect themselves and of awakening in them a consciousness of the duties that God assigned to them personally and of the consequent reward each should have of his labors was one of Arnold's most characteristic features in the training of youth."

I give these long quotations from the letters of Arnold and of his associates, even at the risk of weary-

ing you, because it is my purpose to give you as complete a picture as possible of Arnold the man both in his inner spiritual nature and in his external life. From this picture I trust we may all learn, in greater or less degree, wisdom, seeing in it how all potent may be individual effort and influence, and realizing more than ever before how true it is that, even in this world, "One with God makes a majority." This, my main object, can often, I find, best be subserved by extracts from the letters contained in Dean Stanley's Life of Arnold, to which work I again acknowledge my indebtedness.

Let me now digress from the direct path into which my subject leads, that I may recall at some length the nature of the schools called in England "Public Schools" with one of which the name and fame of Dr. Arnold are now forever identified. He was, as has been intimated, elected head master of Rugby in 1827; the choice having fallen upon him mainly by reason of a letter, submitted to the board having the matter in charge and written by a gentleman of character and influence, in which after warmly advocating the choice of Arnold, then comparatively unknown, he is said to have asserted that such an election would "change the face of education in England." It was generally agreed that, in many important respects, which we need not here dwell upon, a reform was most necessary if these schools were to continue the work of training for the universities, and indeed for life, the youth of England; therefore Arnold was chosen.

Rugby is one of the ten great endowed schools of England, popularly known as public schools; they are Eton, Winchester, St. Paul's, Merchant Taylor's, Charter House, Christ's Hospital, Shrewsbury, Harrow, Rugby and Westminster. These schools, except so far

as there may be similarity given by common subjects of instruction bear no resemblance whatever to the public schools of America. They are the training schools for Oxford and Cambridge and their influence is exerted directly upon the boys of the upper and middle classes. Each of thém owes its foundation to private endowment and the large revenues which most of them enjoy are due in part to the natural increase in the value of their grants of lands and to judicious investment of the original fund, which has, in most instances, been supplemented by additional gifts and bequests of those specially interested in their individual prosperity.

Rugby owes its existence to the liberality of Lawrence Sheriff a citizen of London, who, about the middle of the sixteenth century, determined to found an almshouse and a school in his native town. A portion of the property designed for the futherance of this worthy object he bestowed during his life time; a second portion he left by his will, directing in that instrument that the school should be thus designated: "The Free Schoole of Lawrence Sheriffe of London, Grocer." "The school-master," he directed further, was to be "a discreete and learned man chosen to teach grammar and if it conveniently may be to be a Master of Arts." An act of Parliament passed in 1777 made it obligatory that the head master shoud be "a Master of Arts of Oxford or Cambridge a Potestant of the Church of England." The assistants number about twenty and are most of them appointed by the head master. The school is also entitled to a chaplain but since the time of Dr. Arnold, who established the precedent, the chaplaincy has been exercised by the head master, to whom it offers a powerful means of spiritual influence. The chapel was erected in 1814 and contnins five painted

memorial windows, which are much admired, one being in honor of Rugby's Crimean heroes and another to those of its sons who fell in India during the Sepoy Rebellion. Rugby may well celebrate the fame of her military heroes for they have won glory on every field known to their country's history since the foundation of their *Alma Mater*,—in Africa in the Peninsula, at Waterloo, in the Crimea and in India. The wealth of Rugby may be inferred from the fact that that portion of its income set apart for the payment of its instructors amounts annually to the large sum of more than £20,000. The head master, who by the original provisions of Lawrence Sheriff's grant, was obliged to satisfy his temporal wants upon a stipend of £12 per annum, now receiving a money salary of $2957 exclusive of a residence, garden and some other sources of emolument. As in all the other great schools, so here there are two classes of students, "foundationers," who pay no tuition and for whose benefit the original grant of the founder was made, and "non-foundationers," boys who pay all the expenses of their residence including tuition as well as board. The number of this latter class is much greater than of the former. There is, in this school at least, no difference in the social status of the two classes of pupils. The students of the classical department, which is regarded as the most important, are divided into three divisions known from the degree of advancement as the Upper, Middle and Lower schools. There are, besides, schools of mathematics, physics and modern languages, though their place seems subordinate. The boys of the classical school are divided into six "forms" as they are called, "classes" we should say which are for convenience sometimes subdivided into "parallel divisions." The sixth form is the highest.

No boy is allowed to remain in school after the age of nineteen; no boy above the age of fifteen is admitted, unless qualified to take such place as would of right belong to his years. Classical instruction occupies seventeen out of the twenty-two hours of weekly attendance of the Rugby boy upon class instruction. There are two examinations of the entire school during the year, one occurring in June, the other in December; the June examinations of the sixth form being conducted by a committee appointed by the universities. A number of prizes, some of consieerable value, are offered, and there are elected annually, at an examination open to all pupils who have been in residence three years, five persons as representatives of the school at the universities to whom pecuniary aid in sums ranging from £40 to £80 per annum is extended. The monitorial system is much used in the government. The monitors, technically known in the school as præposters, are the boys of the sixth form; they keep order during roll-call, call over the names of students at their respective boarding houses — the students are apportioned as boarders to the houses of the several masters—and, sometimes, read the evening prayers. Their badge of office is a light cane, and, they are empowered to use this cane under certain circumstance, actively in the preservation of order. upon any of the boys below the fifth form who may prove refractory; this punishment is, however, limited to five or six blows across the shoulders, and their attempts at correction generally take the form of the imposition of extra lessons. Fagging is or at least was, in Dr. Arnold's time, one of the prominent features of the school, resting on the assumption that for the material aid furnished by his junior in the way of doing errands, dusting or making

toast, the senior was to return full equivalent in his capacity of mentor. This ideal interchange of equivalents, it is unnecessary to say, rarely exists except in theory. Rugby is noted for its games of which football is the game *par excellence*; cricket, too, is a favorite as is also "hare and hounds." The river Avon which runs past the town furnishes opportunity for bathing and aquatic sports generally. The Rugby boy has two vavations, amounting in the aggregate to fifteen weeks in the year and is entitled to at least three holidays in each week.

The beginning of Dr. Arnold's Rugby career opened wide that door of opportunity, which, indeed, to him who seeks it is never closed. The prevalent feeling that the public schools were falling into certain grievous errors, that as a minor fault they were devoting too much time to the classics and too little to modern languages and science, that as a very serious mistake they were daily divorcing their instruction more and more from religion, was a conviction in which he deeply shared and this field of labor which afforded opportunity to set in motion the much needed reform, the enthusiasm of his disposition led him to seize upon with joy. Still he could not help but regret the necessity of leaving his home at Laleham. The surroundings of Rugby were at best commonplace, and little calculated to satisfy his love for the beautiful in nature. To escape from the monotony of its scenery he purchased some time afterward, an estate in the Lake District and beautifully situated, which was to him the Mecca of many a pilgrimage when body and brain and soul cried out for rest. The curious mixture in the mind of Dr. Arnold of conservatism with radicalism made his early attempts at reform in the school, appear chaotic

and illy considered. Since he was always ready to receive and entertain suggestions as to the means of meeting difficulties, his system had a certain external fluidity, if we may use that term, which was, to the casual observer, misleading; he had, however, a touchstone for all methods and expedients in the great underlying purpose of his administration. His hope was to make of these boys, who represented the next generation of upholders of the national honor, Christian gentlemen, men who should have such clearness of intellect as to discern the right, such moral cultivation that they would prefer right to wrong from taste as well as conviction, and such courage, that they would be ready to defend what they believed the cause of truth and justice even with their lives. Of course, in a school as large as Rugby,—numbering from two hundred and fifty to three hundred boys,—there were many who could not, or would not answer to appeals made from any views of life so serious, and it was the practice of the new head master to remove quietly all whose presence was detrimental to the school at large or who were themselves, for whatever reason, incapable of being improved. So ready and accurate was his judgment of boyish character that his predictions with reference to the youths under his care were in most instances amply justified. He was accustomed to advise the parents of the boys sent away as to the course most likely, in his view, to prove beneficial, the result often proving the justice of his conclusions. Expulsion from the school was a last resort in the case of hardened offenders. His plan could not, however, escape misrepresentation and was afterward made the basis of malignant abuse of the Rugby system.

In the students of the higher classes especially, it was the desire of the head master to cultivate a strong

sense of responsibility for the general welfare and progress of the school; this he, however, accomplished as much as possible by indirection and the youth in whom the feeling was strongest was frequently the last to suspect the source of the inspiration which had breathed upon and renewed his spiritual life. The author of "School Days at Rugby" illustrates this admirably in the conversation of his hero with one of the masters held on the eve of "Tom"s departure, which thus concludes:

"It was a new light to him to find that besides teaching the Sixth and governing and guiding the whole school, editing classics and writing histories, the great Head Master had found time in those busy years to watch over the career, even of him, Tom Brown and his particular friends,—and no doubt of fifty other boys at the same time, and all this without taking the least credit to himself, or seeming to know, or let any one else know, that he ever thought particularly of any boy at all."

The direct influence of Arnold was exerted only upon the sixth form, which as I have already said, was the highest, but, since he was extremely careful in the selection of his assistants, and encouraged each to stand as nearly as possible in such relation to the boys under his immediate supervision as he himself stood to the school at large, exerting a similar influence and striving for similar results, his spirit pervaded the atmosphere of the place and gave tone to the entire work.

As a teacher in the presence of his class the efforts of Dr. Arnold seem to have been mainly directed to the cultivation in his pupils of self reliance and of intellectual integrity; he was skillful in his use of questions and in developing the unknown from the known, in leading the boys to discover for themselves the necessary connection of events and the inter-dependence of facts, in rousing desire to know causes and to express thought

logically. He worked, as it were, with the boys asking information freely from them on any subject not within his own immediate range, never assuming any special superiority of manner or any profundity of scholarship, but impressing at once by the quiet natural dignity which needed no adventitious support, and by the treasures of knowledge from which he drew that abundant illustration which gave to his lectures, particularly in history, so vivid an interest. The chapel services were almost the only occasions afforded him of reaching the entire school; how he exercised this power the author of "School Days at Rugby" himself a Rugby boy and "great part" of that which he describes has told us in his own graphic way and has dwelt with loving recollections on "The oak pulpit standing out by itself above the school seats. The tall gallant form, the kindling eye, the voice now soft as the low notes of a flute, now clear and stirring as the call of the light infantry bugle, of him who stood there Sunday after Sunday witnessing and pleading for his Lord the King of righteousness and love and glory, with whose spirit he was filled, and in whose power he spoke. The long lines of young faces rising tier above tier down the whole length of the chapel," and of the "soft-twilight" which stole over all and deepened "into darkness in the high gallery behind the organ." He has told us too how these boys "listened as all boys in their better moods will listen" and how "wearily and little by little, but surely and steadily, on the whole, was brought home to the young boy for the first time, the meaning of his life; that it was no fool's or sluggard's paradise into which he had wandered by chance, but a battle field, ordained from of old, where there are no spectators, but the youngest must take his side, and the stakes are life and

death, and the who roused this consciousness in them showed them at the same time by every word he spoke in the pulpit and by his whole daily life, how the battle was to be fought and stood there before them their fellow-soldier and the captain of their band."

Thehead-mastership of Arnold continued for fourteen years—years not undisturbed by calumny and misrepresentation, but yet, full of that deep underlying peace which consciousness of duty well and faithfully performed must bring to heroic souls. The strenuous zeal of Dr. Arnold for what he believed to be the truth, led to a heated controversy with the High Church party which was, indirectly, the cause of most persistent and outrageous personal attack upon him through the medium of the press, and although he made no public allusion thereto nor noticed the slanders thus set in circulation, he could not help but feel unhappiness, especially as he found himself ostracised for his opinions, by many of his former friends. Confident of the justice of his cause he, through all, went on steadily with his work, and as steadily the purity and strength of his character grew into appreciation, until, in the later years of his Rugby residence, he had gained the entire respect and admiration of even his former adversaries.

In 1841 he was appointed "Regins Professor of Modern History" at the University of Oxford, the compliment of his election being greatly enhanced in value by reason of his late controversy with the Oxford party in Church and State. No work could have been more entirely accordant to Dr. Arnold's taste than that which opened before him in this professorship, and he did not hesitate at once to accept it; but as his duties would not require residence he determined to retain, at least for a time, his place at Rugby, devoting the Oxford salary to

the foundation of university scholarships. His inaugural lecture was delivered in December of the same year, and treated, as we learn from his correspondence, "of the several parts of history generally and their relations to each other and then of the peculiarities of modern history." The occasion was naturally of the greatest interest and the audience was very large, their accommodation rendering necessary the opening of the "Theatre."

Arnold had, without yielding in any way his convictions, conquered a triumphant peace, and in the light of her full recognition, whatever might at any time have alienated him from his *alma mater* faded away, leaving his return to the place he had so long and so deeply loved unclouded by either doubts or regrets. So with thankfulness and joy of heart he entered upon the duties of that office which had from afar brightened before him as the noblest goal of his ambition. Not yet forty-seven years of age, in the full flush and vigor of his manhood; looking back upon patient, strenuous and successful effort in a cause which seemed to him the noblest to whose defence any man is called; looking forward to a new epoch in the work of his life in which it should more than ever be his task to call up from their tombs the heroic dead of all time that their examples might mould to something like heroism the age in which he lived, looking forward still beyond to that blessed retirement at "Fox How," where, surrounded by his family, soothed and animated by the natural beauty of all the local associations he might pass in peaceful literary labors the evening of his days, he seemed of the fortunate most fortunate. Surely auspicious deities beckoned him onward, holding out to him the gift of happy days or whatever gift greater than happy days they offer to mortals. Cicero, in that one of his Tusculan

Disputations written "On the Contempt of Death" quotes two well known stories told by the Greeks, the one of Cleobis and Biton, sons of the Argive priestess, the other of Trophonius and Agamedes. The priestess mother of the youths "is said to have entreated the goddess to bestow on them as a reward for their filial piety, the greatest gift that a god could confer on man, and the young men, having feasted with their mother, fell asleep; and in the morning they were found dead." Trophonius and Agamedes made a similar request "for they having built a temple to Apollo at Delphi offered supplications to the God * * * asking for whatever was best for men. Accordingly Apollo signified to them that he would bestow it on them in three days, and on the third day at daybreak they were found dead." Was it the best gift of the gods to Arnold of Rugby that he too, when most the favorite of fortune, when most entitled to claim the future as his own, should also, in the old heathen phrase, "at daybreak" have been "found dead?"

It was on the morning of Sunday, June 12th, 1842; the preceding Saturday had closed the year at Rugby; in all the attendant exercises the head master had taken his usual lively interest—in the school speeches, in the visit of the board of examiners, in the work of the fifth form. He had distributed the prizes and preached the final sermon; he had closed his New Testament lectures with a dissertation on those words of the apostle which were to prove themselves prophetic: "It doth not appear what we shall be; but we know that when He shall appear we shall be like Him for we shall see Him as he is." At the supper given in farewell to the sixth form on Saturday evening no one had been more cheerful or more hopeful than Arnold, no one seemed to

hold more firmly to life. Then the labors of the whole year over, lessons recited, sermons preached, prizes distributed, the great head master of Rugby lay down to his last sleep. Very early on Sunday morning he was roused by a sharp pain in his chest which increased constantly in its intensity. The destroyer of his father's life claimed his also. Medical skill could do nothing to relieve his suffering; affection was powerless to hold him to the earth and at eight o'clock he was dead. Only the day before the boys of the school had seen him in their midst, the life and soul of the place, now already he was become only a memory; imagine their consternation, their grief, as they attempted to realize that the "captain of their band" had in the very hour of victory fainted under the burden of life and of the flesh, and had gone forth with the waning night, "A lone soul to the lone God."

As was preeminently fitting, Arnold was buried in the chapel which had so often re-echoed his words of wisdom, of encouragement and of consolation, and there was erected to his memory the monument which represents the common desire of men of all parties and all sects to do him reverence.

It were indeed a task most idle were I to attempt description of the sorrow which his death caused, not to the Rugby boys alone, not to his family and friends merely but to the great host of boys as well, who now become men and filling their various places in the world with less or more honor, looked back to Rugby as to the place in which they were first taught to realize the true value of life, for these there had indeed with him "passed away a glory from the earth."

The life of Arnold more almost than that of any other man of our times must be estimated as a whole;

not as that of a teacher though instruction was his delight; not as that of a student though every day added to the rich treasures of his knowledge; not as that of a clergyman though his chaplaincy was a veritable cure of souls, not as that of husband and father though no domestic life was ever happier; not as that of Regins Professor at Oxford, though here he found the crowning glory of his ambition, but as that of a man, most worthy to be thus designated, embracing all these as its moments, and hence, more than that of any contemporary, "a living epistle known and read of all men," since it is after all, character which acts on character, spirit which responds to spirit throughout the Universe. The eternal principle in humanity, that by which it is allied to the Creator recognizes its spiritual kinship with whatever of the same divine spirit may be found in man. How Arnold's spirit made itself a power, what aspirations ennobled, what weak hands strengthened what souls saved who can tell us more feelingly or more faithfully than his gifted son when he says:

"Thou would'st not alone
Be saved, my father! alone
Conquer and come to thy goal,
Leaving the rest in the wild.
We were weary, and we
Fearful, and we in our march
Fain to drop down and to die.
Still thou turnedst, and still
Beckonedst the trembler, and still
Gavest the weary thy hand,
If, in the paths of the world,
Stones might have wounded thy feet,
Toil or dejection have tried
Thy spirit, of that we saw
Nothing—to us thou wast still
Cheerful, and helpful, and firm!

Therefore to thee it was given
Many to save with thyself;
And, at the end of thy day,
O faithful shepherd! to come,
Bringing thy sheep in thy hand.

And through thee I believe
In the noble and great who are gone;
Pure souls honor'd and blest
By former ages, who else—
Such, so soulless, so poor,
Is the race of men whom I see—
Seemed but a dream of the heart,
Seem'd but a cry of desire.
Yes! I believe that there lived
Others like thee in the past,
Not like the men of the crowd,
Who all round me to-day
Bluster or cringe, and make life
Hideous, and arid, and vile;
But souls tempered with fire,
Fervent, heroic and good,
Helpers and friends of mankind."

THE PROFESSIONAL SCHOOL IN THE AMERICAN UNIVERSITY.

By Thomas Jefferson Lowry, S. M., C. E., Professor of Civil and Topographical Engineering, and Dean of Engineering Faculty, in the University of the State of Missouri.

The changes which discovery and invention have, within this century, wrought in the life of society and the nation are amazing. The gas-jet has taken the place of the tallow candle, and the telegraph, telephone, and phonograph that of the post. But steam and the multiplication of machinery have been the most far-reaching in their effects,—they have revolutionized every industry of our country. Every labor-saving machine invented and adopted throws thousands out of employment; and crying distresses unavoidably characterize these violent social changes. In ameliorating the condition of the unemployed we are obviously reduced to this dilemma: Either, the wheels of discovery and invention must be blocked, or, our affairs and social conditions must be adjusted to those new circumstances. The progress of our civilization demands that the first shall not be done, and, hence, society must adjust itself to this new order of things. It is a fixed fact in our civilization that nature's forces have been subjugated to our needs,—

by it we have grown as a nation to what we are, and it now underlies our whole existence. And despite the howls of ignorance, and fanatic opposition of red-handed communism, steam and wind and gravity and electricity will continue to nerve the untiring arms of machinery in working for man; thereby forcing him on to a higher plane of existence, and giving the common laborer comforts which, a few centuries ago, kings could not purchase.

Seeing then that a readjustment of vocations is necessitated by the perpetual elimination, by labor-saving machinery, of the great multitude of least intelligent and least versatile laborers, we ask "what are the remedies?"

Obviously, they are: 1st migration.

2nd. Education of the people to versatility. Migration is necessary and desirable under all circumstances. Large numbers of people cast on shore by the fluctuations of mechanic industry, must seek homes on the border land. The continuous circulation thus kept up between the centre and circumference of our country, is a national tonic. It is the great available means of present readjustment of vocations. It says to the citizen who falls out of the line of productive industry: "Go to the foot of the line and begin again. Engage in the exciting task of building up civilization in an empty wilderness and you and your children shall thrive once more." But, migration does not completely solve the problem; for, migration itself presupposes versatility. Thus, the question recurs, with redoubled force, what will give this versatility? All agree on the general answer—Education. But, as to the *kind* of education there are three theories, differing either, in methods, or aims, or both.

The aim of the first of these is the perfection of the individual, and its method is mental gymnastics, in the pursuit of truth.

The aim of the second is the conservation, improvement, and transmission of our civilization, and the method it employs is possessing ourselves of truth.

The third employs the methods of the first, as preparatives, for compassing the aims of the second.

The first is the *ancient*, the second is the *rational*, and the third is the *traditional* system.. One or the other of these theories has shaped the curriculum of every English and American college, and now presides over its educational efforts. The first of these we find embodied in the English Universities; the third, in those of our colleges which are of English parentage and model; and, the second, in those of our Universities which are the necessary outgrowths of American civilization—prominent among which are Virginia, Cornell, Michigan, Missouri, and John Hopkins.

The problem before us now is to determine which of these systems furnishes the most direct proximate means of attaining versatility. The ancient system views man as an end unto himself, ignores the necessity —admitedly makes no pretentions to qualify—for exercising any trade, calling, or profession, and hence, has no claim on our attention in this inquiry. Now the traditional and the rational systems agree that the great end of all culture is preparation for the activities of life; they differ only in the methods employed for attaining this end. The traditional system says, learn first the useless fact B to get the discipline necessary to acquire the useful fact C; while the rational system ignores useless B and attacks C at once, making it serve both for knowledge and discipline. Now, since it costs as much effort to learn a useless fact as a useful one, it is obvious, that, by that method, half the mental power is wasted, and by this method there is none. In the vicarious discipline of

that method, a certain amount of the plastic force of the system is used up, and is, therefore, not available for other purposes. This, is the extra mental cost of the traditional system for which we have to show an equivalent in solid advantages, either in knowledge or discipline, for the activities of life, or it will be forced, on the score of economy, to give way to the rational system. Now, in what do the traditional and rational curricula differ as to subject matter (knowledge)? Essentially this: that the six years work in the classics of that system is, in this one, replaced by two years in the modern languages and four years in the natural sciences and the applied mathematics. It is admitted that these modern languages —French and German—yield discipline, at least, equal to the classics. And what is incomparably of greater value, they reveal those thoughts, those mind processes, those instruments which have revolutionized the condition of our existence, and which are even now the advance guards in the march of (modern) civilization. When we consider that these fields of thought and research were to the classics, and are now to the classicists, dream-land, how ludicrous appears the assumption that the classics furnish knowledge and discipline equal to that of the modern languages, for giving versatility in life's activities. And it does not admit of intelligent question that it is the natural sciences and the applied mathematics which furnish the mainsprings of our material prosperity, supply the truths indispensible to productive activity in any of the industries. Now, in fact, the value of a knowledge of the classics, on the ground of the information exclusively contained in Latin and Greek authors, has steadily decreased as the number of good translations from them have increased. In this progressive decrease a point has been reached where the

residuum of valuable information still locked up in the classics, does not justify the efforts necessarily expended in acquiring these languages. It is true that there are certain artistic effects in literary composition, and peculiar subtleties of thought in the moral and metaphysical sciences which are untranslatable; and that the peculiar aroma of classical poetry, is incommunicable, yet if a man is conversant with the best translations, he cannot be far from the kingdom of heaven. When the advocates of the traditional system were made to see that the price to be paid for these untranslatables and incommunicables of the classics, was no less a labor than the complete acquisition of the Latin and Greek languages; and were shown the living truths which the same amount of labor would have gathered in the fields of modern thought aud research; and were reminded of the fact that every industrial pursuit is steeped in science; and were forced to recognize that there is not a fact or principle in the whole compass of physical science, or in the arts and practices of life, that is not fully expressed in every civilized modern language, they reluctantly yielded the point of the usefulness of the knowledge in the classics for attaining versatility; and took their stand on the proposition, that the classical languages train the mind for the activities of life as nothing else does.

Now, determined as it is, that the truths of modern science are of more worth than those in the classics, for guidance and use in the activities of life, it remains to judge of the relative values of these two knowledges for purposes of training for these activities. We may be quite sure, says the great philosopher, Spencer, that the acquirement of those classes of facts, which are most useful in the arts and practices of life, involves a mental exercise best fitting for life's activities. It would be ut-

terly contrary to the beautiful economy of nature if one kind of culture were needed for the gaining of information and another kind needed as a mental gymnastic. Everywhere, throughout creation, we find faculties developed through the performance of those functions which it is their office to perform; not through the performance of artificial exercises devised to fit them for these functions. The red Indian acquires the swiftness and agility which make him a successful hunter by the actual pursuit of animals. By the miscellaneous activities of farm life the farmer gains a better balance of physical powers than gymnastics ever give. The same law holds throughout education. The education of most value for guidance must, at the same time, be the education of most value for discipline. Now the evidence. The advantages claimed for language learning are: First, it strengthens the memory. True; but the sciences of Physics, Chemistry, Geology, Mineralogy, Botany and Astronomy afford far wider and richer fields for the exercise of memory. Now mark that while for the training of mere memory, science is as good as, if not better than, language; it has an immense superiority in the kind of memory it cultivates. In the acquirement of a language, the connections of the ideas to be established in the mind correspond to facts which are in a great measure accidental; whereas, in the acquirement of science, the connections of ideas to be established in the mind correspond to facts that are mostly necessary. Unless—as is commonly not true—the natural relations between words and their meanings are explained, then language learning gives fortuitous relations. The relations which science presents are causal relations; instead of being practically accidental, they are necessary; and, as such, exercise the reasoning faculties. Language

familiarizes with non-rational relations, science familiarizes with rational relations. That one, exercises memory only; this one, exercises both memory and understanding.

The translation exercise cultivates inventive power, —but it is only a power to arrange words, and not a power of marshaling scientific truths and principles for meeting (solving) the difficulties arising in the activities of life. By converting the mind into a kaleidoscope of words, it gives only such an inventive power as is needed to solve riddles and conundrums.

Bain says, "that all experience shows that only very inferior English composition is the result of translating from Latin or Greek into English. And, that the study of the classics is devoid of interest; and what makes it tolerable is the large devotion of time to the themes of universal interest—personal and sensation narrative." Certain it is, however, that these languages become parts of a rational curriculum only when "taught, not merely as gymnastics, but as embodiments of food for the soul," as in the Missouri University.

It is reprehensible to delude the student with the fallacies, that through a scheme of aimless exercises (in the classics) for discipline mental power may be accumulated for universal application, and that the useful truths needed, will be gathered by the wayside, with little effort, out in active life. It is not a fact, that the vitalizing truths in any department of human thought, hang around us like apples on a tree, to be gathered with little effort. There is no such thing as getting possession of truths "by throwing salt on their tails." Gaining possession of the truths of the useful sciences means mental exercise more varied, vigorous, protracted, and exhilarating than any to be found in the pursuit of the classics; it means more:—

nourishment for the mind,—food for the soul. The pursuit of truth exercises and disciplines the mind; but it is truth possessed—digested and assimilated—which nourishes and strengthens the mind. The pursuit of the classics, failing to impart vitalizing truths, enfeebles while it exercises and disciplines the mind. The pursuit of the truths of science exercises and disciplines, while their possession enlightens, nourishes, strengthens, and energizes the mind. The classics stimulate to imitation; the sciences stimulate to individuality. Those give the student to antiquity; these give him to himself. The classics make hero worshipers; science makes heroes.

The dogmatic teachings of the classics engender blind faith in authorities, and thus smother out independent thought and inquiry. Science, by revealing the causal relations of the facts and phenomena of nature, arms and stimulates the mind to independent inquiry and research; and, thus, fosters independence,—that most valuable element in character,—that essence of true manhood.

"I tell you there is something splendid in that young man who will not always mind. Why, if we had done as the kings told us five hundred years ago, we would all have been slaves. If we had done as the old school doctors told us we would all have been dead. If we had done as our antiquated classical teachers told us, we would have all been mental imbeciles. We have been saved by disobedience; we have been saved by that splendid thing called independence, and I want to see more of it, day after day, and I want to see children raised up so they will have it. Give the children a chance for success. Don't try to teach them something they can never learn. Don't insist upon their pursuing some calling they have no sort of taste or talent for. Don't make that poor girl play ten years on a piano when she has no ear for music, and when she has practiced until she can play 'Bonaparte Crossing the Alps,' and you can't tell after she has played it whether Bonaparte ever got across or not."

Individuality is the soul of success. The men who

achieve the greatest successes out in real life, are those who bristle all over with individuality. Common sense then clearly points to those educational facilities which insure the freest and fullest development of individuality, as the means most potent, in raising the mental faculties of childhood and boyhood to their highest degrees of healthful capability. Straight-jackets for mind and body are known, neither in the family circle nor out in busy life. They are instruments for crippling normal activity, and are peculiar to the asylum and the colleges ancient and traditional.

Education in the family individualizes. The intuition of the mother detects the mental proclivities of the child, and nourishes and directs them in the lines of their peculiar activities. Hence, we see why so many great men attribute their success to their early home training; why, in the zenith of their fame, they invoke blessings on her who paved their way to success. It is she who so energizes the intellectnal faculties of the child that no reasonable amount of the cramping and cramming processes of our traditional colleges can wholly paralyze them. Yes, cramp the mind as you may, corset it as you will with the curricula of these colleges, yet, if not strained beyond the limit of perfect elasticity, individuality reasserts itself, and nerves it on to a success directly proportional to its surviving energies. But let the mind be strained by a classical course till it receives a permanent set Greece-ward or Rome-ward, till the head is charged with antiquated ideas, till the mind is enervated by mumbling over the dry bones of antiquity, and is thus incapacitated to resume its relation with the on-flowing current of events of the age, then, the chances are high that we will behold the pitiable spectacle of it giving the go-by to modern thought and knowledge and

thinning down its intellectual life to a languid nursing of its classical memories. Seeing then that individuality is the inspiring thought of the educations received at home and out in life, I submit, that it should preside over the education in college, in order to make it (education) a continuous process.

Disciplining the student in the sciences, gives a knowledge of, and trains in the use of, the forces, materials, and objects of nature,—things which challenge his attention in boyhood, and force themselves upon him in manhood. Education in the sciences is a continuation of the healthy plastic education of boyhood, and it flows on out into the intellectual life of a productive manhood.

The vicarious discipline in the classics not only involves enormous waste, but it utterly ignores the fact that, the leading out of the mental faculties, which we call education, should be a continuous process,—beginning at the cradle and ending at the grave. The educations received, *first* at home, *second* at college, and *third* out in busy life, are interdependent, and should hence be parts of one harmonious whole. Now, our traditional system of education is neither an outgrowth of the proper education of childhood, nor does it flow on into the intellectual life of manhood; it is a foreign body of thought, a cramping, cramming, distorting process, uncongenial and unaffiliated, thrust into the college period, and destroying the unity and continuity of the mental career.

When forced from the position that the classics furnish superior discipline for the activities of life, the advocates of the traditional system insisted, as a peculiar merit, that it gives "broad culture." Broad culture! Ah, yes! an expression which has that amount of vagueness about it which makes it a convenient shelter for a bad

case. That mind is nearest perfect (*i. e.* raised to its highest degree of healthful capability) whose faculties are fully and harmoniously developed. The traditional colleges have erred in construing full and harmonious development, to mean even development, and to imply varied learning, or, as they express it, in a glittering generality, broad culture. On the first blush, varied learning would appear to promise versatility. If the energies of the human mind were unlimited, and if mental digestion was not a prerequisite to mental assimilation, *i. e.*, if knowledge, merely acquired, brought with it the power to apply it, then we could go on indefinitely inflating the mind with varied learning, and thereby secure versatility *ad infinitum.*

Knowledge is valuable only as it energizes, or as it can be used; but it energizes, and can be turned to practical account only in proportion as it is digested and assimilated. Undigested knowledge has no relative utility, because it cannot be long retained and even while it is remembered it is in that confusion that renders it not available, either in the prosecution of other branches of learning, or in any of the practicalities of life. And unassimilated knowledge has no absolute utility, because it does not nourish the mind, or increase its power of free, continued, and vigorous action. After knowledge is collected, the power of applying it will come by very slow degrees; and, in fact, will never come until something more than mere elements is effectively learnt. This is true of every department of knowledge: First, there is a lower stage in which the student can do little more than collect; second, there is a higher state in which he can begin effectively to apply thought to his collected stores, and thus acquire the power of applying them. When we consider the limited energies which the human mind

can bring to bear, during the four years of college life, upon a curriculum made up of the fragments of twenty or thirty sciences, and languages living and dead, it is obvious, that we cannot within this period get beyond the mere elements,—will not be able to reach those higher states (digestion and assimilation) which give the power of applying these elements. With an attention thus divided, by this crushing burden of distracting studies, it is impossible to acquire that accuracy and originality of thought which are essential to the practical application of stored-up knowledge. It is plain, therefore, that the varied learning of the traditional system is fatal to versatility. The "cramming," necessarily involved in completing the dolly-varden curriculum of the traditional college, is remarkably successful in making the student conceited all the forenoon of life, and stupid all its afternoon. Don't make the mind a junk shop. A student may have varied learning, and yet rank but little above an intellectual barbarian. Not only do different professions demand different kinds of knowledge, but the different ranks of the same profession require different grades of knowledge. There are things, which it is desirable, yes necessary, for a second-class mind to know, which a first-class mind should be ashamed to know. Learning less varied and more profound, is a demand of the age.

Now, as to the true aim of American education being to evenly draw out the mental faculties, and develop them all to the same extent. There is a fine ring in this idea; but it is a musical cheat. It sounds like the truth; but it is a lie. It has been the deluding, misguiding intellectual will-o'-the-wisp in the realm of the American educator for more than a century. And the path of pursuit of this delusive phantom is strewn

with the wrecks of thousands of intellects. Its reactionary effect has been to bring down upon the traditional college the withering rebuke, that its education is a synonym for "a misdirection of the mental energies." To cultivate fully and harmoniously our various faculties, is to bring them up to their full normal capacity, is simply to enable them to energize longer and stronger without painful effort. This is accomplished only by a free and untrammeled development of these faculties, such as is given by our better American universities with optional courses; and not by the planing, beveling, sand-papering, i. e. flattening out, processes of our even-development colleges. Any attempt at even-development is a distortion of the mind's faculties; because, it involves either, a restraining of some of these faculties in their spontaneous tendency to action, or urging others to a degree, or continuance, of energy beyond the limit to which they of themselves freely tend,—a distortion which, by checking or crushing out individuality, violates the order of nature, and is hence subversive of the best interests of the individual, society, and the nation,—a distortion which defeats the ends of true culture, by rendering exact scholarship impossible and by smothering out enthusiasm, and hence balks every idea of advancement and blocks the wheels of progressive civilization. For, by our very constitution, certain faculties predominate in each mind; that is, each person is born with the germs of certain intellectual faculties of various relative intensities; and no amount of true culture can vary their number, or will materially change their relative strengths. And, hence, the *division of labor in the realm of intellect*, is a fixed factor in the world's progress. It advances civilization even more powerfully than does the well-understood *division of*

manual labor. And for it there are two great reasons.

First, that derived from the constitution of the human mind.

Second, that from the nature of truth itself.

First, certain minds, having by nature a preponderance of certain faculties, are peculiarly fitted for the *acquisition* of particular forms of knowledge and their *application* in particular professions. And we find, not only in the school house but through the course of life, each mind—which has sufficient candor to learn itself and sufficient individuality to obey its own inclinations and tastes—pursuing studies in the line of its activity. It is well it is so. It greatly economizes the mental energies. For, by this means all subjects are studied out by *some*, and the *whole community* is made more wise than they would be if the effort were made to keep them all abreast in the march of intelligence. But the division of mental labor is not simply an economical factor in the development of national intelligence, for, the shortness of human life, the limited energies of the human mind, and the vastness of the field of knowledge, render it absolutely necessary to any progress at all. It is only the unprogressive savage man who attempts to play farmer, warrior, tailor, cook, and merchant at once.

A second great reason, for the division of intellectual labor, and for special training, is found, as Dr. Laws has clearly shown, in the nature of truth itself: "All truth is one and harmonious, accordant with nature, at whatever point you take hold of it with a firm grasp. Take our position wherever we may on the circle of knowledge, and we find every radius leads to one common centre. Take hold of any thread of truth, and if we properly follow it out, we will, within our sphere of action, bring the whole body of truth into revelation."

Here we might rest the proposition, that the traditional system does not give versatility. But, in order to reach a final decision as to the relative merits of the traditional and rational systems for giving versatility, let us apply the crucial test: which best prepares for the activities of life, in the order of their importance?

The comparative worth of the different kinds of knowledge is not clearly conceived by the public. Hence, our youth are educated at random, under the guidance of mere fashion or fancy or prejudice. The great question in American education is not whether such or such knowledge is of worth, but what is its relative worth. Before devoting years to some subject which fashion or fancy may suggest, it is surely wise to weigh with great care the worth of the results as compared with the worth of various alternative results which the same years might bring if otherwise applied. The first thing in deciding among the conflicting claims, of various subjects, on our attention, is to settle which things it most concerns us to know, i. e., to determine the relative values of knowledges. To this end, a measure of value is the first requisite. Happily about this there can be no dispute. To prepare for complete living is the true function of education. In directing the energies of youth, subjects and methods of instruction should be chosen with deliberate reference to this end. Our first step in the solution of this problem, is obviously to classify in the order of their importance the leading kinds of activities which constitute human life. They are, *vide* Spencer: 1. Those activities which directly minister to self-preservation; 2. Those activities, which, by securing the necessaries of life, indirectly minister to self-preservation; 3. Those activities which have for their end the rearing and discipline of offspring; 4. Those activ-

ities which are involved in the maintainance of proper social and political relations; 5. Those miscellaneous activities which make up the leisure part of life, devoted to the gratification of the tastes and feelings. It is clear that these divisions of our activities subordinate one another in the foregoing order, because the corresponding divisions of life make one another possible only in that order. And the educations which prepare for these activities, should subordinate one another in the same order of decreasing importance: 1. That education which prepares for direct self-preservation; 2. That which prepares for self-maintenance; 3. That which prepares for parenthood; 4. That which prepares for citizenship; 5. That which prepares for the miscellaneous activities of life. The ideal of education is—complete preparation in all these divisions. But failing in this ideal, as every one must, we should maintain a due proportion between the degrees of preparation in each. Let the attention be greatest where the value is greatest, less where the value is less, least where the value is least. The crucial test of the relative educational worths of the sciences and arts, is their bearing on these activities of life. Instinct wards off the sudden annihilation of life, and slow annihilation is retarded by obeying our sensations, and the teachings of physiology, the second division of our activities, is fostered by the natural sciences and the industrial arts; while physiology and psychology are the best preparatives for parenthood; history and descriptive sociology are the keys to intelligent citizenship; and those accomplishments, the classics and the fine arts, which are the efflorescence of civilization, should obviously be wholly subordinated to that scientific knowledge and discipline in which civilization rests; and as they occupy the leisure part of life, so should they occupy the leisure part of education.

A simple inspection of these two curricula shows that the rational one, both in the choice of, and in the arrangement of, its subjects best prepares for these activities of life; because, it fosters these activities in the order of their importance. A trial by the above standard works disaster to the curriculum of the traditional college. It discloses its impotence for fostering life's activities, and thus reveals the cause of its disastrous effects on our civilization. This system has not only erred in the choice of its subjects, but its arrangement of them is most illogical. By dismissing the natural sciences and the exact, and the other useful arts with a minimum amount of attention, it has failed to meet efficiently the different requirements of modern society. And by placing these natural sciences at the top of its curriculum and the abstract sciences at its bottom, it has got the principles of architecture quite reversed, turned up side down; has got the cart before the horse; has thrown the parts of its curriculum all out of joint.

The traditional college is of English parentage and model. Our politics threaten England, and her educations threaten us. Directly traceable to the influence of England on our educations, home and college, are the three great evils which now afflict our institutions and intensify our social distresses. There is a defect in our system of domestic training; a mistake in our method of college education; and a blunder in our system of university training. Parents fail to bring up their children to be self-reliant and independent; colleges fail to educate them in the lines of their mental activities; and universities fail to train them up to useful trades and professions. And hence when the invention of a new machine or the pressure of hard times, forces them out of their accustomed employment, with weak power of indepen-

dent thought, and hence no power of adaptation, they degenerate into vagabonds and tramps,—idlers in a land of work, starving in a land of plenty. What America needs is a generation of young men more thoughtful and more practical; so that if tossed ever so high they will, cat-like, alight on their feet. Now, what forces put to work will trot such young men out upon the stage of action? The cause of the evil once clearly defined will suggest its own remedy. Our traditional universities and colleges have ever, with an encouraging pat on the head, said "now boys spread yourselves." Inflation has been the order of the century in education, as it is now the order of the day in our currency. Now note, if you please, what this has begotten in the restlessly active American mind: A bolting down, without mastication, of itsscientific and literary food, with its legitimate consequence—indigestion. And to-day, we are a nation of mental dyspeptics, suffering with scientific and literary indigestion. These universities and colleges, of a decade ago, had degenerated into patent machines for turning out that pitiable class of human minds commonly known as jacks-of-all-trades—masters of none. Their educations had gone on diverging from the practical affairs of life until they had gotten out of joint with the times. They had not kept up with the changing conditions and requirements of society; and had hence fallen in the rear of our civilization and become drawbacks to improvement instead of promoters of progress. The march of science, the march of intellect, and the march of civilization are inseperable concomitants, but the part played by the classics, in this march too often reminds us of Dick Dead-Eye in Pinafore.

The typical traditional "college has been a place where a prescribed course of study, largely devoted to Greek, Latin and

Mathematics, with a brief introduction to historical, political and ethical sciences, has continued during four years, and led to a bachelor's degree. Daily recitations, and residence within the college walls have been maintained. One of the first innovations was made when the University of Virginia allowed its scholars to elect their own courses, gave prominence to examinations, and laid no stress on the system of four year classes. Nearly a quarter of a century later Cornell University sprung at once into great prominence, by the freedom with which it threw off traditional fetters, allowing great freedom of choice of study, introducing abundant means of illustration and practical laboratories, engaging non-resident professors of distinction to supplement the ordinary teachers, and favoring technical instruction in the useful arts as well as general instruction in the liberal arts. And threatened, as they were, with annihilation by an advancing civilization, Yale, Brown, Rutgers, Dartmouth, Princeton and other of the older traditional colleges patched up their old curricula with new courses in the modern sciences."

And of those traditional colleges which have, from inability or unwillingness, failed to modify their courses to meet the changed conditions and requirements of society, all are feeble and struggling for continued existence. And, as one by one, they expire, in the mortal throes of agonizing death, we hear them cry, "the universities and professional schools killed us." But this is not true. Their's is the death of the suicide. They die of anæmia. It is the province of the American college to furnish the kind of education which the American youth of this age requires and demands. They either misconceive their work, or ignore public opinion, and their fate is inevitable. They disregard the fact, that obedience to the voice of the people is the *sine quo non*, the requisite indispensible, of the life of an American college; and public patronage, their life-giving sap, is withdrawn, and, year by year, they drop withered blooms from the tree of American education.

"But by far the boldest innovations which have been made in

any traditional college, are those inaugurated at Harvard under the administration of President Eliot. The interior working of that institution has been remodeled, and great freedom of choice (extending to the modern departments of science, as well as to literature, history and philosophy) is now permitted to every student, with results which appear to have dissipated nearly all doubts as to the wisdom of the plan, and to have attracted increasing numbers of students."

The State Universities of the West—the more prominent of which are, Michigan, Missouri, Wisconsin, California, Iowa, and Minnesota—were created to meet the demands of Western American civilization; and, embody, in the main, the features of Virginia and Cornell Universities. They are the great nurseries of the productive industries of our country.

These modifications of the American colleges are likely to be attended with the best results, for they accord with the best experience of other countries. It is the pressure of public opinion, the direct interference of the will of the people, that is remodeling our universities, by giving the necessary free scope to useful science and ingrafting the utilitarian into their curricula; and thus, making them correspond at once to the spirit of our Republic and the wants of the people at large. For emphatic evidence of this, look at their courses of study; the classics and the pure mathematics no longer monopolize all the student's time or the university's prizes and honors. Their courses now bristle with life and living science. And as an earnest of the thoroughness of the reformation and an assurance that the good work will go bravely on, look at the character of the minds which have been called to the presidential chairs of the great universities of our land. From a contemplation of these minds a wholesome lesson may be learned of the tendencies of Amer-

ican thought and of the enlightenment and health of this reformation. Who are they? Look at them, from Maine to Texas, from Maryland to California, and answer, whether they are exponents of exploded creeds, back-feeling crabs, or worshipers of the dry bones of antiquity? No; they are possessed of the dread responsibilities of the present. Do they flaunt in your faces thread-bare thoughts in languages dead and half forgotten? Their's is a nobler work. In the majesty of our mother tongue, they give us thoughts that breathe in words that burn. Why is it, that Eliot is at Harvard; White at Cornell; Bascom at Indiana University; Laws at Missouri University; Gilman at John Hopkins; and Leconte at California University? Not simply because they are walking cyclopædias of classical lore, but rather because they are men full of live science and well up to the age.

The Missouri University of to-day and the one of past days, are radically different institutions. The time was, when it was a mere college for higher general culture; it is now a university in the true, i. e., the American acceptation of the term. Formerly higher education in this university was up in the clouds. Franklin proved the identity of the lightning of the clouds and the electricity of the laboratory; and Rollins, with other far-seeing Curators, and Read and Laws proved to Missouri the identity of the electric energy of the higher education with the energy of the useful professions. In their hands the professional schools of medicine, law, agriculture, pedagogics, and engineering, have been the kite, the string, and the key, with which the electric energy of higher academic culture, has been conducted silently and effectively down; and vigorous life thereby infused into the useful professions. Under

their management higher education in this university is striking roots in the useful professions of every-day life: —It is raising the standard of medical education; it is redeeming the bar from the imputations of ignorance, so justly heaped upon it; it is increasing Missouri's power of production, while preventing the exhaustion of her soil, by teaching her farmers economic agriculture; it is improving her system of public education, by recruiting the ranks of her ten thousand district school teachers, with the flower of her youth; it is spreading the knowledge of engineering, and thereby utilizing and husbanding her vast material wealth, and providing, by the improvement of her great watery highways, cheap transportation for her surplus products; and lastly it is strengthening the bulwarks of national liberty, by diffusing a knowledge of the arts of war among her citizens. This university is being redeemed from apparent remoteness and intangibleness, by bringing it into articulate connection, below, with the high schools, academies and private colleges of the state, and above, with the useful and glorious professions and the great scientific services of the state and nation. It thus becomes, not only the crowning glory of the state system of education, but also, the gymnasium in which are trained; first, not accomplished drones, but active, live men, with brains and muscles capacitated for intelligent productiveness in our four great industries; and second, those minds and hands which will perforce assist in purifying and chastening the public mind in the fine arts, in planning and constructing those great engineering operations and works of state and national importance, and in constructing the maps of the American continent, topographical, geological and agricultural.

There are moments in the life of a man when his

destiny stands trembling in the balance—choosing a profession is such a moment in the life of a young man. Upon this choice many a promising youth "strands his bark, and the rest of the voyage of life is bound up in shallows and miseries." I must beg the attention of young men, who have not chosen a profession to the following: *The field of labor* before the young engineer is broad and the reward is bountiful. We, in Missouri, are particularly blessed in having those broad-backed, untiring commercial carriers, the Missouri and Mississippi, flowing by our doors, and beckoning us to load on our surplus products, and they will carry them out on the world's highway free of charge. Nature has given us these noble rivers—the government recognizes it her right and duty to survey and improve these great commercial highways—and the Missouri University recognizes it a duty, which she owes the nation, owes the agricultural, mining, manufacturing and commercial interests of this state, owes the young men of this state, who have natural engineering ability, to provide departments for a diffusion of a knowledge of engineering arts and sciences—so that these young men may assist in surveying these rivers and solving those great problems of hydraulic engineering of state and national importance—solutions which will enable us to utilize that immense—now wasted—energy, "gravity," and thereby secure that great desideratum of the west, "cheap transportation."

And, besides, we have old roads to improve and new roads and bridges to build, and on them yearly expend untold thousands. Yet, it is a painful but patent truth that nine-tenths of the county surveyors of the state cannot, from sheer ignorance of the engineering arts, lay out and construct a road between two distant points on the shortest and cheapest route. Over our

creeks and small rivers we yearly see bridges built which fall by their own weight. A knowledge of the first principles of strains and strength of materials would preclude the possibility of such humiliating catastrophes.

We have also forests to be utilized and marketed, and immense hidden mineral wealth of coal, iron, lead, &c., to be developed and mined. And who but the competent engineer can do this economically and successfully? *The United States government* has under way surveys and improvements which it will take half a century to complete. She has now in progress trigonometrical, topographical, geological and magnetic surveys of her territories, and trigonometrical, topographical and hydrographic surveys—and improvements—of her rivers, coasts, and bays and great lakes; and on these she wants your surveying and engineering skill. Many of *the states* have underway trigonometrical, topographical, geological and agricultural surveys; and the inauguration, in the near future, of these surveys in the state of Missouri is clearly foreshadowed, demanded as they are by the multiplied wants of an advanced civilization.

The above surveys and improvements are now going forward and very few of the young men of Missouri are taking part in them. Like "the foolish virgins," they are caught without oil in their lamps, without special fitness for the work by previous study and training, and are hence forced to sit quietly by and see surveyors and engineers brought from Germany, England and the eastern states to survey and to improve our numerous rivers and survey and map our state and national domain. The young men of Missouri are allowing golden opportunities to glide by them. It is no fault of the United States government that there are not scores

of Missouri's sons now enjoying high, honorable and lucrative positions in the great scientific services and surveys of the nation. She stands ready to employ the competent. Ah! the heart grows faint and sick to see the amount of natural—but undeveloped—engineering ability which goes out from our universities and colleges yearly and wastes its sweetness on the desert air.

Foreign nations are anxious to employ you. Are not American surveyors and engineers now in the highest offices in the Japanese coast survey? Are not American generals and engineers heading the army of the khedive of Eypt? Are not American astronomers and engineers building the railroads and manning the observatories of the South American republics? Yes American surveying, astronomical and engineering talents command a premium in foreign markets. There are, in the American—and especially the Western American—minds a fertility of resources, a power of adapting means to ends, and an acuteness of perception which peculiarly fit them for observers, planners and executors in the surveying and engineering arts, which make them emphatically the best astronomers, surveyors, and engineers in the world. Make yourselves thorough in the theory, and expert in the practice of either astronomy, geodesy hydrographic surveying, civil engineering, or topographical surveying and you will not have to hunt positions; for, positions hunt such men as these. The world is waiting for these men.

To enable young men of Missouri to prepare themselves for labor in these inviting fields, the Missouri University established an *Engineering Department* which is in successful and growing operation. The courses are: I. Civil engineering. II. Topographical engineering. III. Military engineering. IV. Surveying. Each leading to its appropriate degree (and diploma).

The course in civil engineering is designed for those who wish to make either road and railroad engineering, bridge construction, or river improvement, a specialty. The course in topographical engineering is arranged for those who find distasteful the higher analytical mathematics, and who show instead special aptitude for the surveys and improvements of rivers, lakes and coasts. The course in surveying fits young men for navigation, practical astronomy and the United States government trigonometrical, topographical, geological, magnetic, coast and river surveys, all of which are now under way. The course in military engineering is essentially that of the United States military academy at West Point. This department now offers a complete theoretical and practical treatment of these great subdivisions of engineering and surveying. Its design being to turn out practical surveyors and engineers, a practical application, in the field, of every theory is required. Active efforts are made to secure the surveying and engineering graduates positions, and with gratifying success; a number of them are employed on the work of the U. S. A. engineer corps.

Why is it that the large majority of our educated young men can't support themselves? are either, relying upon "fathers" to take care of them, or, as Dr. P. Yeaman expresses it, "are anxious to become apron-string pensioners;" would starve if tossed into the world and forced to take care of themselves! Is it not the "glorious inutility" of the education which our so-called colleges give them? The great majority of our colleges provide the people with only limited elementary and vague theoretical instruction, totally insufficient for the mechanical uses of every day life; and thus utterly fails to stir up, to stimulate the intellect, to develop and make it susceptible of higher impulses. Among the immense majority of American students, a kind of mental collapse follows the sparse instruction received in these colleges. This faulty course of education generates stagnation, checks or crushes out the civilizatory spontaneity of the masses. The chronic indifference thus produced in

the masses, to any instruction beyond the coarse rudiments, has resulted in long protracted and various social, political, and governmental depressions. It has done more: flooded our nation with non-producers,—drones in the hive of humanity; and filled our land with tramps and crime. Now let this brood of parasites (viz.: counterfeiters, lottery operators, confidence men, corrupt legislators, barterers in justice, and thousands of other callings more despicable than the lowest activity in the scale of honest labor) hang on to American society, and multiply, for another decade,—let crime continue another ten years at fever heat—let red-handed communism strike down the rights of property, and then indeed, will we see American Liberty go out like a blazing comet in a sea of blood.

The best methods and systems will, however, be inefficient until the spirit shall awaken and stimulate the man from within. That, and only that, has a healthy growth which grows by itself, by its own vitality. Give the mind an insight into the applied sciences and you imbue it with a life-long enthusiasm. The outer or merely theoretical circle of applied science is the deadline of intellectual progress. Fall short of it and your life is a failure, fall within it and success is yours. It is *here* that God has wrought his wonders to perform,—it is *here* that are found the main-springs of the world's progressive civilization. Now our traditional colleges have ever pushed the applied sciences into the background, utterly oblivious of, or ignoring, the fact that the application of the sciences, in the exact and the industrial arts, completes genuine American civilization,—fixes the material and social prosperity of the whole country. American civilization is the result of bringing the united exertions of science and industry to a direct and constant

bearing on the requirements of the millions. Every industrial pursuit is a science in itself, and, to become really productive, ought to be carried out scientifically. Unfortunately, the science which we learn at college, is too apt to be left at college. Take it home with you; carry it about with you, and apply it every day.

"That son is not truly educated who cannot grow more corn on the acre than his unlearned father, and grow it with less labor. That educated daughter has received a mistaken and superficial training, if she cannot excel her mother in making soap, or cheese, or butter. All these are chemical processes, in which her education should render her an adept far beyond any untaught person. That educated horticulturist, whose garden is not better, and whose fruit trees are not more thrifty and productive than his illiterate neighbor's, sadly discredits and damages the cause of education."

When I address myself to the young men who are preparing themselves for that profession, the most glorious of earth, the ministry. Ah! here, I touch upon sacred ground. Stepping from the lecture room, where you learn to read the book of nature, into the pulpit you step from the grand to the sublime! The knowledge you have of nature must not be a vague indefinite knowledge that in all creation there is wisdom; but rather a conscious knowledge,—a glowing, intelligent, burning conviction of the wisdom of the structure of the universe. It will not do for you to have simply a hear-say knowledge that the bee constructs its cell in a geometrical figure the strongest and most economical of space and material; that the wheat stalk is fashioned into the shape the strongest possible with the given amount of material; that the hawk in his swoop for a chicken describes a cycloid, the curve of swiftest possible descent; that a ray of reflected light traverses the shortest possible path; that God employed but three curves

in the mechanism of the heavens, the ellipse, the parabola, and the hyperbola. Let your conviction of such of nature's truths flow from a conscious knowledge, a power to prove them, and then indeed will you be able to send the conviction home that the earth, the air and all therein proclaim, and the heavens bear witness of a transcendently intelligent first cause. Having traversed the road yourself, you can lead the doubting up through nature to nature's God. You say you will not study the open book of nature. A great, a fatal mistake! You ignore the design of God. He has given you two books of revelation—*His word* and *His works*. The reformation remains but half completed till to the free and intelligent reading of the *imprinted* book, is added the intelligent reading of the *impressed* book, the book of nature. Reading the book of nature is not a mere matter of choice—it is imperative! The health and life of our physical organism depend upon it. Is not the edible mushroom planted by the poisonous toadstool? and the luscious grape hung by the deadly berry? Some Botany, it is obvious, must be learned. And electricity the world's subtile nerve force, will pulsate a maiden's whisper under oceans and across continents when handled with intelligent care; but handle it with careless ignorance and see how quickly it will shock you! yes, shatter every bone in your body. And steam is a harmless, docile slave in an intelligent hand, but a rebellious fury in the hand of ignorance. But do you say you will learn enough of these sciences to preserve life and health, and no more? You then discard the second book of revelation, teeming with the grandest intelligence, power, and wisdom of the first great cause. You forget what relation you sustain to the government of God. You stand as the interpreters of His *words* and

works. Ah then, how can you look upon the face of nature, without blushing for your ignorance of the beauty, harmony, intelligence, and power there displayed? Send your spirit forth through the works of God, and it will catch an inspiration which will make your very thoughts syllogisms, your every utterance conviction. The Author of the universe has so intended. The days of miracles are past. Those inspired directly from heaven are no more. The word and works of God are the fountains of inspiration of His interpreters in this day and age. The christian religion is not a mere thing of fancy of disappointed old maids, love-sick bachelors, silly old women, or half-witted old men. It has a deep under current of pure philosophy and reason which challenges the study, the wonder and admiration of the wisest and brightest of earth. It is applied science which enables us to draw aside the veil from the face of nature, and view in its grand simplicity, the order, harmony, and wonderful economy of force and material which the Architect of the universe has set forth in his works. How few, oh very few! of the young ministers of the Gospel ever lift the veil of this inner temple of God's works—who ever enter this holy of holies of the material universe.

"The true work of the educator is to act the part of gleaner. The best schools and educational facilities of to-day are certain short hand processes to help the student in gleaning the field of knowledge and selecting a specialty." The true work of the teacher being to glean the field of knowledge, he must possess the power of analyzing, that is, explaining the reason, use, and connection of every part of the subject. Mere book learning in the applied sciences is a sham and a delusion. What the teacher here teaches, unless he wishes to be

an impostor, that he must first know; and real knowledge in the applied sciences means a personal acquaintance with the facts, a conscious knowledge of the subject. He must have the rationale of his subject, so that he can carry to the waiting mind a conviction of its truth, and connect that truth with the duties of life. That teacher of any one of the Exact Arts is a success or a failure in proportion to his ability of ferreting out, and holding up to inspection, that central thread of common sense on which the pearls of analytical research are invariably found strung. For until the teacher does this, his own spirit is not illumined, and hence he cannot come before his class with his mind all ablaze, shedding living light on his subject. And to acquire the good will of his pupils it is not necessary that he shall be a fawning sycophant, cowering for a smile. There is that which is far more potent: a hearty, open, up and down enthusiasm for the subject of his teaching. We have, in the career of every live teacher, a forcible illustration of this idea, and a living testimony of the patent truth in the saying of Josh Billings, that, "a live man in a University is like the itch in a district school—puts everybody to scratching."

Force of character in a teacher, is no less important than this enthusiasm. 'Tis spirit that responds to spirit, mind that acts on mind, character that impresses character, hence, it is disastrous to subject the plastic mind of youth to the influence, the tuition of a mind without force of character. To breathe the atmosphere of such a mind is contamination, to touch it is disease, and long contact with it, is intellectual death.

That the student possess enthusiasm, is not enough. It must be a healthy enthusiasm. An enthusiasm for a profession which he can master—an ambition to accom-

plish that which is within his reach. To attempt more, or aim higher, is spending your strength beating the winds. Don't shoot at the stars. Let's first measure our strength, then aim at a mark the highest, which we have a reasonable hope of attaining, ever bearing in mind that we Americans are prone to overestimate our mental powers and physical endurance. We all imagine we are born either for the Court of St. James, the halls of Congress or the White House. Missouri is full of young men who have their eyes on marks which, if they would but measure their mental calibers, they would see there is not a ghost of a chance of their ever attaining. "O wud some power the giftie gae us, to see ourselves as ithers see us." Do I hear the objection that perhaps hidden powers of mind are possessed? Don't deceive yourselves, young gentlemen. If you have the promethean spark within, you are conscious of it,—just as conscious as you are of the muscular strength of your arm.

To the idea that every American is a born lawyer, doctor, orator, or statesman, and the consequent rushing into the glorious professions, as they are called, law, medicine, and politics, is due the failure of so many. Those minds and hands which the nation needs, and whose exertions will be paid and applauded, are not the plodders in the lower walks of the glorious professions; but instead, those brains and muscles which have the faculty, habit, and inclination of thinking logically and quickly, of putting two and two together and their shoulders to the wheel. But are you determined? then go on! ignore the useful professions! make petty-fog lawyers, quack-doctors, one-horse preachers, and politicians, and see how quickly the world will put you on half-rations, or send you to the poor house. "The

offices of life are mainly humble; and the mental powers and capabilities of students are mainly humble." The sooner we see this truth clearly, and act upon it, the sooner we place ourselves in the way of becoming producers in the hive of humanity, useful to the world in our day and generation.

"As a matter of fact and experience it is found that a student usually accomplishes very little until a settled and definite purpose presides over his movements. The energies of youth are limited and hence to qualify them for life's work, which is the great aim of scholastic education, as much definiteness as practicable should be given to their energies to save them from waste." There is not enough definiteness of aim among the American students. We find among them too many *cross-eyed minds*,—minds which, when they bend the bow to shoot the crow, kill the cat in the window. The average American student at college has a burning desire to acquire everything in general, but nothing in particular,—to go everywhere in the whole realm of literature, language, and science. They are in a great hurry to go somewhere and get something, but "where" or "what," they too often know not. It is this indefiniteness of aim, this vacillating purpose, which develops them into the intellectual Don Quixotes of our country, who are ever charging upon imaginary intellectual knights, ever attempting the impracticable and the impossible. While it is those minds who, knowing their powers, work in the lines of their mental activities with a definiteness and fixedness of purpose, are the soldiers in the army of civilization. Cultivate force of character if you would be of the higher order of men. The two grand divisions, alike of animals and men are *vertebrates* and *invertebrates*. Vertebrate men have a back-

bone, and invertebrate men have none,—but a long strip of cartilage where the back-bone ought to be. Those we admire, these we pity and despise. A man without back-bone, a vacillating, double-minded man is, in business, a failure: in the army he is a blunder; in the navy he is a Sinbad; in the coast survey he is a cooker; in science he is a smatterer; in the mechanic and the exact arts he is a bungler; in agriculture he is a dabbler; in medicine he is a quack; in the pulpit he is a narcotic; at the bar he is a shyster; in politics he is a demagogue; in the forum he is a buncombe; in the presidential chair he is a tool in the hands of scheming politicians; in painting he is a dauber; in poetry he is a rhymster; in music he is an automaton; in the drawing room he is a fawning sycophant, cowering for a smile; in the editorial sanctum he is a scribbler; in the faculty he is a stumbling block; in the school room he is a failure, yes, worse, he is a curse, he is a crime: In his essence he is a fraud. In this life, his, is endless trouble and vexation of spirit; and in Heaven,—w-e-l-l—he is not admitted there:—James I, 6-7: "He that wavereth is like a wave of the sea driven with the wind and tossed. For let not that man think that he shall receive anything of the Lord."

By the meagre instruction of the traditional college and by its perverted order of attempting to evenly draw out the mental faculties, and by its insane effort to mould into one form the minds of all the pupils, not only has the entire public mind been dwarfed but thousands of intellects have been, and are continually murdered; and to shield their own inefficiency and that of their system these teachers pronounce over the masses a condemnatory verdict of imbecility, by such truisms as, "we can't polish brick-bats, nor draw blood out of turnips."

Our rational universities with their professional schools, made the first lift, the first effort to restore to each individual the use of his peculiar mental faculties, by bringing within easy reach the fertilizing means of instruction in the line of each mind's activity. The particular spark latent in each human creature is being enkindled, and the dignity of humanity redeemed in the masses. On the extension of these professional schools, depends the true progress and all-embracing civilization of the people.

That agriculture and mines furnish the raw material for the life-blood of our nation, which manufactures digest, and commerce distributes to every part, are propositions indisputable,—are political axioms, self-evident upon the mere statement. Agriculture and mines are the feeders, manufactures the stomachs, commerce the veins and arteries, and the telegraph wires the nerves of the American nation. We can, hence, see that the four grand pillars of our state prosperity are so linked in union together that no permanent cause of prosperity or adversity to one of them, can operate without extending its influence to the others. Now, in a healthy nation, leaving out only some very small classes, what are all men employed in? They are employed in the production, preparation, and distribution of commodities. Is it not then clear, that the true work of the American universities, in their special schools, is to foster these great national industries,—by forming, not "hewers of wood and drawers of water," not ignoramuses who will place themselves in competition with modern machinery, but rather enlightened members of the body politic, productive members of the community; skillful, well-informed practical artisans, operatives, agriculturists, and artists in the industrial and exact arts. It is these men, full of live

science and its applications in the industrial and the exact arts, who are at once the masters of the situation, and a demand of the age. In fact, the American universities have already made professional education a successful and important part of their service to the public.

"It is, says Prof. Eliot, a function which we have acquired within this century, have found very useful and propose to enlarge. To us a relinquishment of this power by Oxford and Cambridge, seems a loss of power and an injury both to the universities and the nation. The abandonment by the English universities of the great field of professional education is one of the most noteworthy things in their history. Formerly, they, like the continental universities, had faculties of theology, law, and medicine; but the professional instruction in law has been practically abandoned by them for generations; while even in theology their meagre provision of systematic instruction has lost them the control of the Anglican clergy. Professional education in law and medicine long since left Oxford and Cambridge and went to London, where neither legal nor medical education has been satisfactorily provided for."

England is fifty years behind Germany in her educational facilities. The German gymnasium with the University, the German Realschule with the Professional School, are the life and lights of that nation which has within twelve years arisen in her colossal grandeur, and assumed her place as the arbiter of the destinies of Europe. And they stand now beacon lights upon the mountain tops to guide the educational efforts of the world. The American Universities, profiting by the blunders of the English Universities, are incorporating professional schools into their curricula.

The following historical matter is from Prof. Gilman in *North American Review*, 1876:

"The earliest professional education in this country, was given by the clergymen, lawyers, and physicians, each in his own way and own study, without any refer-

ence to an academic examination or degree. The imperfection of such means of education gradually led to the establishment of schools, which were technical training-places for lawyers, ministers and physicians. One of the earliest and best of law schools was begun in Litchfield, Connecticut, by Judges Reeve and Gould in 1784, and maintained for many years—drawing to its instructions young men from the most distant parts of the land. In 1794, Chancellor Kent delivered his introductory lecture on law in Columbia College, N. Y. In 1816 Harvard appointed a professor of law. The Law School at New Haven was organized in 1824, and remained a private institution until 1846, though a professorship of law had been maintained in Yale College after 1801. The University of Virginia began a law school in 1825. There are now thirty-eight schools of law.

"It was during the Revolution that the first steps were taken at Cambridge for the introduction of the study of medicine, and a plan for the establishment of three chairs relating to medicine was presented to the Corporation by Dr. Warren in 1782. The Medical school at New Haven was begun in 1813; the College of Physicians and Surgeons in New York dates from 1807. There are now seventy-four schools of medicine, besides eleven dental and fourteen pharmaceutical colleges.

"The Catholics maintained a Theological school at Baltimore as early as 1791, and another at Emmitsburg in 1808; the theological school was founded at Andover in 1807, at Princeton in 1812, at Cambridge in 1817, at Bangor in 1818, at New Haven in 1822, though in the colleges last named, theological instruction had, for a long time previous, been given to graduates. Now

there are 113 theological schools. It is thus apparent that one of the earliest intellectual movements of the Republic was the organization of professional schools.

"One of the most important modifications in the higher education has been the growth, within the last twenty-five years, of special schools of science. For a long period the United States Military Academy at West Point, founded in 1802, was not only a school of military engineering, but was the chief place in the country for the training of topographical, hydrographical and civil engineers. In 1826 the Rensselaer Polytechnic school at Troy was incorporated, and under the guidance of Amos Eaton quickly exerted a strong influence in favor of what has been called in later days, the New Education. About twenty years later the foundation of the Lawrence Scientific school at Cambridge, and the accession of Agassiz to its staff of teachers, gave the next impulse to scientific education, and soon the Yale, now the Sheffield Scientific school began its career. Now, most of the older institutions and the State Universities of the West, of which, Columbia, Princeton, Dartmouth, and Pennsylvania University (and the Universities of Michigan and Missouri) are conspicuous examples, announce their special courses in engineering and other departments of science. The Stevens Institute at Hoboken, distinct from every other foundation, has made a specialty of mechanics and physics." Many of our best geodists, astronomers and topographical and hydrographical engineers have received their training by service, during a term of years, on the United States Coast Survey.

"In 1862 Congress appropriated a very large portion of the national domain for the encouragement of scientific instruction. The act is known as the 'Agricultural College Act,' but its pro-

visions include the sciences relating to agriculture and the mechanic arts, not excluding literary and classical studies. Its intent was to give an impulse all over the land to those studies which have the most obvious relation to the development of the national resources, and which will fit young men for modern scientific professions. Its effect has been remarkable. Notwithstanding occasional infelicities in the plans of operation adopted by some of the states, the general influence of this endowment has been excellent. In some of the older eastern states the national grant was sometimes given to the support and development of institutions already begun, as at Providence, New Haven, Burlington, Hanover, and New Brunswick. In Massachusetts it was divided, a part going to the Institute of Technology in Boston, and a part to the Agricultural College at Amherst. In New York this gift gave strength and vitality to Cornell University, and enabled it to spring at once into a position of conspicuous influence." In a few of the western states this national bounty went to the State Universities, to found agricultural colleges, as in Missouri, Wisconsin and Minnesota. "The southern states, in consequence of the war, were slow to receive the benefits of the Act; but throughout the North and West, institutions aided by this grant are now in full progress, and usually with results which are better than even the friends of the enactment anticipated."

The American Universities are incorporating professional schools into their curricula; but they are committing the fatal blunder of attempting *to teach the arts without putting them into practice.* And our Polytechnic schools and Military Institutes are falling into the same *error.* I quote from the Report of the special Examining Board of the Virginia Military Institute, Lexington, Va., July 1st, 1875. The Board consisted of Prof. Chas. Davies, Maj.-Gen. W. F. Barry, U. S. A., Prof. D. H. Cochran and Gen. J. W. Grigsby:

"The theoretical instruction, and resulting discipline, in this department must be excellent; but, the committee would suggest the importance of concrete examples, and that frequent exercise in obtaining by actual surveys the data for the application of the formula, serves both to elucidate the formula and insure their

ready and accurate application in professional life. In the opinion of your committee the course in Civil Engineering would be strengthened by increasing the proportion which the field work at present bears to the theoretical instruction."

Now, in the light of experience, in the light of common sense itself, I say, if the American Universities would heed this idea of the practical—this idea of uniting *manipulative skill* with *theoretical instruction* in these professional schools, then would teaching the Exact Arts cease to be the vexed question it is.

If the farmer produce by mistake articles, of a quality which others do not want, or in a quantity greater than the demand of the market, then he suffers serious loss, it may be ruin, by his products rotting unused. The necessity is equally great for the professional schools to study closely, the markets for their products, the demands of the industries and professions. They should keep in view, the quantity and quality of the demands of the markets, when pointing out to their students the most promising and most important directions of labor and thought in the industries and professions; should never loose sight of the fact that they are manufacturing for these markets.

For Americans, the best education is an inspiration more than an acquisition. It comes not simply from industry and steady habits, but far more largely from that kindling and glowing zeal which is best begotten by familiar contact with large libraries and museums, and by constant intercourse with students of the same pursuits and the same ambitions and with enthusiastic specialists. It shows itself not so much in the amount the possessor has made himself master of, as in the spirit which he takes what he knows and goes out with it to grapple with his life work. American education is im-

portant, not so much for what it does for the pupil, as for what it enables him to do for himself. The sooner we make a youth pursue a course of culture for himself, the sooner we graduate him from our colleges. By preparing him to take his education into his own hands, we give him the benefit of a perpetual self-education. The pride of America is her self-educated men. Self-determination is aimed at in our universities, not only in the theoretical sphere, but in the sphere of the will. Our best universities only prepare a man to take his education into his own hands. And he is best prepared for this, who has the power of exact and original thought, joined to the enthusiastic spirit. The course of study which best gives these, is a *thorough knowledge, theoretical and practical, of one or two of the subjects of a rational college curriculum, added to an elementary knowledge of all its subjects. This makes a richer, stronger, and more fruitful mind than a superficial acquaintance with each and all of them.* This, is the education obtained in *the professional school of the American university.* Professional education; 1. gives accuracy of thought; 2. it awakens a healthy and life-long enthusiasm for the pursuit of knowledge; 3. it gives versatility, *the remedy sought for in the readjustment of vocations*; 4. it conserves and improves our civilization.

Professional studies best give precision of thought and accurate knowledge. Here knowledge must be put into practice; and no slip-shod half-way knowledge of a subject gives that clearness and precision of thought which is necessary for putting this knowledge into practice. "Every such study has a practical bearing, and in the students mind is invested with a strong sense of responsibility. Hence springs an idea of moral and phys-

ical obligation to be faithful and thorough. The noblest fruit of education is this sense of responsibility and accountability. With its acquisition the youth becomes a man, the 'unwilling school-boy' enters upon what he feels to be the serious work of life.

"The special merit of an office education,—i. e., the training to be gained in a lawyer's, doctor's, or engineer's office, in the counting room, or in a factory—is due to the fact that there the student deals with the problems of real and not ideal life. The obvious importance of every step in a process stamps it ineffaceably upon the mind. This is equally true of the studies in a professional school."

A professional education awakens a healthy enthusiasm for the pursuit of knowledge. Now, there is in every branch of knowledge a beginning, a middle, and an end. A beginning in which the student is striving with new and difficult principles, and is relying in a great measure on the authority of his instructor; a middle in which he has gained some confidence in his own powers, and some power of applying his first principles. He has as yet no reason to suppose his career can be checked. Let him proceed, and he will come to what is called the end of his subject, the commencement of a region which has not been tracked or surveyed; and here his mind will either come to a dead stand-still, or go forth on voyages of original investigation and discovery.

What is a student when he graduates at our colleges? Is his education then finished? Is he to pursue no branch of study further? Nay does not a practical business career open upon him immediately? The lawyer, physician, engineer, or teacher in order to be a finished lawyer, physician, engineer or teacher must be

able to investigate his subjects up to the boundaries of knowledge. Seeing then that the future business of life will require knowledge of the way to "go through with" a branch of inquiry, I submit that such a process should form in one instance at least, the exercise of college years. Convince the mind by one example, and the similarity which exists between all branches of knowledge will teach the same truth for all. Going *through with* at least one subject, as we do in a professional school, will accomplish a two-fold purpose: 1. it will awaken the mind to a wholesome and just estimate of its powers; 2. it will imbue the mind with a healthy enthusiasm for the pursuit of knowledge,—an enthusiasm which will enable the student to carry his other studies up into that higher state of knowledge where the mind can effectively apply thought to its collected stores, and thus prepare it for those sublimest of intellectual efforts—discovery and invention. There is something inspiring in the upper regions of knowledge as, of the atmosphere. And as the old eagle takes her young eaglets to the mountain tops when training them to fly, so must the teacher take his students up into the higher regions, up to the boundaries of knowledge when teaching them to fly,—when starting them out on voyages of original investigation, discovery and invention.

Professional education gives versatility. Experience has revealed (and mental philosophers explained) the following phenomenon,—that men who have given deep attention to one or more liberal studies can learn to the end of their lives, and are able to retain and apply very small quantities of other kinds of knowledge; while those who never learned much of any one thing, seldom acquire new knowledge after they attain to years of

maturity, and frequently loose the greater part of that which they once possessed. Now, it is the professional school of the American University that gives deep attention to one or more studies, that gives a thorough knowledge theoretical and practical of one or two of the subjects of a rational curriculum, added to an elementary knowledge of all its subjects, therefore, it is this professional school that best gives versatility.

Professional education best conserves and improves our civilization, because: 1. It gives precision of thought, and awakens enthusiasm, and thus meets the ends of true culture; 2. It secures the highest skilled activity of each individual, and gives him versatility in life's activities, 3. It gives a knowledge, theoretical and practical, of those sciences and arts in which civilization rests.

But is it objected that students and professors in these professional schools will become hardened one-sided bigots? This is impossible for a mind which breathes the liberalizing atmosphere of a university of associated professional schools. By mere absorption it will get enough to preclude the possibility of this. It certainly cannot be logically argued that because a mind appreciates the grandeur and harmony of Astronomy that its eye shall necessarily grow dim and its ear dull to the harmony and beauties of the workings of the forces of the physical and chemical sciences. And this liberalizing atmosphere extends even beyond the walks and walls of our universities,—it is diffused through our educated communities. This free commerce of ideas between the minds of all men goes constantly on, in the most active, subtile ways, with effects the most salutary. There is no kind of property which is not in some degree made more valuable by every educated mind in its vicinity. Whoever will trace out this subject in all its

bearings, and will add up its results will find that *its sum* will be *equal* to the *difference* between a *civilized* and *savage* community.

He who reads human society the deepest, sees it the clearest that those handmaids of liberty, the press, the pulpit, the bar, and the industrial, the fine, and the engineering arts are the world's great civilizers. It is the combined influence of these, and not the desolation of successful war, which has planted and upheld the standard of christian civilization at the ends of the earth. Have not the industrial arts won man from his nomadic wanderings and poured into the lap of industry the material comforts and luxuries of civilization? Have not the fine arts refined the tastes, purified and ennobled the aspirations and fired the soul on to the accomplishment of the sublimest efforts of human genius? And what shall we say of the engineering arts, which have spanned the great rivers, scaled the mountain tops, and united the two oceans; and, by thus cementing our Union, upheld at once and perpetuated our national unity and our country's freedom. Surveyors and engineers are the artificers of the great commercial arteries and veins of the earth. While other great influences are the *vis viva*, the living moving forces which impel the commercial blood of the world, yet their's are the arts, which render its circulation possible, which carve out the channels for the world's commerce on land; and, at sea, render its circulation safe by furnishing charts of coasts and piloting it from port to port. Their counsel is sought, their skill is required in war as well as in peace. The successful general requires the skill of the surveyor's pencil to delineate the topography of the ground over which he is to manoeuvre or fight. Topographical maps were the faithful counselors of

Napoleon I. It was with these, and not his assembled marshals, that he held his councils of war on the eve of every great campaign, manoeuvre, or battle. And the parts which topographical charts played in our civil war would furnish the richest pages of its unwritten history. Their want, would go far toward explaining many of the reverses to the federal arms in '61 and '62, and their use, many of their successes in '63 and '64. And the statesman finds in engineers his most powerful instruments for bringing about his designs; they enable him to regulate the speed of the wheel of progress,—by with-holding their influence the car of progress stops.

At the close of our Civil war what did we find? Our nation torn into bloody fragments. The work of the warrior, it is true, was done; but the work of the statesman was just begun. The work of propping the bloody fragments of our nation together with bayonets was indeed accomplished; but the work of cementing them together was to be conceived and executed. The statesmen of that day took in the problem, and by a bold and admirable stroke of statesmanship solved it. They lent national aid to gigantic enterprises of permeating the nation, in every direction, with great commercial arteries, veins, and nerves, railroads those and these the telegraph wires—till state was knit to state the nation over. But this idea was not new or original with the statesmen of 1865. Jefferson conceived it and every President from him up to Jackson reiterated and advocated it. Jefferson, in his third annual message to Congress, uses this language: "By building roads and canals and improving rivers, new channels of commercial communication and social intercourse will be opened between the states; the lines of separation will disappear; their interests will be identified, and their union cemented by

new and indissoluble ties." Calhoun says, "the strongest of all cements of our bodies politic are the roads, canals, rivers, the press, and the mails. Whatever impedes the intercourse of the different states of our Republic weakens their union. The more enlarged the sphere of commercial circulation—the more extended that of social intercourse—the more strongly are we bound together—the more inseperable are our destinies."

Now, these ideas accord with human reason. For, those who understand the human heart best, know how powerfully distance tends to break the sympathies of our nature. Nothing—not even dissimilarity of language—tends more to estrange man from man. Can we not, then, see clearly how railroads and telegraph wires, by annihilating space, have bound our Republic together.

The engineering arts are the keys to the mystery of that liberal commerce which connects by golden chains the interests of mankind. Now, give me the power of cutting off, at will, the knowledge of the engineering arts and I will shake the world—will make every nation on the face of the earth quake from centre to circumference. Give me the command of the engineers and astronomers of earth and I will at one fell stroke paralyze the commerce of the world on land and at sea: And, will weaken the power that binds these states till it is weaker than a rope of sand; till revolutions sweep over this nation like troubled visions o'er the breast of dreaming sorrow; till contending armies and states rise and sink like bubbles on the water. To us Americans then can anything be indifferent that respects the cause of the engineering arts, when we have used them in civilizing our country and cementing our union. Ah, sirs, is it not a burning shame that these engineering arts, which contribute so powerfully to the improvement of

our country and race, which are absolutely necessary to our national preservation, are not an educational care of all the great Universities of our land.

The lights of applied science are now upon the mountain tops; the waves and winds of error and fanaticism beat upon them! Who shall keep them? You teachers of applied science, you gentlemen of the professional schools, are the watchmen. Keep these vestal fires burning. And, on the night of December 31, 1899, as the clock of heaven rings out the old and rings in the new century, when from out the storm and darkness comes the voice of Liberty ringing abroad, "watchmen, what of the night?" we'll send the answer back to heaven," 12 o'clock and all is well."

P. S.: Much of the material of this lecture is I believe new; and much of the remainder can lay claim to whatever originality there is involved in "using old facts in new circumstances." I have extracted largely from the writings of Presidents Gilman, Eliot, and Laws, and Professors E. L. Youmans, W. T. Harris, Bain, and Herbert Spencer. My reason for not always giving them credit on the spot when using their ideas and language, was that, in dissecting these from their context, and adapting and fitting them into the context above, I have oftener misrepresented, than truthfully represented, what they intended to say.

In conclusion, it is perhaps proper to state that while in college, I read the entire Latin course (and part of the Greek) as laid down by our western universities.

T. J. L.

ART, THE IDEAL OF ART AND THE UTILITY OF ART.

By George C. Bingham, Professor of Drawing in the University of the State of Missouri.

(From the Missouri Statesman, March 7th, 1879.)

In consequence of a severe attack of pneumonia, which confined Prof. Bingham to his room, at his request the lecture was read by his friend Maj. Rollins, president of the board of curators. After a few preliminary and appropriate remarks by Dr. Laws, in which he referred to the fact that this was the first and only public recognition which had been given to the Fine Arts in the institution since its first organization, and expressing the wish that in the future good results would flow from it in the permanent establishment of a School of Design and of Art in the University, he introduced to the audience the reader of the lecture, who after expressing his very great regret for the cause which kept Gen. Bingham away from the meeting, proceeded to make some very complimentary remarks in reference to the high character of that gentleman as a citizen of Missouri, and one of the most eminent artists of our country. Evidences of his wonderful genius were to be seen in the capitol of the state, and indeed in many parts of the country wherever a taste for the fine arts had received any attention.

Maj. R. said it had been his good fortune to know Prof. Bingham for nearly forty-five years, since their young manhood, as intimate friends and companions, and he could say with entire truth that he had never known a purer or better man, one of whom any commonwealth might feel justly proud. Although no artist

himself, but having a great fondness for pictures, in the course of his extended remarks he commented freely upon some of the paintings before the audience, and others, also the productions of his genius, and which had won for him great distinction in the world of Art. He spoke of the great moral effect of all his works, and wherein a number of them so handsomely illustrated the character and habits of Western life, and others of them illustrated with inimitable skill, the free institutions under which we live; these monuments of his genius and artistic skill would live and be admired, when it may be the institutions themselves shall have perished. Maj. R. referred to a number of interesting facts in reference to the early history of this part of the state, and also told several anecdotes which were very much relished by his hearers.

In proceeding to read the lecture of Prof. Bingham, he said it was due to that gentleman to say that it had been hastily prepared in a few days, and had not been even recopied.

The subject of the lecture was "Art, the Ideal of Art, and the Utility of Art." It was read so that every one in the audience heard it distinctly, enjoyed it, and was greatly instructed by it. The lecture was written in the clear and strong style which marks all the productions of Prof. Bingham's pen, chaste and classical in all his allusions to ancient and modern art, and artists, and maintaining his position with an argument and logic which seemed unanswerable. The evening passed off most pleasantly, and we are gratified to see so much interest manifested in the subject of the Fine Arts by the young gentlemen and ladies of the University.

[Mr. Bingham died in Kansas City, July 7, 1879, in the 69th year of his age. The following is his lecture:]

Ladies, Gentlemen and Students of the University:

I have been requested by our worthy president to embody in a brief lecture, and present to you some of the views on Art which I have been led to entertain from many years of practice and experience and familiarity with the works of many of its most eminent professors. We are all naturally disposed to prefer that mode of expression by which we can communicate to others, most forcibly and clearly, the thought to which we are

prompted to give utterance. Hence artists have generally been averse to giving a mere verbal expression to ideas which they are able to present in a far more satisfactory manner, with the pencil or chisel. It is doubtless owing to this reluctance on their part that the literature of their profession is chiefly the product of theorists who can err in safety under the silence of those who alone have the ability to correct them. These theorists are often laboriously ambiguous even in their definition of Art.

Micheal Angelo, whose sublime and unrivaled productions, both in painting and sculpture, certainly entitle him to be regarded as good authority in all that related to Art, clearly and unhesitatingly designates it as "The imitation of nature."

The Oxford student, however, who ranks as the ablest and most popular writer upon the subject, undertakes to convince his readers that the imitation of nature so far from being Art, is not even the language of Art. He boldly goes still further and asserts that the more perfect the imitation the less it partakes of the character of genuine Art. He takes the position that Art to be genuine must be true, and that an imitation of nature so perfect as to produce an illusion, and thereby make us believe that a thing is what it really is not, gives expression to a falsehood, and cannot therefore be justly regarded as genuine Art, an essential quality of which is truth.

Such logic may be convincing to the minds of those admirers who regard him as an oracle upon any subject which he chooses to touch with his pen. But in all candor it seems to me to be merely on a par with that of a far less distinguished character, who, travelling with a companion along the banks of a river, undertook, for a

wager, to convince him that the side of the river on which they were journeying was really the other side. He did it by stating as his postulate that the river had two sides, and as the side opposite to them was one of these sides, the side on which they were traveling was necessarily the other side. Truth and such logic are not always in harmony.

The well known story of Zenxas and Appeles, two of the most famous painters of ancient Greece, has been handed down to us through the intervening ages. Being rivals and alike ambitious of distinction, a challenge passed between them for a trial of their skill. One painted a picture of grapes so perfect in its imitation of that luscious fruit, that the birds of the air flocked to partake of them as a servant was carrying the picture to the place of exhibition. The other merely painted upon his canvass a curtain, but so perfect was its resemblance to a real curtain, that his rival stretched forth his hand to remove it in order to get a view of the supposed picture beneath. Such an adherence to nature, and I may add to the truth of nature, constitutes what should properly be called the truth of Art; that Art only which belies nature is false Art.

These imitations are recorded in the literature of that classic period, as evidence of the excellence in Art by which it was characterized. We are loth to suppose in an age made illustrious by the highest civilization which the world had then attained, and surrounded by works of Art which coming ages will never surpass, great statesmen, scholars, artists, and literary men could have been so far mistaken in regard to the true nature of Art, as to recognize as an excellence therein, that which was really a defect.

About the close of the war of 1812 one of the great

naval conflicts between the British and American fleets was dramatized upon the stage in the city of Baltimore. The scenery was arranged with all the skill which the most consummate Art could bestow upon it. Even the movements of the vessels and the motion of the waves were closely imitated. An unsophisticated sailor who had participated in such conflicts, happened to be seated in the pit as one of the audience. Becoming absorbed in what was transpiring before him, to an extent which banished all idea of mere stage effect from his mind, he thought he saw one of our vessels beclouded with smoke, and threatened with destruction by the enemies' fleet. His patriotism rose above all considerations of personal safety. He could not rest without an effort to transmit to the imperilled vessel a knowledge of the danger by which it was threatened. This could only be done by taking to the water, he being an excellent swimmer. He sprang up with great excitement, and approaching the stage and shedding his linen as he went, he plunged head foremost into what he took to be water, but it being only a well devised imitation of that element he went through it to the basement about twenty feet below, leaving our vessel to its fate. What man of ordinary intelligence will venture to affirm that scenic Art thus so nearly resembling the reality of nature is less Art on that account?

More than once in my own experience portraits painted by myself, and placed in windows facing the sun to expedite their drying, have been mistaken for the originals by persons outside, and spoken to as such. Such occurrences doubtless mark the experience of nearly every portrait painter; but none of them ever dreamed that the temporary deception thus produced lessened the artistic merit of such works. The great ability of Ruskin

as a writer is generally and justly conceded. He has performed a great work for artists of his own age in destroying that reverence for the works of the old masters which has attributed to them an excellence entirely beyond the reach of modern genius. But no artist can safely accept his teachings as an infallible guide. Artists who expect to rise to anything like eminence in their profession, must study nature in all her varied phases, and accept her both as his model and teacher. He may consider every theory which may be advanced upon the subject nearest to his heart, but he must trust his own eyes and never surrender the deliberate and matured conclusions of his own judgment to any authority however high.

What I mean by the imitation of nature is the portraiture of her charms as she appears to the eye of the artist. A pictorial statement which gives us distant trees, the leaves of which are all seperately and distinctly marked, is no imitation of nature. She never thus presents herself to our organs of vision. Space and atmosphere, light and shadow, stamp their impress on all that we see in the extended fields which she opens to our view, and an omission to present upon our canvass a graphic resemblance of the appearances thus produced, makes it fall short of that truth which should characterize every work of Art. But while I insist that the imitation of nature is an essential quality of Art, I by no means wish to be understood as meaning that any and every imitation of nature is a work of Art.

Art is the outward expression of the esthetic sentiment produced in the mind by the contemplation of the grand and beautiful in nature, and it is the imitation in Art of that which creates this sentiment that constitutes its expression. The imitation is the word which utters the sentiment. No Artist need apprehend that any imi-

tation of nature within the possibilities of his power will long be taken for what it is not. There are attributes of nature which the highest Art can never possess. In the younger days of Micheal Angelo, soon after his rapidly developing genius had been noised abroad, he visited the studio of an aged sculptor in Florence while he was engaged in giving the finishing touches to the last and noblest of his works. The old man wishing to have an expression of his judgment upon it, exposed it fully to his view allowing the most favorable light to fall upon it. The young Angelo contemplated it for many minutes with wrapped attention, no word passing from his lips. At length turning upon his heel he said *it lacks one thing*, and immediately disappeared. His words fell as a death blow upon the ears of the old man. He had bestowed upon the work the results of his life-long study in the confident expectation that it would transmit his name to posterity, and associate him in history with the greatest Artists of his day. He became gloomy and despondent, soon sickened and was laid on his death-bed. Learning that Micheal Angelo was again in his vicinity he sent him a message inviting him to visit him. When the young sculptor appeared in his presence he reminded him of the remark which he had made at the close of their previous interview, and earnestly entreated him to name the one thing lacking in what he had fondly regarded as the crowning work of his life. I meant, said the younger artist, that it lacked *the gift of speech* and that only! We can well imagine the new life which, at these words instantly sprang up in the soul of the gifted old man, smoothing his passage to that upper and better life to be associated forever with all who love the true and the beautiful.

As the powers of man are limited so is Art necessa-

rily limited in its domain. It can only embody those appearances of nature which are addressed to the eye and exhibited in form and color. Like the work of the grand old Florentine sculptor it can faithfully present the human form in all its symmetry and beauty, but it can not breathe into that form a living soul or endow it with speech and motion, It can give us the hue and forms of hills, mountains, lakes and rivers, or old ocean, whether in calm, sunshine or storm, but all that we see in these results of limited power is alike motionless and voiceless. Their is no murmuring in their brooks as they seem to encounter the rocks in their passage. Their clouds are stationary in their skies, their suns and moons never rise or set. There is no sound of lowing coming from their flocks and herds. All is silent and still, and being so can never be mistaken for actual nature. Nevertheless that Art which, within the limited sphere of Art, most nearly resembles actual nature, most clearly expresses the sentiment which actual nature produces in the minds of those who have the taste to relish her beauties. Ruskin, with all his verbal powers of description, failed as an artist, and I have no hesitation in affirming that any man who does not regard the imitation of nature as the great essential quality of Art will never make an artist.

THE IDEAL IN ART.

There are various and conflicting opinions as to what constitutes the ideal in Art. In the minds of those liberally endowed artists whose productions exhibit a wide range of thought, it seems to my judgment to be that general and much embracing idea necessarily derived from the love and study of nature in her varied and multitudinous aspects, as presented in form and color. It must, however, be necessarily limited by the taste of

the artist, which may confine him to what is special rather than to what is general in nature. I say it may be limited and contracted by the taste of the artist. Artists permit themselves to be absorbed only by what they love. And as nature presents herself to them in a thousand phases, they may worship her in few or many. Such of her phases as take possession of their affections also take possession of their minds, and form thereon their ideal, it matters not whether it be animate or inanimate nature, or a portion of either. A Landseer is captivated by the faithfulness, habits and hairy texture of dogs, and makes them his specialty in Art, being kennelled in his mind, as it were, they exclude other subjects of Art and become the ideal which governs his pencil. When Sidney Smith was requested by a friend to sit to Landseer for his portrait he replied, "*is thy servant a dog that he should do this thing?*" His reply was significant of the apprehension justly entertained that the artist could not avoid giving to his portrait something of the expression which more properly belonged to his favorites of the canine species. Rosa Bonhier, early in life, fell in love with the kine which furnishes us all, with the milk, butter and cheese which form so large a portion of the aliment which sustains our physical frames. In living with them and caressing them, their forms and habits took possession of her mind as they had done of her heart, and formed that ideal, which makes her pictures of cattle far transcend in excellence those of Paul Potter or any of her predecessors.

I cannot believe that the ideal in Art, as is supposed by many, is a specific mental form existing in the mind of the artist more perfect than any prototype in nature, and that to be a great artist he must look within him for a model and close his eyes upon external nature. Such

a mental form would be a fixed and determined idea, admitting of no variations, such as we find in diversified nature and in the works of artists most distinguished in their profession. An artist guided by such a form would necessarily repeat in every work exactly the same lines and the same expression.

To the beautiful belongs an endless variety. It is seen not only in symmetry and elegance of form, in youth and health, but is often quite as fully apparent in decrepit old age. It is found in the cottage of the peasant as well as in the palace of kings. It is seen in all the relations, domestic and municipal, of a virtuous people, and in all that harmonizes man with his Creator. The ideal of the great artist, therefore, embraces all of the beautiful which presents itself in form and color, whether characterized by elegance and symmetry or by any quality within the wide and diversified domain of the beautiful. Mere symmetry of form finds no place in the works of Rembrant, Teniers, Ostade, and others of a kindred school. Their men and women fall immeasurably below that order of beauty which characterizes the sculptures of classic Greece. But they address themselves none the less to our love of the beautiful, and none the less tend to nourish the development and growth of those tastes which prepare us for the enjoyment of that higher life which is to begin when our mortal existence shall end.

All the thought which in the course of my studies, I have been able to give to the subject, has led me to conclude that the ideal in Art is but the impressions made upon the mind of the artist by the beautiful or Art subjects in external nature, and that our Art power is the ability to receive and retain these impressions so clearly and distinctly as to be able to duplicate them

upon our canvas.) So far from these impressions thus engraved upon our memory being superior to nature, they are but the creatures of nature, and depend upon her for existence as fully as the image in a mirror depends upon that which is before it. It is true that a work of Art eminating from these impressions may be, and generally is, tinged by some peculiarity belonging to the mind of the artist, just as some mirrors by a slight convex in their surface give reflections which do not exactly accord with the objects before them. Yet any obvious and radical departure from its prototypes in nature will justly condemn it as a work of Art.

I have frequently been told, in conversation with persons who have obtained their ideas of Art from books, that an artist should give to his productions something more than nature presents to the eye. That in painting a portrait for instance, he should not be satisfied with giving a true delineation of the form and features of his subject, with all the lines of his face which mark his individuality, but in addition to these should impart to his work the *soul* of his sitter. I cannot but think that this is exacting from an artist that which rather transcends the limits of his powers, great as they may be. As for myself, I must confess, that if my life and even my eternal salvation depended upon such an achievement, I would look forward to nothing better than death and everlasting misery, in that place prepared for the unsaved. According to all of our existing ideas of a soul, there is nothing material in its composition. The manufacture, therefore, of such a thing out of the earthen pigments which lie upon my palate would be a miracle entitling me to rank as the equal of the Almighty himself. Even if I could perform such a miracle, I would be robbing my sitter of the most valua-

ble part of his nature and giving it to the work of my own hands. There are lines which are to be seen on every man's face which indicate to a certain extent the nature of the spirit within him. But these lines are not the spirit which they indicate any more than the sign above the entrance to a store is the merchandize within. These lines upon the face embody what artists term its expression, because they reveal the thoughts, emotions, and to some extent the mental and moral character of the man. The clear perception and practiced eye of the artist will not fail to detect these; and by tracing similar lines upon the portrait, he gives to it the expression which belongs to the face of his sitter, in doing this, so far from transferring to his canvass the soul of his subject, he merely gives such indications of a soul as appear in certain lines of the human face; if he gives them correctly, he has done all that Art can do.

THE UTILITY OF ART.

If man were a mere animal whose enjoyments did not extend beyond the gratification of the appetites of such a being Art might justly be regarded as a thing of very little importance.

In the elevated sense in which we are discussing it, it addresses itself solely to that portion of man which is the breath of the Eternal—which lives forever,—which is capable of endless growth and progress, and the requirements of which are peculiar to itself. The beautiful, and all that is embraced in what is termed esthetics, together with all that contributes to mental development is the natural food of the soul, and is as essential to its growth, expansion and happiness, as is the daily bread we consume, to the health and life of our animal nature. The appetite for this spiritual food, like that for the nourishment essential to our material growth, is a

part of our nature. As the latter turns the lips of the new born infant to the breast of its mother, the former exhibits itself in its love of the beautiful. Before it is capable of thought or reason, its eyes will sparkle with intense delight at the presentation of a beautiful bouquet, while it would look upon a nugget of gold richer than the mines of California ever produced, with utter indifference. As the growth, strength and development of the body depend upon the food demanded by its natural appetites, so must the growth and development of the soul, and its capacity for enjoyment, depend upon the spiritual food demanded by those tastes peculiar to and a part of its nature.

The soul is as necessarily dwarfed by withholding from it its proper nourishment, as is the body from a like cause. The natural wants of both should be constantly supplied, that the child as it grows in stature may also wax strong in spirit. If we regard that as useless which meets the demands of the esthetic tastes of our nature, then we must regard God as exhibiting no wisdom in decorating nature in so lavish a manner with the grand, the sublime, and beautiful. In giving us the fruit he might have omitted the beautiful bloom which heralds its coming. In giving us the rain which moistens our fields and makes our rivers, he might have withheld the accompanying arch which spans the heavens and exhibits to our delighted gaze its perfect symmetry in form and unequaled glory in color. He might have spread over land and sea and sky a dull and monotonous hue, instead of enriching them with that infinitude of the beautiful, which they ceaselessly unveil to the eye of man. All this display of the grand and the beautiful seems to be a divine recognition of the wants of our spiritual nature and a benevolent purpose to supply them.

The absence of Art in any nation will ever be a mark of its ignorance and degradation. While the highest Art will be the chaplet which crowns the highest civilization, its uses extend far beyond the gratification of our inherent love of the beautiful. As a language, its expressions are clearer than any which can be embodied in alphabetical forms, or that proceeds from articulate sounds. It also has the advantage of being everywhere understood by all nations, whether savage or civilized.

Much that is of great importance in the history of the world would be lost if it were not for Art. Great empires which have arisen, flourished and disappeared, are now chiefly known by their imperishable records of Art. It is indeed the chief agent in securing national immortality. In the remote and prehistoric periods of the past, there have doubtless been nations who gave no encouragement to Art, but like the baseless fabrics of vision they have disappeared and left not a wreck behind. And this glorious Republic of ours, stretching its liberal sway over a vast continent, will perhaps be best known in the distant ages of the future by the imperishable monuments of Art which we may have the taste and the genius to erect.

METAPHYSICS.

A Lecture by Samuel S. Laws, Professor of Metaphysics in the University of the State of Missouri, May 10, 1879.

There is only too much reason to apprehend that the bare mention of metaphysics, as the subject of this lecture, suggests to some minds the question whether anything really serious or intelligible is intended. The prejudice against this subject is not unfrequently veiled under the following burlesque definition, credited to the blacksmith of Glamis: "Twa folk disputin thegither; he that's listenin disna ken what he that's speakin means, and he that's speakin disna ken what he means himsel—that's metaphysics!" The irrepressible wit of Sydney Smith was indulged in ridicule of it. It is related that, when lecturing on one of its topics, he exclaimed, in his deep, sonorous and warning voice, "Ladies and gentlemen, there is a word of dire sound and horrible import, which I fain would have kept concealed if I possibly could, but as this is not feasible I shall meet the danger at once and get out of it as well as I can. The word to which I allude is that very tremendous one of *Metaphysics*, which in a lecture on moral philosophy, seems likely to produce as much alarm as the cry of fire in a crowded

playhouse; when Belvidera is left to cry by herself, and every one saves himself in the best manner he can. I must beg of my audience, however, to sit quiet, and in the mean time make use of the language which the manager would probably adopt on such an occasion: I am sure, ladies and gentlemen, there is not the smallest degree of danger." This prejudice against metaphysics has not been confined to the rude and vulgar, either of the present or of the past. By placing the fool's cap on the head of Socrates, the ignorant derision of the Athenian populace culminated in his unrighteous death sentence by their judges. The spirit of this scene still lives. Once, metaphysics was named and esteemed the queen of the sciences; but what has been the fate of this princess? Our most distinguished modern scientists have been reenacting the part of Aristophanes, with this difference, that he employed ridicule against Socrates, avowedly in the interest of conservatism, whilst these votaries of nature have made a mistaken use of it in the supposed interest of progress. Were Shaftbury's criterion valid, that ridicule is the test of truth, it might legitimate this style of warfare; but more than once have other than groundlings with bloody hands joined in driving from the world's stage the brightest impersonations of the true, the beautiful and the good. Scientific, no less than religious truth, has had its martyrs; but through the ages, the two, properly understood, have never been in conflict with each other, whilst both have been in antagonism with ignorance, their common and implacable foe. Metaphysics is their common and faithful friend. With united voice the lovers of truth might peal forth the words of Tennyson, as the anthem of the centuries—

"Ring out the old,
Ring in the new;
Ring out the false,
Ring in the true."

But it must not be forgotten that the old is not always the false, nor the new always the true, as was illustrated in a notice once given of a book—perhaps one of the popular contributions to modern science—in which notice it was remarked, by way of commendation, that the book in question had in it much that was new and also much that was true; and by way of criticism, that what was true in it was old and what was new in it was false. The only rational rule of mental procedure is to "prove all things," whether new or old, and "hold fast to that which is good." By the faithful assertion of this catholic principle of judgment, we loyally venture to believe that our queen is destined to recover the crown and royal state of which she has been deprived, and to hold again her position in the universities of the world, less exclusively and pretentiously, no doubt, and yet with an empire subject to her restored sceptre, embracing whole kingdoms which, under the old regime, were not yet discovered. The science of the present reveals, daily, that it is not self-sufficient, and that, just as a building of large and imposing dimensions requires beneath its super-structure a foundation that sinks out of the view of the senses, so science rests on the transcendental and unseen realities of the world of metaphysics. Faith is more profound than reason.

As a corrective of the misconceptions and ignorance which generate the prejudice to which reference has been made, and as a means of enlisting an intelligent interest in our subject, it will be my aim to present it in as elementary and complete a manner as the limits of the hour and the surrounding circumstances will permit. It is due to the body of students of this University, that the one in charge of this disparaged department, which has been dropped or omitted from the curriculum of some of the

leading institutions of our day, should disabuse their minds of those false impressions which may disincline them to enter on this line of work. What may induce neglect of this study may also perniciously serve as a plausible apology for what should properly be esteemed a disgraceful ignorance. Moreover, as colleagues in the faculty of this University, each one by voicing his own department, not only the more effectively serves the students, but also his colleagues. Surely, one of the leading advantages of such a course of lectures as this one in which we have been engaged, is its measurable realization of the helpfulness of associated labor.

There are three words, viz., metaphysics, philosophy and ontology of which you will please take note as having identically the same significance. What is to follow amounts to little more than an exposition of the one true meaning of these three terms. I hasten to indicate that meaning.

The word metaphysics has a wide and also a narrow sense, and we must guard ourselves against equivocation by an explanation. In its narrow sense, it means all the sciences of mind, as distinguished from the sciences of matter; but in its broad and generic sense, it presupposes an acquaintance with these special sciences of both mind and matter and designates the science of being or an inquiry into the nature of knowledge itself, especially with reference to the substantial reality of mind, matter and God. A chair of metaphysics takes account of both of these aspects of the subject, but the present lecture is intended to set forth the one last named, that is, metaphysics proper as distinguished from metaphysics in the popular sense as designating a limited group of the special sciences. The word philosophy is also applied indifferently and equivocally to the special sciences

of matter and also of mind; but ontology has a less popular use and technically accords with metaphysics proper, which is our present theme. It has been already announced that it is the intention on the present occasion, without further notice, to use these three words in the same sense and that their most profound and important one, as will appear more fully from what follows.

In didactic teaching a definition has great virtue, at the opening of a discussion; it is like a port for which a voyager sets sail, as it gives definite regulation to his movements. But it is only at the end of the inquiry, that the pupil is supposed to be in a situation to criticise, modify or even supplant the definition, in the light of his own knowledge of the subject. The faith of the pupil at the outset is only provisional.

Each of the above words has its own interesting etymology and legend, but it is not their verbal but their realistic significance which is at present our chief concern. There have been numerous definitions given of the thing meant by metaphysics proper, philosophy or ontology; but this may be safely said of them all that,however diversely this ontology may beviewed, it is uniformly recognized as a form of knowledge. This broad fact may be serviceable, for we are able to distinguish three entirely distinct forms or phases of knowledge, and by so doing to individualize metaphysics in such a manner as to extricate it from what might otherwise be an inextricable confusion; and such a statement may have substantially the value of a definition, whether one be formulated or not. The first of these three kinds of knowledge is empirical. This is simple matter of fact knowledge and constitutes the experience of individuals and peoples,covering their inner as well as their outer life—it

is the spontaneous life of the world and constitutes the raw materials of its biography, its literature and its history. In its second phase, knowledge is scientific or modal. In this phase it is the product of reflection and generalization, for science consists of the systematic classification of the laws of phenomena. No amount of knowledge, whether confused or classified, abstract or concrete, constitutes science till laws are grasped and coordinated. But laws are the mere modes of the coexistence, continuance and succession of phenomena in time and space. The final and third division of knowledge into philosophic as distinguished from the empirical and scientific, is the one which invites our attention on this occasion. Empirical knowledge, in its childlike spontaneity and simplicity, takes no rational account of laws and causes, whereas, philosophy views things in relation to their causes and first principles, whilst science views phenomena in their uniform relations to each other in their successions and coordinations of time and space. The explanation of a phenomenon of experience from observation or experiment, may be either scientific or philosophic,—it is scientific, when the phenomenon is referred to its law; it is philosophic, when referred to its cause or sufficient reason. Science does not consist in a search for causes but in a search for laws, as being the formulation of the effects resulting from the uniform action of causes. The laws of nature properly considered have no causal force; they are correctly viewed as only "the paths along which the forces of nature move." The philosophy of nature is its aetiology; the science of nature is its modality.

It is not meant that experience is ignorant of causality and its uniformities, but only that this spontaneous form of knowledge is in the concrete and that our spontaneous intuitions are quite free from abstract reflection

and construction. Nor is it meant that the scientist does properly or can possibly ignore causes, but only that, to the extent that he has or holds them in contemplation, it is not as a scientist but as a philosopher that he does so. The scientist is more than his science,—is not a mere scientist. Nor is it meant that the philosopher ignores experience and science, but that as a philosopher he lifts their contents to a higher plane. In each case, the man of experience, the man of science and the man of philosophy is somewhat more than himself, for the same soul, in its various stages of unfolding, is the one treasure house of all this threefold wealth of knowledge. Individuals, like nations and ages, pass from spontaneity to reflection and then, by criticism, discover a chaos or a continent. Ours is a critical age and the angel of truth is already calling to the watchmen, what of the night? and in the dawning of the morning of a day brighter than any on record, she is treading the firm earth with a surer step than ever before. With confidence may we say, in the bold language of Milton, "Let her and falsehood grapple; who ever knew truth put to the worse, in a free and open encounter."

Empirical knowledge answers the question—*what?* scientific knowledge answers the question—*how?* and philosophic, metaphysical or ontological knowledge answers the question—*why?* The what, the how and the why are not in isolation but are interdependent; and the true unity of knowledge is realized in their reciprocal communion; the first phase is phenomenal; the second modal and the third noumenal:

These distinctions, especially in their scientific and philosophic phases, seem to have struggled in the mind of Aristotle for articulate recognition and utterance, as is seen in such passages as the following from his Metaphysics:

"But in every respect is the science of ontology strictly a science of that which is first or elemental, both on which the other things depend and through which they are denominated. If then, this is substance, the philosopher or metaphysician must needs be in possession of the first principles and causes of substances. * * * But this is the same with none of those which are called particular sciences; for none of the rest of the sciences examines universally concerning entity."

The importance of these distinctions appears also in such passages as the following, from the Hegelian Schwegler's History of Philosophy:

"In what, then, is philosophy distinguished from these sciences, e. g. from the science of astronomy, of medicine, or of right? Certainly not in that it has a different material to work upon. Its material is precisely the same as that of the different empirical sciences. The construction and disposition of the universe, the arrangement and functions of the human body, the doctrines of property, of rights and of the state—all these materials belong as truly to philosophy as to their appropriate sciences. That which is given in the world of experience, that which is real, is the content likewise of philosophy. It is not, therefore, in its material but in its form, in its method, in its mode of knowledge, that philosophy is to be distinguished from the empirical sciences. These latter derive their material directly from experience; they find it at hand and take it up just as they find it. Philosophy, on the other hand, is never satisfied with recieving that which is given simply as it is given but rather follows it out to its ultimate grounds; it examines every individual thing with reference to a final principle and considers it as one link in the whole chain of knowledge. In this way philosophy removes from the individual thing given in experience, its immediate, individual, and accidental character; from the sea of empirical individualities, it brings out that which is common to all. In short, philosophy examines the totality of experience in the form of an organic system in harmony with the laws of thought."—(pp. 11-12.)

There is in this passage a certain interblending of the scientific and philosophical, which the above threefold distinction enables one easily to discern and rectify.

This wisdom, as it was termed by the earliest speculators of Greece; this philosophy or love of wisdom, as a later age more modestly termed it; this metaphysics, as it was named from the chance designation of the earliest formal treatise, that of Aristotle, on the subject; or this ontology, as defined by etymological refinement—call

this third and final form or phase of knowledge by what name we may, in all cases it seeks for the foundations of the edifice of human knowledge; the ultimate and enduring realities—the noumena—attainable by our intelligence, on which depends the certitude of what we know. Metaphysics transcends every particular science, whether of mind or matter, and every experience, and grasps what lies beyond and what, through the criticism of science and experience we learn, makes science and experience themselves possible. The real problem which metaphysics undertakes to solve, is this, the nature and ultimate conditions of our knowledge,in its last analysis. Is it real? is it illusory? is it phenomenal only? is it relative or absolute? has it objective as well as subjective validity? What is the ultimate, the final and the satisfying ground on which the superstructure of science and the accumulations of human experience, in their most comprehensive sense, repose? We seek an answer. Our accepted answer must be to us our philosophy; and hence, right or wrong, our philosophy is our theory of the universe. To us a universe unknown would be as zero; and it is real to us only as known. Theorize we must; facts without theory are dead rubbish; our nature demands science and philosophy, and in each, theory is more than hypothesis—a theory is a vindicated hypothesis.

It is now proposed to take a brief survey of the leading hypotheses of the ages, set forth in the attempt to solve the problem of knowledge: notice will first be taken of those various views which, in varying measure, are esteemed partial, inadequate and false. The one view which I conceive to be true and valid and alone entitled to recognition and consideration as a theory, will be reserved to the last. The truth is imperishable,

it is one and catholic and ever, like the sun, bears on its front a luminous glow. The soul hungers for it as the bread of its life, and nothing else can satisfy it. It is hoped that the conciseness of this survey enforced by the circumstances may occasion clearness rather than obscurity.

All the philosophies which have gone to record may be reduced to two, which are fundamentally distinct and antagonistic, viz., nihilism and realism, or as I shall take the liberty of calling them, phenomenalism and noumenalism. These two opposing views present the negative and positive poles of speculation; one is destructive and the other constructive.

I have a sweet or bitter taste, the smell of a pleasant or offensive odor, the sight of a beautiful or disgusting image, experience a feeling of joy or sorrow: the phenomenalist admits the appearances as phenomena of consciousness, but will not allow to these appearances any substantive reality, nor accept of either mind or matter as revealed or evidenced in any act of knowledge whatever. The phenomena are only as shadows without substance, and as dreams without a dreamer. The one point in common to all noumenalists is that the universe of being is something other than an illusion, a cheating mirage, a phantasm or dream, and that in the act of knowledge we grasp phenomena *plus* substantial reality, that at least a substantial self exists and endures amid all the mutations of the universe. But what follows will serve to render this general and abstract enunciation easily understood.

1. NIHILISM.

It is because the spirit of destruction without positive aim has animated the discontented elements of European society, especially of late in Russia, that these

communistic agitators have been called nihilists. Their spirit is precisely the same as that of the nihilistic philosophy; they seek the destruction of what is not satisfying, without offering to substitute something better in its place. In dealing with perishable objects such as the products of nature and art, the work of destruction has a fearful and irreparable advantage. A child with a hatchet may in a few hours destroy the great oak whose growth is the work of centuries. But in dealing with principles and things of a rational nature, the conditions of vitality are not so precarious. Truth itself is indestructible; and this is the stuff out of which knowledge, the fact which we seek to explain, is made, for all real and enduring knowledge, all that deserves the name of knowledge, consists of apprehended truth. Hence the repeated recoils and recoveries of thought from the misleadings of error, and the tireless renewal of efforts, after repeated failures, to gain the truth in its simplicity, in its fadeless beauty and soul-satisfying power, notwithstanding it is so often and so sadly misunderstood, misrepresented and dishonored by errorists. Nihilism mutilates the truth of the fact of knowledge in that it allows no reality, true or false, material or spiritual, to aught beneath or beyond apppearances; and even phenomena are speculatively esteemed and treated as illusory. This view is confessedly not accordant with man's spontaneous activity. It is, then, the unnatural progeny of a distorted, partial and mistaken interpretation of man's nature; but as man is an integral part of the universe, so far forth as that universe in its totality stands within the vision of knowledge, no hypothesis is capable of vindication which fails to provide, without omission or distortion, a complete exposition of all the facts of man's nature.

In the domain of speculation there are three names pre-eminently associated with nihilism, viz., Pyrrho, Hume and Fichte. Even Berkeley and Kant were realists. Protagoras, the sophist, is sometimes individualized as the representative of the dogmatic and Pyrrho as representing the sceptical or nescient phase of nihilism. Dogmatic nihilism denied the existence of aught beyond appearances and sceptical nihilism denied the knowableness of aught beyond, i. e. were it true that something other than mere sensible appearances exists, still we cannot know it: or as another has expressed it—"The difference, therefore, between Protagoras, the sophist, and Pyrrho, the sceptic, was this—that while the former maintained the universe to be a mere appearance *destitute of any answering reality*; the latter simply held that it was an appearance of which the *reality was unknown*." But as both of these phases of nihilism virtually emerge from the fragments and reports of Pyrrho transmitted to us, his name properly stands first on the roll of the representatives of this daring speculation. Diogenes Laertius, in his "Lives of Eminent Philosophers," gives a third more space to Pyrrho than to either Socrates or Aristotle. Let us attend to some extracts, chiefly from this ancient sketch. Diogenes says:

"The Pyrrhonean system, then, is a simple explanation of appearances, or of notions of every kind by means of which, comparing one thing with another, one arrives at the conclusion, that there is nothing in all these notions but contradiction and confusion." Again: "The difficulties which they, (the Pyrrhoneans,) suggest, relating to the agreement of what appears to the senses, and what is comprehended by the intellect, divide themselves into ten modes of argument, according to which the subject and object of our knowledge are incessantly changing." After canvassing these and other modes, he continues: "As to the contradictions which are founded in those speculations, when they are pointed out in what way each fact is convincing, they (the Pyrrhonists) then, by the same means, take away all belief in it. * * And

they prove that the reasons opposite to those on which our assent is founded are entitled to equal belief." * * * He continues: "These skeptics, then, deny the existence of any test of any demonstration, of any test of truth, of any signs, or causes, or motion or learning, and of anything as naturally or intrinsically good or bad. For he (Pyrrho) used to say that nothing was honorable, or disgraceful, or just, or unjust."

And on the same principle he asserted that there was no such thing as downright truth; but that men did every thing in consequence of custom and law. "For that nothing was any more this than that." Again:

> But Democritus says that there is no test whatever of appearances, and also that they are not criteria of truth. Moreover, the dogmatic philosophers attack the criterion derived from appearances, and say that the same objects at different times present different appearances, consequently, if the sceptic (Pyrrhonist) does not discriminate between different appearances, he does nothing at all. If, on the contrary, he determines in favor of either, then, say they, he no longer attaches equal value to all appearances. The sceptics (i. e. Pyrrhonists) reply to this, that in the presence of different appearances, they content themselves with saying that there are many appearances, and that it is precisely because things present themselves under different characters, that they affirm the existence of appearances. Perhaps our opponent (the dogmatist) will say, Are these appearances trustworthy or deceitful? We (sceptics) answer that, if they are trustworthy, the other side has nothing to object to those to whom the contrary appearance presents itself. For, as he who says that such and such a thing appears to him, is trustworthy; so also is he who says that the contrary appears to him. And if appearances are deceitful, then they do not deserve any confidence when they assert what appears to them to be true. * * From all of which it follows, that the first principles of all things have no reality.

Pyrrho (384-288 or 360-270 B. C.,) is reported to have lived to the age of ninety or more. It will be observed from the dates given that he was a contemporary of Plato (430-348 B. C.,) and also of Aristotle (384-322 B. C.) whom he survived, at the least, for more than thirty years. Like the great church historian Neander, he is said to have "lived in a most blameless manner with his sister." Having followed in his youth the business of a huxter, he then became a painter and a

student of Democritus in the school of Anaxarchus, whom he accompanied in the train of Alexander the Great, as far as India. He was a native of Elis, and, on his return to that place, he is said to have been made a priest of the temple by the good will of his fellow citizens. Pyrrho himself, like Socrates, wrote nothing, but Diogenes says 'his friends Timon, and others of that class have left books. All these men were called Pyrrhoneans from their master: and persevered in overthrowing all the dogmas of every sect, while they themselves asserted nothing.' Whilst Sextus Empiricus, the physician, who flourished about 200 of the Christian Era, is the great storehouse of information and arguments on ancient scepticism which has been revamped in modern times, Pyrrho chiefly lives in what is preserved from his most eminent pupil Timon, a physician of Phlius, who wrote three books of satirical poems in which all the Greek philosophers are reviled as babblers except Xenophanes, the Hegel of Greece, who, in his esteem, sought the truth and Pyrrho who found it. Said Timon in the spirit of his master,—"That a thing is sweet I do not affirm, but only admit that it appears so." "Again, we feel that fire burns, but we suspend our judgment as to whether it has a burning nature." In a word, as it is pithely summed up by Ueberweg—"There exist no fixed differences among things." Such is Pyrrhonism.

The supreme psychological characteristic of this ancient nihilistic speculation is the assumed suspension or indifferency of judgment under the full blaze of evidence, however pertinent and cogent, whereas, by an inexorable law of the mind, adequate evidence apprehended, necessarily decides the judgment. There is no one respect in which the passivity of the intellect is

more strikingly revealed than in its submission to evidence. "These sceptics," says Diogenes, "deny the existence of any demonstration; of any test of truth." The blinding and perverting force of selfish passion and prejudice where moral issues are involved, being here out of view, the submission of the intellect to evidence is as stated. The human mind that would not be compelled to acquiesce in the demonstration that the three angles of a triangle are equal to two right angles or in the axiom that the whole is equal to all its parts, would be pronounced imbecile or idiotic; and a like failure to discern the equally valid moral distinctions as to things right and wrong, true and false, good and bad, would, under the kindly influences of our christian civilization, be cared for and treated as that of a lunatic.

Three centuries of Greek speculation preceded Pyrrho, extending from Thales downward and embracing the Academic, the Peripatetic, (308 B. C.) the Stoic and (306 B. C.) the Epicurean Schools, with all of whose founders he was a contemporary; and as he studied these pre-Socratic and post-Socratic systems, his mind sank into doubt and negation—not the Socratic doubt of the Academics, which balanced between the choice of positive probabilities; much less the doubt of the Cartesians, which has become the positive guarantee of certainty in our modern philosophy; but the doubt of unreality, for to him "the first principles of all things have no reality," which doubt leaves the mind a blank, or rather, a camera of unsubstantial images. His critical judgment could easily detect untenable elements in the schemes of his predecessors and contemporaries, and three alternatives were plainly open to him, (1) either the indiscriminate rejection of all, (2) an electic reconstruction by choosing the good and rejecting the

bad, or, (3) the positive substitution of a new and supposed better creation of thought. But Pyrrho's whole being moved away from the positive to the negative pole, he rejected all; and the issue in his mind was, as we have seen, the dreary subversion of all speculative knowledge, the denial of the existence and knowableness of all reality and of truth itself, for which he admitted no criterion and no distinctive character. It was speculatively the black, bottomless, hopeless and dreamy doubt of nihilism.

But human nature is often more sensible than human reason; its spontaneous activities often brush away like cobwebs men's fine spun speculations. Naturally enough Pyrrho practiced a better philosophy than he taught.

Aenesidemus, probably of the first century, A. D., says that 'Pyrrho studied philosophy on the principle of suspending his judgment on all points, without, however, on any occasion acting in an imprudent manner, or doing anything without due consideration, i. e., suspending judgment in all matters which do not refer to living and the preservation of life. Accordingly, say they, we avoid some things and we seek others, following custom in that; and we obey the laws.' Hence it is related that when, on a certain occasion, Pyrrho was driven back by a dog which was attacking him, he said to some one who blamed him for being discomposed, "that it was a difficult thing entirely to put off humanity; but that a man ought to strive with all his power to counteract circumstances with his actions if possible, and at all events with his reason." Horace says that one cannot drive out nature with a pitch-fork, and the law of self-preservation is by Pyrrho conceded to be stronger than theory and to bring the "actions" of the sceptic into discord with his "reason."

Hence, "he is represented on the one hand as a marvel of folly, on the other as a miracle of wisdom." For example: Diogenes says that "he never shunned anything and never guarded against anything, encountering every thing, even waggons for instance, and precipices, and dogs, and everything of that sort; committing nothing whatever to his senses. So that he used to be saved by his friends who accompanied him." But, on the other hand, Timon in one verse represents him as—

"The only man as happy as a god,"

Such contradictoriness of representation implies something more than an imperfection of the record; it seems to have arisen from the practical and confessed impossibility of acting in harmony with his theory.

It is not surprising that Pyrrho is differently estimated by different philosophers, for the portraiture of every one is necessarily somewhat personal, owing to his remains being second-hand, fragmentary and inconsistent, so that each one is left in good part to make his sketch from the colors on his own pallet. The fact is, the name of Pyrrho is highly typical, but the salient points of the above extracts and estimates sufficiently individualize his representative character as the father of scepticism. The paternity of many subsequent speculations is traceable to him. In the 17th century, the authors of the Port Royal Logic placed the following estimate on this system:

There are no absurdities too groundless to find supporters. Whoever determines to deceive the world, may be sure of finding people who are willing enough to be deceived, and the most absurd follies always find minds to which they are adapted. After seeing what a number are infatuated with the follies of judicial astrology, and that even grave persons treat this subject seriously, we need not be surprised at anything more. * * * We find others, on the contrary, who, having light enough to know that there are a number of things obscure and uncertain, and wishing, from another kind of vanity, to show that they are not led away by the

popular credulity take a pride in maintaining that there is nothing certain. They thus free themselves from the labor of examination, and on this evil principle they bring into doubt the most firmly established truths, and even religion itself. This is the source of Pyrrhonism (or scepticism) another extravagance of the human mind. * * * True reason places all things in the rank which belongs to them; it questions those which are doubtful, rejects those which are false, and acknowledges in good faith, those which are evident, without being embarrassed by the vain reasons of the Pyrrhonists, which never could, even in the minds of those who proposed them, destroy the reasonable assurance we have of many things. None ever seriously doubted the existence of the sun, the earth, the moon, or that the whole was greater than the parts. We may indeed easily say outwardly with the lips that we doubt of all these things, because it is possible for us to lie; but we cannot say this in our hearts. Thus Pyrrhonism is not a sect composed of men persuaded of what they say, but a sect of liars. Hence they often contradict themselves in uttering their opinion, since it is impossible for their hearts to agree with their language. We see this in Montaigne, who attempted to revive this sect in the last (16th) century. * * * Thus these disorders of the mind—the one leading to an inconsiderate belief of what is obscure and uncertain, the other to the doubting of what is clear and certain—have nevertheless a common origin, which is the neglect of attention which is necessary in order to discover the truth.—pp. 2-6.

On the contrary, Prof. Baynes in his note on this passage of the Port Royal Logic, holds that Pyrrho has done good service to philosophy, and that his "teaching consisted in showing that, since knowledge supposes relations, absolute knowledge is a contradiction." But it must have been a questionable *service*, for in his formal dialectics, Pyrrho seems to have set at defiance the law of identity, by repudiating all fixedness of predication; and also the law of contradiction, by holding that contradictions are entitled to equal belief and that "demonstration" is a fiction, so that "nothing is any more this than that;" and as to the matter or content of his logical forms, he held that the "first principles of all things have no reality;" and in addition to confounding all rational distinctions, he equally reduced all moral distinctions to a chaos by denying that anything is "honor-

able or disgraceful, just or unjust, good or bad." Certainly language must have lost all reliable significance, or such radical and sweeping negations are tantamount to the overthrow and annihilation not alone of "absolute knowledge" but of all knowledge. In its speculative attitude as well as in its suicidal practical recoil, by an appeal to the irrepressible spontaneity of human nature in its common sense utterances and activities, Pyrrhonism is a surprisingly complete anticipation of Hume. In fact, this Scotch sceptic and historian, who, as a philosopher, may be fairly viewed as Pyrrho's *alter ego*, seems to have borrowed the pallet of the Greek painter; and our Scotch professor certainly gives us a curious surprise in making Pyrrho the prototype of Hamilton instead of Hume.

Let us now make an immediate and silent descent across an interval of two thousand years, extending from the Greek Pyrrho, reputed "the true founder of scepticism," to the Scotch Hume (1711-1776), reputed "the prince of sceptics." The few extracts which will now be adduced, to reveal and epitomise his views, are of undoubted authenticity and genuineness, being in these respects unlike the conjectural extracts respecting Pyrrho:

It seems evident, that men are carried by a natural instinct or prepossession to repose faith in their senses; and that, without any reasoning, or even almost before the use of reason, we always suppose an external universe, which depends not on our perception, but would exist, though we and every sensible creature were absent or annihilated. Even the animal creation are governed by a like opinion, and preserve this belief of external objects, in all their thoughts, designs and actions.

It seems also evident, that when men follow this blind and powerful instinct of nature, they always suppose the very images presented by the senses, to be the external objects, and never entertain any suspicion that the one are nothing but representations of the other. This very table which we see white, and which we feel hard, is believed to exist, independent of our perception, and to be something external to our mind which perceives it. Our presence bestows not being on it: our absence does not annihilate

ti. It preserves its existence uniform and entire, independent of the situation of intelligent beings, who perceive or contemplate it.

But this universal and primary opinion of all men is soon destroyed by the slightest philosophy, which teaches us that nothing can ever be present to the mind but an image or perception, and that the senses are only the inlets through which these images are conveyed, without being able to produce any immediate intercourse between the mind and the object. The table, which we see, seems to diminish, as we remove further from it: but the real table, which exists, independent of us, suffers no alteration: it was therefore nothing but its image which was present to the mind. These are the obvious dictates of reason; and no man who reflects ever doubted, that the existences which we sonsider, when we say, this house and that tree, are nothing but perceptions in the mind, and fleeting copies or represencations of other existences which remain uniform and independent.

In all the incidents of life, we ought still to preserve our scepticism. If we believe that fire warms, or water refreshes, it is only because it costs too mucil pains to think otherwise.

Not only are the senses thus subverted but reason herself, as will immediately appear. Says Hume:

I have proved that these same principles, when carried further, and applied to every new reflex judgment, must, by continually diminishing the original evidence, at last reduce it to nothing, and utterly subvert all belief and opinion.

Again:

Reason first appears in possession of the throne, prescribing laws, and imposing maxims, with an absolute sway and authority. Her enemy, therefore, is obliged to take shelter under her protection, and by making use of rational arguments to prove the fallaciousness and imbecility of reason, produces, in a manner, a patent under her hand and seal. This patent has at first an authority of reason, from which it is derived. But as it is supposed to be contradictory to reason, it gradually diminishes the force of that governing power and its own at the same time; till at last they both vanish away into nothing, by a regular and just diminution.

"Nothing," nothingness or nihilism is, then, in Mr. Hume's own language, the upshot of his philosophy and he follows it to its utmost consequences:

I am uneasy to think I approve of one object, and disapprove of another; call one thing beautiful, and another deformed; decide concerning truth and falsehood, reason and folly, without knowing upon what principles I proceed. * * * For I have already shown that the understanding, when it acts alone, and according to its most general principles, entirely subverts itself, and leaves not the lowest degree of evidence in any proposition, either in philosophy or common life.

It is curious, as already intimated, that Hume seems so servilely to repeat Pyrrho. Pyrrho explained his practical inconsistency, by saying it was a difficult thing entirely to put off humanity, but that one should do so "with his actions if possible, and at all events with his reason." Hume draws the matter more deftly but, in precisely the same manner, concedes the practical absurdity of his scheme, thus:

> The great subverter of Pyrrhonism, or the excessive principles of scepticism, is action, and employment, and the occupations of common life. These principles may flourish and triumph in the schools, where it is indeed difficult, if not impossible, to refute them. But as soon as they leave the shade, and the presence of the real objects which actuate our passions and sentiments are put in opposition to the more powerful principles of our nature, they vanish like smoke, and leave the most determined sceptic in the same condition as other mortals.

But again:

> For here is the chief and most confounding objection to excessive scepticism, that no durable good can ever result from it, while it remains in its full force and vigor.
>
> We save ourselves from this total scepticism only by means of that singular and seemingly trivial property of the fancy, by which, with difficulty, we enter into remote views of things and are not able to accompany them with so sensible an impression, as we do those which are more easy and natural. * * We have therefore no choice left, but betwixt a false reason and none at all. For my part, I know not what ought to be done in the present case. I can only observe what is commonly done; which is, that this difficulty is seldom or never thought of.
>
> Most fortunately it happens, that since reason is incapable of dispelling these clouds, Nature herself suffices to that purpose, and cures me of this philosophical melancholy and delirium, either by relaxing this bent of mind, or by some avocation, and lively impressions of my senses, which obliterate all these chimeras. I dine, I play a game of backgammon, I converse, and am merry with my frienks; and when, after three or four hours' amusement, I would return to these speculations, they appear so cold, and strained, and ridiculous, that I cannot find in my heart to enter into them any further.
>
> Here, then, I find myself absolutely and necessarily determined to live, and talk, and act like other people in the common affairs of life. But notwithstanding my natural propensity, and the course of my animal spirits and passions reduce me to this indolent belief in the general maxims of the world, I still feel such

remains of my former disposition, that I am ready to throw all my books and papers into the fire, and resolve never more to renounce the pleasures of life for the sake of reasoning and philosophy. For those are my sentiments in that splenetic humor which governs me at present. I may, nay I must yield to the current of nature, in submitting to my senses and understanding; and in this blind submission, I show most perfectly my sceptical disposition and principles. * * No: if I must be a fool, as all those who reason or believe anything certainly are, my follies shall at least be natural and agreeable.

The foregoing extracts must suffice for indicating in the main our estimate of Hume on the present occasion, although it differs from that of some able critics.

Hamilton credits Hume with only a negative aim and result. He says "The sceptic, *qua* sceptic, cannot himself lay down his premises; he can only accept them from the dogmatist." * * "Hume was a sceptic; that is, he *accepted* the premises afforded him by the dogmatist and carried these premises to their legitimate consequences. To blame Hume, therefore, for not having doubted of his borrowed principles, is to blame the sceptic for not performing a part altogether inconsistent with his vocation." Now, it should be borne in mind, that Berkely had already destroyed matter, and that Hume undertook to show that, by the same process, or by parity of reasoning, the destruction of mind was inevitable. His fundamental position was expressed thus: "All the perceptions of the human mind resolve themselves into two distinct kinds, which I call *impressions* and *ideas*. The difference betwixt them consists in the degrees of force and liveliness with which they strike upon the mind and make their way into our thought or consciousness. Those perceptions which enter with most force and violence, we may name *impressions*, and under this name I comprehend all our sensations, passions and emotions, as they make their first appearance in the soul. By *ideas*, I mean the faint images of these in

thinking and reasoning." Matter and mind are resolved into a congeries of impressions and their fading pictures, so that the sum total of knowledge is phenomenal and only phenomenal. As already explained, this is nihilism. Hume swept away both matter and mind as substantive realities, and in spite of his utterly discrediting reason, his speculations then took a positive phase, and on the basis indicated in the above extract, respecting "impressions and ideas," he constructed a complete system of the human mind. If the office of a sceptic be purely negative, then Hume was something more than a sceptic, for, unlike Pyrrho, he assumed the aggressive role of a positive constructive philosopher. And so successful was he in this as to reduce the world to the *alternative* of accepting his positive system of phenomenalism or of reconstructing its philosophy, and the most notorious feature of the philosophy of the present is the fact that its votaries mainly fall into two groups, those who stand with Hume in his phenomenalism or positiveism and those who antagonize it and stand with Reid and Hamilton in their realism. Hamilton says: "The dilemma of Hume constitutes, perhaps, the most memorable crisis in the history of philosophy; for out of it the whole subsequent metaphysic of Europe has taken its rise." The actual dilemma was, as I have stated it, the alternative between nihilism and realism or phenomenalism and noumenalism. The battle still rages.

Hume was a Pyrrohonist, but he was more than a Pyrrohonist; he was a sceptic, but he was more than a sceptic; his criticism resulted not only in destructive nihilism, but in constructive nihilism. As a sceptic his aim was destructive and it succeeded in knocking many false props from under knowledge, but his renewal of the daring and sacrilegious attempt to destroy the

temple of knowledge itself, was a failure; yea, his bold assault only resulted in the foundations of knowledge being laid deeper and broader. But as Pascal happily says, and we have seen it illustrated in both Pyrrho and Hume,—"Nature subverts scepticism and reason subverts dogmatism:"

> Truth crushed to earth will rise again,
> The eternal years of God are hers.

The third name mentioned as in the van of nihilism, was that of J. G. Fichte, 1762-1814, A. D. He did not professedly play the role of the sceptic, but his idealistic dogmatism is even a more thoroughgoing nihilism than that of either Pyrrho or Hume. The following remarkable passage from Fichte's "Bestimmung des menschen," tells the whole story:

> The sum total is this: There is absolutely nothing permanent either without me or within me, but only an unceasing change. I know absolutely nothing of any existence, not even of my own. I myself know nothing and am nothing. Images (Bilder) there are; they constitute all that apparently exists, and what they know of themselves is after the manner of images; images that pass and vanish without then being aught to witness their transition; that consist in fact of the images of images, without significance and without an aim. I myself am one of these images; nay, I am not even thus much, but only a confused image of images. All reality is converted into a marvellous dream, without a life to dream, and without a mind to dream; with a dream made up only of a dream of itself. Perception is a dream; thought—the source of all the existence and all the reality which I imagine to myself of my existence, of my power, of my destination—is the dream of that dream.—H's Reid, p. 129*.

Such an utterance as this one of Fichte has on the individual mind a soporific influence and recalls the Nirwana, the Hindoo doctrine of the individual soul's extinguishment by being blown out like a lamp in the phraseology of Buddhism, that ancient system of Nihilism. (Max Muller's Chips, I. 279, 280.)

Travelers sometimes call our attention to a most remarkable phenomenon of nature which we, after the French, call a *mirage*. At one time, it may be the ap-

pearance of pools and lakes of water in sandy and desert places where water is most needed and least likely to occur; at another, it may be a calm flowing water, reflecting from its unruffled surface the trees growing on its banks, while objects in the background assume the appearance of splendid residences amidst groves of trees, or of castles embosomed in a forest of palms with outlying lakes dotted with verdant and beautiful little islands. The illusion is often so perfect in all its circumstances that the most experienced travelers and even the natives of the desert are deluded by it; and an experienced eastern traveler observes, that "no one can imagine, without actual experience, the delight and eager expectation, followed by the most intense and bitter disappointment, which the appearance of the mirage often occasions traveling parties, particularly when the supply of water which they are obliged to carry with them on their camels is nearly or quite exhausted."

"Still the same burning sun! no cloud in heaven!
"The hot air quivers, and the sultry mist
"Floats o'er the desert, with a show
"Of distant waters mocking their distress."

The phantom ship, which the early colonists of our country beheld in the air, as a supposed divine interposition in answer to their earnest cries to heaven for supplies to meet their desperate necessities, was but a mocking mirage. But may we not in all seriousness ask, whether the delusion of those who transmute these empty images into substantial realities is any greater than the delusion of those who change the life sustaining realities of the universe into the splendid mockery of a sceptical mirage. Surely it is a much more pleasing service which the great Shemitic peer of the Aryan Homer, renders, when, in his vision, he holds before us the literal realization of actual blessings as surprising as

the conversion of the illusion of the mirage into a substantial reality:

> Then shall be unclosed the eyes of the blind;
> And the ears of the deaf shall be opened:
> Then shall the lame bound like a hart,
> And the tongue of the dumb shall sing:
> For in the wilderness shall burst forth waters,
> And torrents in the desert:
> And the glowing sand shall become a poll,
> And the thirsty soil bubbling springs.

Let us rather welcome an excess of realism than the hollow and unatural emptiness of nihilism.

In the spring of 1874, James Parton, the well known author, was elected President of the "N. Y. Liberal Club," and on assuming the chair, among other things, said: "Here we are, this human race of ours, tossed upon this round ball of earth, naked and shelterless, sent rolling through space. *Why?*—we don't know; *whence?*—we don't know; and *whither?*—we don't know,—that is to say, I don't know. If there are any here so fortunate as to know, I tender them my respectful congratulations. But for my own part, I only clearly know that I don't know."

This is the inevitable outlook of faithless nihilism. No wonder that its gloom, which horrified the mind of Hume, should bewilder a Parton.

II. REALISM:

We now turn our thought from the dreary chaos of nihilism and seek a firmer footing upon the continent of realism. I have often thought of an incident when I was a college student. A letter was received from one of the last graduating class, giving a discription of his experience in a new line of study. "Yes boys," said George, "I am studying Hebrew; but I feel like a blind sheep in a millpond, for I can neither see shore nor touch bottom." The fact was, George was not a very

apt scholar in language; the difficulty was subjective and not objective, for this language is remarkable for its simplicity and perfection. And thus it is that the nihilist flounders, for to him the moral and physical reality, order and beauty of nature are a chaos—

> "A dark
> Illimitable ocean, without bound,
> Without dimension, where length breadth and height,
> And time and place, are lost; where endless night
> And chaos, ancestors of Nature, hold
> Eternal anarchy."

It is important at this point to recall the view that consciousness is the great storehouse of the materials, the fountain of the stream, the Bible of Philosophy. Consciousness is sometimes vaguely and popularly used for what may at any time have been a distinct matter of knowledge, as, I am not conscious of ever having made the remark attributed to me; and then, it has been understood in the too narrow sense of a particular faculty coordinate with other particular faculties and whose function or office it is to take note of their operations; whereas, the better view esteems consciousness as the root of our intelligence, so that the particular powers are only the modifications or sharers in common, each in its measure, of its vitality and energy. This generic view as distinguished from the popular and specific views, seems to define the nature of this canon of philosophy. But the nature and the sphere of the activity of this generic function of our intelligent being, may, for reasons which cannot now be canvassed, be viewed as threefold, i. e., (1) phenomenal, (2) noumenal and (3) inferential. However, as some limit consciousness entirely to the facts or phenomena of experience, the word intuition, which means the power of the immediate vision of truth on the apprehension of its evidence, whether that

evidence be direct or mediate, may with propriety be made to do duty in this tripple service; and then, our phenomenal intuition will coincide with consciousness and the noumenal and inferential intuitions will be distinctive. The bearing of this will be evident farther on, for as thus defined, intuition rather than consciousness is the true and valid criterion of philosophy. Of course the operation of intuition, like that of every other power, has its root in consciousness; but it is something more than consciousness, just as each specific power is consciousness *plus* a defferential element, as memory, thought, imagination, feeling, will, to all of which consciousness stands in common relation and each of which has its characteristic and discriminating form of energy. Consciousness is not coextensive either with mind or with mental activity.

The facts of consciousness have two aspects, as they are viewed simply as phenomenal appearances in some sense or other, or as they are viewed as evidencing somethiug other than themselves. It is the province of metaphysics to consider at large these facts of consciousness, subjectively or internally in relation to the mind knowing, and objectively or externally in relation to the things known. Psychology is the science of both classes of these facts of consciousness, as such, *inter se*; but ontology deals with these facts in relation to realities existing out of consciousness. When these facts are vacated of all substantial import, the world is an empty plantasmagoria and the result is nihilism; when credited with substantive validity, in whatever measure, a corresponding realism is the result.

As a matter of fact we have three specific forms of realism, viz., the unitarian, the dualistic and the theistic. Each of these must be briefly expounded.

1. Unitarian realism. This holds that the phenomena of consciousness, which are constitutive of the primary fact of knowledge, reveal substantial reality, but that this reality is one and single. There are three varieties of this unitarian form of realism. The first is idealism, which makes mind the only substance; the second is materialism, which makes matter the only substance; and the third is that of absolute identity, which views the properties of both mind and matter as the common properties of one supreme and all-comprehending substance. Each of these views will now receive a brief notice and in the order named.

(1.) The first, then, is idealism, according to which the one and only substantial reality is mind. The existence of mind, as a thinking substantive reality, is placed beyond doubt by a very simple enunciation. Let us drop the reins on the neck of doubt; and, without shrinking or reservation, boldly doubt of everything—of the existence of God, of the external world, doubt our own existence. But when it is said that all things are doubted, it is manifest that the doubt itself is excepted which did put all things else in subjection. It is obviously impossible to overthrow this doubt itself, for if you doubt of it, your doubting still remains as an ultimate and insuperable fact. But doubting is conscious thinking,—is a fact of consciousness. Now, to utilize a distinction just made and which is believed to be one of importance, as this act of thinking stands in the eye of phenomenal intuition, so the thinking self is cognized, not by inference from this fact, but directly, instantaneously, and necessarily by a power of the mind which I have ventured to call the noumenal intuition. As ordinarily interpreted, we cannot be conscious of self but only of the mental modification

through which self is mediately known or inferred: just as we are not conscious of our mental powers themselves, but only of their actions: whereas, there seems evidently to be an endowment directly cognizing self *and* its powers, as the logical antecedant or apriori condition of intuiting their operations, and this endowment is made distinctive and intelligible by designating it the noumenal intuition. However, if the function of consciousness itself be extended so as to embrace it, very well, provided it is understood.

This exposition covers the ground of Descartes' *Cogito, ergo sum.* This expression is sometimes viewed as an enthymeme, or syllogism with one premise suppressed; and by supplying it, the full argument would be: *whatever thinks exists*; I think; therefore, I exist. But the major premise, *whatever thinks exists*, is an abstract universal proposition, and therefore it is not in its primary and spontaneous form. The necessity and immediacy of the conjunction of thought and self are just as imperative in the original and concrete particular act of consciousness and intuition, as in the abstract universal form of reflection and logic. The *ergo* evidently leads away from the original concrete fact, in its spontaneous and intuitional form, to its scientific and formulated phase; just as the proposition, *every change must have a cause*, is not the original fact of intuition in its spontaneous form. The original judgment contemplates only an individual concrete change, as necessarily referable to an antecedent and adequate action of force; and the universal proposition is not properly a generalization upon a multitude of instances, but merely the unlimited statement of what is found true in every instance of a change. The repetitious instances do not furnish the particulars of an induction, but only particular illustra-

tions of the same identical primitive concrete judgment, so that reflection converts the concrete psychological judgment, by abstraction, into the universal logical judgment. Just so, *I think and I exist* is the primary concrete and complex psychological intuition; but the proposition taken as the major premise of Descartes' syllogism, *whatever thinks exists*, results from reflection and abstraction, but not from generalization, in the empirical sense, which can only enunciate what is and not what must be.

If I am asked how I know that I exist? and answer that I am conscious of it, the answer is seen, in the light of the foregoing exposition, to be valid and beyond the reach of doubt. A fact of phenomenal and of noumenal intuition may be explained and illustrated, but can neither be proved nor disproved; it is not amenable to logic, but only to common sense; and logic itself is possible, only on the assumption of the priority of the existence and authority of such realities.

Realism, then, has a sure footing, as to the substantial reality of self, which is the veritable warp of knowledge, however diverse and party colord may be its woof. The fact of human thought is assumed in all systems of philosophy, in all sciences and in all experience whether in self communion, in man's intercourse with man or with all things other than self. This substantial self-hood, which refutes and survives all nihilism, is literally our *pou sto*, a sure footing in the domain of reality, to which we gravitate by the necessities of our rational nature and from which all imagined escapes are illusory self-deceptions. Self is the terra firma of thought, from which our rational nature can no more escape than our bodies from the operation of the law of gravitation.

Now, what has just been set forth is the truth, but it is not the whole truth. Idealistic unitarian realism admits only the real or substantial existence of mind, but denies the substantial existence of matter. A few citations from Bishop Berkeley will complete all that need be said at present on this point:

> The table I write on, I say, exists, that is, I see and feel it; and if I were out of my study I should say it existed, meaning thereby that if I was in my study I might perceive it, or that some other spirit actually does perceive it. * * This is all that I can understand by these and the like expressions. For as to what is said of the absolute existence of unthinking things without any relation to their being perceived, that seems perfectly unintelligible. Their ESSE is PERCIPI, nor is it possible they should have any existence, out of the minds or thinking things which perceive them.
>
> It is indeed an opinion flagrantly prevalent amongst men, that houses, mountains, rivers, and in a word all sensible objects have an existence natural and real, distinct from their being perceived by the understanding. But with how great an assurance and acquiescence soever this principle may be entertained in the world; yet whoever shall find in his heart to call it in question, may, if I mistake not, perceive to involve a manifest contradiction.
>
> Some truths there are so near and obvious to the mind, that a man need only open his eyes to see them. Such I take this important one to be, to-wit, that all the choir of heaven and furniture of the earth, in a word all those bodies which compose the mighty frame of the world, have not any subsistence without a mind, that their being is to be perceived or known; that consequently so long as they are not actually perceived by me, or do not exist in my mind or that of any other created spirit, they must either have no existence at all, or else subsist in the mind of some eternal spirit: it being perfectly unintelligible and involving all the absurdity of abstraction, to attribute to any single part of them an existence independent of a spirit. To be convinced of which the reader need only reflect and try to separate in his own thoughts the being of a sensible thing from its being perceived.
>
> From what has been said, it follows, there is not any other substance than SPIRIT, or that which perceives.

Bishop Berkeley is acknowledged to be a representative idealistic realist, and the language of these extracts is too explicit to admit of any question that, whilst he gave to the external world a phenomenal and appa-

rent reality, he utterly denied its non-spiritual substantial reality and held that "there is not any other substance than spirit." But in his mind there was no question about the individual substantial reality of an infinite spirit or God, and of finite spirits. Matter is a phenomenon of mind.

(2.) The second form of unitarian realism goes to precisely the opposite extreme and holds that "there is not any other substance" than matter. Materialism, consequently, is the name by which this second form of unitarian realism is most familiarly known. As in idealism, or philosophic spiritualism, all the phenomena of matter are explained away as phenomena of mind, so in materialism, all the phenomena of mind are explained away as phenomena of matter. The unitarian psychologists reach this result by explaining all knowledge as consisting of transformed sensations, whether the philosopher's stone, by which this magical transmutation is effected, be the reflection of Locke, the association of others, or the two combined. *Nihil est in intellectu quod non fuit prius in sensu*—there is nothing in the intellect which was not previously a sensation. This is the accepted axiom of all such as hold this view. This adage is their only and universal rule for interpreting, translating and transforming the facts of consciousness. It has been wittily observed of the associational psychologists, that "whenever one of their fundamental assumptions is contradicted by the experience of manhood, it is easy to say that in infancy—a period of which anything can be affirmed, since nothing is remembered—it was strictly true. This is certainly making the most of early years. The small child is put into the association mill, and after a little brisk grinding is brought out with a complete set of mental furniture.

When the critic reaches the spot he is blandly told that the work is done, and the machinery put away. He is further warned that any search on his part will be useless; as the traces of manufacture have been entirely obliterated." The cultivators of various branches of physical science are much given to this materialistic realism. In that little book entitled "The Unseen Universe," which made a sensation at the time of its anonymous publication, but which is now known to be the joint product of the distinguished physicists Stewart and Tait, the case is put in the following striking language:

> Is there not, therefore, a reality about matter which there is not about mind? Can we conceive a single particle of matter to go out of the universe for six or eight hours and then to return to it; but do we not every day "see our consciousness disappearing" in the case of deep sleep, or in a swoon, and then returning to us again? Far be it from us to deny that we have something which is called consciousness, and is utterly distinct from matter and the properties of matter, as these are regarded in Physics. But may not the connection between the two be of this nature?—When a certain number of material particles, consisting of phosphorus, carbon, oxygen, hydrogen, nitrogen, and perhaps some others, are in consequence of the operations of their physical forces, in a certain position with respect to each other, and in a certain state of motion, consciousness is the result, but whenever this connection is brought to an end, there is also an end of consciousness and the sense of individual existence, while however the particles of phosphorus, carbon, etc., remain as truly as ever.
>
> Now this means that matter must be looked upon as mistress of the house, and consciousness as an occasional visitor whom she permits to take of her hospitality, turning him out of doors whenever the larder is empty. It is worth while to investigate the process of thought which gives rise to this curious conception of the economy of the universe.

In his work on the "Diseases of the Nervous System," which is widely circulated among the medical profession, Dr. Hammond "looks at the brain as a complex organ evolving a complex force—the mind." Again he says:

> The mind, therefore, as before stated, is a compound force evolved by the brain, and its elements are perception, intellect,

emotion and will. The sun likewise evolves a compound force, and its elements are light, heat and actinism. One of these forces, light, is again divisible into several primary colors, and the intellect of man, one of the mental forces, is made up of faculties. It would be easy to pursue the analogy still further, but enough has been said to indicate how clearly the relationship between brain and mind is that of matter and force.

The false intellectual conception is then a fixed result of the altered brain tissue, and is just as direct a consequence of cerebral action as is a thought from a healthy brain.

My own idea of insanity is based entirely on the fact, that as the healthy mind results from the healthy brain, so a disordered mind comes from a diseased brain.

In Vol. I, of Prof. Flint's Physiology, the following admirable passage from Longet is quoted with approval:

In his psychical relations, but in these only, man can constitute a distinct kingdom. Physiology has especially in view the acts which assimilate man to animals; it belongs to psychology to study and make known the faculties which separate him from them.

In Vol. IV, published a number of years later, it is laid down in the text, p. 377, "that there is and can be no intelligence without brain substance. * * * The brain is not, strictly speaking, the organ of the mind, but the mind is produced by the brain substance."

Dr. Maudsley criticises the proposition of Cabanis, "that the brain secretes thought as the liver secretes bile," because, he says, mind, the product of brain action, cannot, like bile, the product of liver action, "be observed and handled and dealt with as a palpable object." * * * "Nevertheless," he states, "it must be distinctly laid down, that mental action is as surely dependent on the nervous structure as the function of the liver confessedly is on the hepatic structure." It would seem, then, that Cabanis and Hammond and Flint and Maudsley, not to extend the list, hold substantially the same view of mind, as a mere phenomenal function of the nervous tissue.

At death the stomach will cease to secrete gastric juice, the liver will stop secreting bile, and nerve tissue—"brain substance" — will no longer functionate and evolve mind—a consequence too grave to be passed in silence and yet too obvious to escape the attention of the most unwary. But it is the object, in this connection, only to submit a statement without argument: and hence it is proper to mention to you, that in a thesis on the "Dual Constitution of Man," which thesis is accessible to you, I have canvassed this precise issue, as to the relation of mind to our nervous organism, and shown that it is not a function but a functioner of nerve force.

Prof. Huxley says: "There is every reason to believe that consciousness is a function of nervous matter." —(Huxley's Crit. and Add., 250.)

Prof. Tyndall says: "Besides the physical life dealt with by Mr. Darwin, there is a psychical life presenting similar gradations, and asking equally for a solution. * * I descern in that matter which we have hitherto covered with opprobrium, the promise and potency of all terrestrial life."—(Belfast Address revised by author, pp. 80 and 89.)

The year after Descartes' death, Thomas Hobbes of Malmesbury (1588-1679) published the work from which the following citations are made:

> Seeing the foundation of all true Ratiocination, is the constant Signification of words. * * * I will begin with the words Body and Spirit, which in the lauguage of the Schools are termed, Substances, Corporeall and Incorporeall. The Word Body, in the most general acceptance, signifieth that which filleth, or occupieth some certain room, or imagined place. * * * The same also is called Substance, that is to say, Subject to various accidents. * * And according to this acceptation of the word,substance and Body signifies the same thing; and, therefore, Substance incorporeall are words, which when they are joined together, destroy one another, as if a man should say, "An Incorporeall Body."

But Hobbes had pursued his studies in Paris, where

he was in constant intercourse with Gassendi (1592-1655) who attempted the revival of Epicureanism and is "styled the renewer in modern times of systematic materialism." The influence of these two names, for more than two hundred years, over the minds of those who have sympathized with or repeated their futile attempt to solve the problem of knowledge by clothing matter with the attributes of mind, thus cutting instead of untying the Gordian knot, has transcended consciousness and computation.

(3.) The third form of realistic unitarianism possesses a present interest, exceeding that of either of the other two forms. Those who stand on this ground do not attempt to destroy the substantiality of matter by making it a phenomenon of mind, as did the idealistic Berkeley; nor the substantiality of mind by making it a phenomenon of matter, as did the materialistic Hobbes; nor the annihilation of substantiality, as did Hume; but they maintain the hypothesis of a common substance to which belong equally the properties of matter and of mind. This view is very plainly set forth as the one which is maintained by Bain's work on "Mind and Body," in Appleton's International Scientific Series. He says, in the concluding paragraph of that work:

> The arguments for the two substances have, we believe, now entirely lost their validity; they are no longer compatible with ascertained science and clear thinking. The one substance, with two sets of properties, two sides, the physical and the mental, a double-faced unity, would appear to comply with all the exigencies of the case.

It is in this immediate connection that we must locate the philosophy of Herbert Spencer. As in the case of others, I will give you the opportunity to judge of his views from some of his own utterances, carefully and fairly selected. He says :

> The noumenon every where named as the antithesis of the

phenomenon, is, throughout, necessarily thought of as an actuality. It is rigorously impossible to conceive that our knowledge is a knowledge of appearances only, without at the same time conceiving a reality of which they are appearances; for appearance without reality is unthinkable.—First Principles, 2d ed., § 26.

We come down then finally to force as the ultimate of ultimates. * * Matter and motion, as we know them, are differently conditioned manifestations of force.—Ibid. §50.

Forces standing in certain relations, form the whole content of our idea of matter.—Ibid. §48.

The name you give me [materialist] is intended to imply that I identify mind with matter. I do no such thing. I identify mind with motion.—Psychology, 2d edi., § 271.

Here then we have force, in Spencer's own and unequivocal language, as ultimate and as standing in common relation to matter and mind, which are its conditioned manifestations; force, therefore, is the noumenon of which matter and mind are the phenomena and this force is with Spencer that ultimate reality in which subject and object are united.

And this brings us, he continues, to the true conclusion implied throughout the foregoing pages—the conclusion that it is one and the same Ultimate Reality which is manifested to us subjectively and objectively. For while the nature of that which is manifested under either form proves to be inscrutable, the order of its manifestations throughout all mental phenomena proves to be the same as the order of its manifestations throughout all material phenomena.

The law of Evolution holds of the inner world as it does of the outer world. On tracing up from its low and vague beginnings the intelligence which becomes so marvellous in the highest beings, we find that under whatever aspect contemplated, it presents a progressive transformation of like nature with the progressive transformation we trace in the Universe as a whole, no less than in each of its parts.—Psy. 1, § 273.

The last extract which will be brought forward is the closing language of First Principles:

Manifestly, the establishment of correlation and equivalence between the forces of the outer and the inner worlds, may be used to assimilate either to the other; according as we set out with one or other term. But he who rightly interprets the doctrine contained in this work, will see that neither of these terms can be taken as ultimate. He will see that though the relation of subject and object renders necessary to us these antithecal conceptions of Spirit and Matter; the one is no less than the other to be regarded as but a sign of the unknown Reality which underlies both.

You see, then, that matter and mind are with Spencer, the two Janus faces of force; his hypothesis is something more than a dynamical view of the material world, for he reduces mental phenomena to the same root.

There is, he says, a fundamental connection between nervous changes and psychical states.

You think of me as seeing no essential difference between mind and the material properties of brain. As well might I think of you as seeing no essential difference between music and the material properties of the piano from which it is evoked. * * * As the motion given to an automatic musical instrument passes through its specialized structure and comes out in the form of particular combinations of aerial pulses, simultaneous and successive; so the motion locked up in a man's food, added to that directly recieved through his senses, is transformed while passing through his nervous system into those combinations of nervous actions which on their subjective faces are thoughts and feelings.

Thus, impossible as it is to get immediate proof that feeling and nervous action are the inner and outer faces of the same change, yet, the hypothesis that they are so, harmonizes with all the observed facts.—Psy. 1, pp. 128, 129, 621-22.

Bear in mind that force is ultimate, that it is "that reality of which matter and mind are the opposite faces"; the phenomena of consciousness and of matter, "a shock in consciousness and molecular motion, are the subjective and objective phases of the same thing." Certainly sufficient evidence has been given, to justify our classification of this philosophy. Sometimes a classification is a virtual refutation.

Herbert Spencer is the recognised philosopher of evolution; he is the queen bee of the development hive and all the others, as Tyndall, Hæckel, Huxley and Darwin himself, are but working subordinates; Darwin is his great pack-horse naturalist; Huxley, his ungloved champion, hitting out from the shoulder miscellaneously; Tyndall and Hæckel and others are hewers of wood and drawers of water, whilst a numerous group of youth are acting as industrious blowers and strikers. But the

"great philosopher," as Mr. Darwin calls him, is the Vulcan of this smithy under the patronage of the gods, superior and inferior, of modern science, wherein mechanical force is transmuted into breathing forms and burning thoughts. Of late, as never before, his claims as the originator, formulator and philosopher of the revamped development hypothesis, known as Darwinism, are obtruded on the public as quite eclipsing the more modest and meritorious claims of Darwin himself.

But the smoke of battle has somewhat cleared away, reason has become calm and resumed the helm, and the outlook reveals the indisputable fact that spontaneous generation and the missing links are the sylla and charybdis between which no divine counsel nor guidance has enabled this Ulysses to steer his barque. The passage has not yet been made; and the philosophy of nescience seems after all not to know the way out of the fog.

The world usually proves to be discriminating and just, and our age will no doubt be looked back upon by the future as having aided but not as having superceded its own thinking. There has been all along a solid phalanx of scholars, scientists and thinkers in America, ready to accept of every contribution to science, from whatever source, but capable of distinguishing between facts and opinions, science and philosophy, and whose minds have never been bewildered by the glamour of Mr. Spencer's bold pretensions. Such men, as Henry and Guiot and Dana and Agassiz and Dawson, never gave in their adhesion; and Joseph Cook, the noted Boston Lecturer, in speaking, 1877, of Harvard, used this language :

> There is a school of rather small philosophy in Cambridge yonder, among a few young men, who, very unjustly to Harvard, are supposed by large portions of the public to represent the University. I happen to be a Harvard man, if you please, and ought

to know something of my alma mater. There is not a paving-stone or an elm tree in Cambridge that is not a treasure to me. Who does represent Harvard? Hermann Lotze and Frey and Beale rather than Herbert Spencer and Hæckel are the authorities which the strongest men at Cambridge revere.

And in the same course he thus speaks of Lotze:

Hermann Lotze, now commonly regarded as the greatest philosopher of the most intellectual of the nations, and who has left his mark on every scholar in Germany under forty years of age, is every where renowned for his physiological as well as for his metaphysical knowledge, and as an opponent of the mechanical theory of life. Hermann Lotze holds that the unity of consciousness is a fact absolutely incontrovertible and absolutely inexplicable on the theory of Mr. Spencer, that we are woven by a complex of physical arrangements and forces, having no coordinating power presiding over them all.

And he also says, in this last connection, that "there is not in Germany to-day, except Hæckel, a single professor of real eminence who teaches philosophical materialism."

Yes it is safe to notify our youth, that this Spencerian phase of unitarian realism has culminated and is now waning; and that the task, henceforth, will be to justly appreciate and profit by its contributions and its failure.

The hypothesis of absolute unitarian realism was perhaps never more simply and ingeniously conceived and enunciated than by Benedict Spinoza, a Holland Jew (1632—1677,) who declined salaried and honorable appointments and preferred to subsist by his own manual industry, rather than by implication to compromise his perfect freedom of thought. He has been called a reasoning mill; his procedure was deductive from his definition of substance, as "that which exists *in se* and is conceived *per se*," i. e., that only is substance which is self-existent and single. Postulating that in the nature of the case only substance and its qualities or modes can exist; also, that only things of the same kind can limit each

other: then, thought and extension would only be empty abstractions, unless referred as attributes to the self-existent substance which, by virture of being the only thing of its kind, is unlimited and, hence, infinite and eternal.

This substantive being, then, involves as attributes, infinite thought and infinite extension; these attributes involve an infinite number of finite determinations, and these determinations constitute the phenomenal world; those of the infinite thought giving rise to finite minds, those of the infinite extension to all material existences. Hence all things are but modes of the attributes of this infinite Being.

The philosophy of the absolute, convinced that mere phenomena cannot be self-existent realities, begins by inquiring after the principle from which they spring, the uniform and unchangeable basis which underlies all changing appearances. This philosophy has played a great part in the scientific history of the world. It formed the basis of the ancient speculations of the Asiatic world. It characterized some of the most remarkable phases of early Greek philosophy, particularly that of the Eleatie school (600 B.C.), founded by Xenophanes the monotheist, but his monotheism was pantheism Plato, with all the lofty grandeur of his sublime spirit, sought for the absolute in the archetypes existing in the divine mind. The Alexandrian philosophers proposed to themselves the same high argument; mingling their theories with the mysticism of the east, and even calling to their aid, the lights of the Christian revelation. In more recent times Spinoza gave currency to similar investigations, which were soon moulded into a stern and unflinching system of pantheism; and in him we see the model upon which the modern idealists of Germany have renewed their search into the absolute ground of all phenomena. The very first requisite, therefore, in understanding the rationale of the German philosophy is to fix the eye of the mind on the notion of THE ABSOLUTE, and thus to pass mentally beyond the bounds of changing, finite, conditioned existence, into the region of the unchangeable, the infinite the unconditioned. It is, in fact, in the various methods by which it is supposed that we are conducted to the absolute, whether by faith, intuition or reason, that the different phases of the German metaphysics have arisen.—Morell's Hist. Mod. Phil. 411.

Among these German systems, those of Schelling and Hegel have been most conspicuous in maintaining "that mind and matter are only phenomenal modifications of the same common substance."

2. Dualistic realism. This is the second generic form of realism, according to the analysis and enumera-

tion already given. The views under this head are also diverse, but they may be arranged in two groups,—(1) that of bastard dualism, and (2) that of legitimate dualism. That, however, which is characteristic of dualism is its intuition of the substantial reality of both mind and matter, as coexistent and distinct substances, each having its own attributes and laws of subsistence and operation. The oriental dualism of Zoroaster, which invaded the thought of Europe at the time of the transition from the old to the new civilization, has no significance in this special connection, however curious, important and indispensable it may be in the appreciation of the ethical, religious and speculative opinions of the early centuries of our era.

(1.) The three forms of spurious dualistic realism which may be now noticed are represented by Descartes, Leibnitz and Brown.

Descartes (1596-1650) was a Frenchman and excogitated his peculiar system of philosophy whilst on duty as a soldier. His mathematical genius placed under obligation all succeeding generations; but by striking out a new method in philosophy, he associated his name with that of Socrates and became the father of our modern philosophy. His system lives only as a curiosity, but his method of appealing directly to consciousness as affording an impregnable base of operations, survives and is not destined to perish.

In regard to the substantial objects of existence, Descartes recognized one self-existent and self-sufficient substance, God, and then matter and mind as derived and dependent, or created substances. These substantial entities we could not know except by virtue of their possession of attributes; each substance has its chief property, which constitutes its nature and essence, and

to which property all others are referred. Extension in length, breadth and depth, constitutes the nature of corporeal substance, and thought constitutes the nature of thinking substance. Every other thing which can be attributed to body presupposes extension and is only some mode of an extended thing; as also the things which we find in the mind, are only diverse modes of thinking. And so we can easily have two clear and distinct notions or ideas, one of a thinking substance, another of a corporeal substance, provided we accurately distinguish all the attributes of thought from the attributes of extension. (Principia, I, LI-LIV.)

This is about his own language; and we get at the heart of his system by observing that mind and matter, whose very natures are constituted of thought and extension, whilst coexistent and most intimately related, yet like two gasses mechanically mixed, do not influence each other. The pineal gland was made the seat of the soul, but the relation of body and soul is one of non-intercourse. This presents a striking double contrast to the two opposite extremes—that of Spencer's conversion of food into thought and that of Berkely's conversion of all corporeal things into ideas which ideas man eats and wears. The correspondence of the activities of soul and body is brought about by the direct agency of God, as each furnishes occasion; or, as another has expressed it: "It is God himself who by a law which he has established, when movements are determined in the brain, produces analogous modifications in the conscious mind. In like manner, suppose the mind has a volition to move the arm; this volition is, of itself inefficacious, but God in virtue of the same law, causes the answering motion in our limb. The organic changes, and the mental modifications, are nothing but simple conditions and are not

real causes; in short they are occasions or occasional causes."

Leibnitz (1646-1716) was a German of amazing versatility, originality, breadth and depth of intellect. His brilliant speculation as to the constitution of mind and matter is known as the system of preestablished harmony, and was occasioned apparently by the system of Descartes. He teaches, in his system, that compound bodies are made up of monads which are the ultimate elements, the dynamical atoms; that each soul is a monad and each monad is a miniature universe, having its inherent or immanent qualities and its sphere and series of allotted activities. Matter and mind thus constituted were, at the beginning, wound up like two clocks, to run forever in perfect harmony. All the contingencies of the universe were anticipated and provided for by its great author, and the involution of energy and intelligence was made equal to the possible evolution. The fact is, Leibnitz so far anticipated Spencer and Darwin in some fundamental features of their speculations, that it has attracted some attention. According to this system:

> God created the soul at first in such manner that it understands and represents to itself in corresponding order whatever passes in the body; and the body also, in such a manner that it must do of itself whatever the soul requires. Between the two substances which constitute this man, there would subsist the most perfect harmony. It is thus, no longer necessary to devise theories to account for the reciprocal intercourse of the material and spiritual substances. These have no communication, no reciprocal influence. The soul passes from one state, from one perception to another by virtue of its own nature. The body executes the series of its movements without any participation or interference of the soul therein. (Opera, ed. Erd., 520, a, et al.)

Again he says:

> I will not make a difficulty of saying that the soul moves the body; even as a Copernican speaks truly of the rising of the sun, a Platonist of the reality of matter, a Cartesian of the reality of sensible qualities, provided one understands them judiciously. I

believe, in like manner, that it is very true to say that substances act the one upon the other, provided it is understood that the one is a cause of the changes in the other, in consequence of the laws of their preestablished harmony. (Erd., 132, a.)

That is, it is proper to use this language of ordinary life, provided you understand by it something entirely different from what is ordinarily understood by it, for body and soul, according to Leibnitz, have really less influence on each other than two separate clocks vibrating near each other. The feeling of joy in the heart and the smile on the face, fear and palor, all corresponding bodily and mental states, are, according to this view, mere coincidences. I will translate for you another of his own brief expositions of his peculiar system, given in a letter just twenty years before his death and six years subsequent to his first formal disclosure of his system to Arnauld:

You say that you do not understand how I would be able to prove what I have advanced touching the communication or harmony of two substances so different as the soul and body. I truly believe that I have found the means of doing so: and behold how I undertake to satisfy you.

Figure to yourself two clocks which perfectly agree. Now that can be effected in three ways. The first consists in a mutual influence; the second is by assigning to them a skillful workman who may regulate them and put them in accord at every moment; the third is to make the two pendulums with so much art and exactness that one may be assured of their agreement everafter. Put, now, the soul and the body in the place of these two pendulums; their agreement can occur in one of these three ways. (1) The way of influence is that of the vulgar philosophy, but as one could not conceive of material particles which can pass from one of these substances into the other, it is necessary to abandon this belief. (2) The way of the continual assistance of the Creator is that of the system of occasional causes; but I hold that this is to make intervene a "Deus ex machina"—an artificial stage god—in a thing natural and ordidary, where, according to reason, God ought to co-operate only in the manner that He concurs in all other things natural. (3) Thus there remains only my hypothesis, that is to say, the way of harmony. God made, at the beginning, each of these two substances with such a nature that by following only its own proper laws, which it has received with its being, it accords in every respect with the other just as if there was a mutual influence or as if God continually extended to them an

influence beyond his general concurrence. Consequently, I have no need of proving anything, unless some one require that I prove that God is sufficiently skilful to employ this prevenient artifice of which we see some sparks even among men. Now, granting its possibility, you see that this [third] way is the most beautiful and the most worthy of him.

You have suspected that my explication would be opposed to the idea so different which you have of spirit and body; but you see in an instant that no one has better established their independence. For as long as one was obliged to explain their communication as miraculous, occasion has always been given a good many people to fear that the distinction between soul and body might not be as real as supposed, since the support of it is so far-fetched. I will not be displeased at your sounding persons of distinction upon the thoughts which I have just explained to you.—(Ibid. xxv.)

It should be observed that Descartes is not himself wholly responsible for what is here criticised as the Cartesian doctrine of assistance or occasional causes, as Malebranche and others endeavored by this shift to bring into consistency such of his views as that of animal organisms being soulless machines and of providence being a continual creation: *la conservation et la creation ne different qu'au regard de notre façon de penser, et non point en effet.* (Descartes' Oeuvres, ed. Simon, p. 93.) They judged that we experience sensations because God causes them to arise in the soul, on the occasion of the movements of matter, and when, in its turn, the soul wills to move the body, that it is God who moves the body for it. In like manner, the movements among bodies themselves is effected by God moving one body on occasion of the movement of another body. (Erd. 127.) Descarte's own view that the soul exercised a directive influence over the body and was susceptible of the action of the animal spirits (Les Pass., pt. 1, § 34) was lost sight of by his followers; and yet Leibnitz repetitiously appeals to his mathematics, in which he was the compeer of Newton and of Descartes, to prove the paralogism that the quantity of direction is as fixed in the un-

iverse as that of moving force, so that bodies must be just as independent of the soul in their direction as in the quantity of their moving force; and he even goes so far as to express the opinion that if Descartes had known of this, as he terms it, new law of nature as to direction, he would have been led to the discovery of the system of pre-established harmony. By the modified Cartesian system, all efficiency was abstracted from both mind and matter and the only efficient operative energy was that of God, who so timed and regulated his action in the lines of material and of mental phenomena that they as perfectly accorded as if each, by its own susceptibility, responded to the efficiency of the other. Whereas, in the system of Leibnitz, this responsiveness or accordance was equally perfect but it was by virtue, not of any present influence of God on either mind or matter, nor of any influence of either on the other, but wholly on account of the original constitution and store of energy lodged in mind and matter at their creation. He frequently objects to the Cartesian system that it makes God a sort of stage convenience, for the denouement of the piece by moving the body, as the soul wills, and giving perceptions to the soul, as the body requires; and that thus, in a most unphilosophic manner, a perpetual miracle is performed in maintaining the ostensible intercourse of these two substances. However untenable the Cartesian system itself may be, I must be allowed to quote with approval the apt reply of Bayle, in the article of his Dictionary on Rorarius, that nothing can properly be called a miracle which is brought about as an instance of an established method of procedure, i. e., according to law. He says: "The system of *occasional causes* does not bring in God acting miraculously. I am as much persuaded as ever I

was," he continues, "that an action cannot be said to be miraculous, unless God produces it as an exception to general laws; and that everything of which he is immediately the author according to those laws, is distinct from a miracle properly so called":—i. e., as it was esteemed by the Cartesian, God's ordinary mode of operation could not in whole nor in part be properly termed miraculous. I will add that those who speak of the miracle of creation, talk wildly, for a creation is not a miracle: a miracle implies, first, an established order of nature, whereas creation, if it mean anything, does not presuppose but initiates that order; and second, a miracle implies a departure from or interruption of the order of nature, whereas, in creation, there is not yet any order to be interrupted. Hence, to talk of the miracle of creation is to talk nonsense,—I mean that it is to use language to which no intelligible meaning can possibly attach, because of the confusion of thought necessarily implied. The fact is, for precisely opposite reasons, no such thing as a miracle was possible upon the hypothesis of either Descartes or Leibnitz.

To the objection urged against his own system, that it was an extraordinary affair and had too little of God, whilst he charged that Cartesianism had too much of God, Leibnitz made answer:

> But I admit the supernatural only at the beginning, at the first formation of things; after that, the formation of animals and the relation between soul and body, are as natural as the most ordinary operations of nature. (Opera, edit. Erd., p. 476, a.)

The only question, in his view, was as to the competence and wisdom of God in so constituting the elements or monads of the universe with dynamic powers, with immanent attributes, as to place the resources of Deity under no farther requisition. It is easy to see, under the Cartesian wing of these speculations, the egg

of Pantheism, and under the Leibnitzian wing, the egg of Atheism, both of which were hatched subsequently. As a matter of fact, Spinoza, stopping short with Descartes' definition of substance as a being self existent and self sufficient, rejected his qualifications respecting created substances and left God alone as the sole existent and efficient substance; and Leibnitz, to escape this consequence of the obliteration of the inherent efficiency of second causes, grandly assumed that God made the universe at its creation the depository of immanent power, wisdom and all attributes adequate to all its necessities and contingencies, as it should ever after flow outward and onward in the commingling but entirely distinct and perfectly accordant streams of physical and psychical life,—thus removing God so far from view as to be forgotten, and investing the universe with so much of God as to be substituted by evolutionism in his place. Pantheism has always amounted to the denial of any efficient finite substance; and Atheism, to the denial, or removal out of view and recognition, of any efficient infinite substance; but these extremes meet in Atheism, for if all things are God there certainly is no God. This, however, is an anticipation of theistic realism.

Leibnitz's own estimate of his system of dualistic realism, in which mind and matter stand so peculiarly correlated, is characteristic and points a moral of value to even the most gifted. From being a Cartesian (Erd. p. 48,) and then leaning to the pantheistic views of Spinoza (p. 206), an article in Bayle's Dictionary on Rorarius seems to have aided in causing a recoil which carried Leibnitz back through the camp of the Cartesians into the paradise of his newly discovered pre-established harmony. Thenceforth he assumed the sobri-

quet of Theophilus, the friend of God instead of Spinozan Atheist, and from his new standpoint, he looked down on all other and, as he esteemed them, inferior systems with an air of supreme satisfaction and complacent triumph, indicated in the following passage in dialogue from the first chapter of his elaborate criticism of Locke's "Essay on Human Understanding:"

I must tell you as news," he says in the character of one of the interlocutors, "that I am no longer a Cartesian, and that I am farther than ever removed from your Gassendi. I have been struck with a new system which puts a new face on the interior of things. This system seems to ally Plato with Democritus, Aristotle with Descartes, the Scholastics with the Moderns, Theology and Ethics with reason. It seems to take the best from all sides and to go far beyond what has been hitherto attained. I find here an intelligible explanation of the union of soul and body, a thing of which I had previously despaired. * * * I see now what Plato meant when he took matter for an imperfect and transitory existence; what Aristotle understood by his entelechy; what is the promise of another life, which, according to Pliny, Democritus himself was accustomed to make; how far the Sceptics were reasonable in declaiming against the authority of the senses; how animals are automatons according to Descartes and yet have souls and sentiment according to popular opinion; how various others with a show of reason attributed life and perception to all things; how the laws of nature, of which a good part were unknown before the birth of this system, take their origin from principles superior to matter, although indeed all matter acts mechanically, wherein the spiritualising authors, whom I have just named, had blundered even as the Cartesians by supposing that immaterial substances change if not the force at least the direction or determination of material bodies; whereas, according to the new system, the soul and the body perfectly observe their laws, each its own, and yet each obeys the other so far forth as is necessary:

And thus he proceeds beyond the limits of our following him, to pour forth the diverse reasons for his enraptured exultation over a system, which seemed to him to gather all that was valuable out of all other systems of all the ages, to escape their errors and to clothe the universe and its supremely exalted Creator in the glorious garments of the sunlight of truth itself. To our awakened view, this gorgeous speculation of two centu-

ries ago, is like the vision of a brain intoxicated with hashish. It was only a mirage! which did not satisty but only mocked the soul athirst for truth.

The third phase of spurious dualistic realism can only be conventionally represented by Brown, or by any other individual name; his name was suggested as representative, mainly because it has been made to bear the brunt of the most terrible onslaught ever made upon this philosophic hypothesis, which holds that, whilst the mind is intuitively apprised of its own existence, it has no such intuition of an external reality nor of aught outside of or other than the mind itself and its modifications; but at the same time, as a matter of unfaltering faith, it holds to the reality of matter and of an external world. We know self, but only believe in not self. This is a hybrid dualism. From Empedocles, 500 B. C., downward, the vicious axiom has been widely accepted that *like is only known by like*—that the object known must be of a nature like that of the knowing mind. Hence, either a mental modification has been taken as the symbol of the outlying external reality supposed to exist in answer to it, or else some refined species or filmy, unsubstantial, natural or supernatural *tertium quid*, has been installed as mediating between the knowing mind and the external world—between the *ego* and the external *non ego*, between mind and matter.

This acceptance of mind as certainly existing because known intuitively, and of matter as only suppposed or conjectured to be as the suitable explanation of a knowledge we may have of something other than itself, which represents it or suggests it to the knowing mind, places matter on a different footing from mind, by excluding it from the pale of intuition or immediate knowledge, and hence, as tested by the standard of legitimacy

which requires matter and mind to be on the same footing, matter is on this view acknowledged only as a bastard reality. By whatever shading, subtlety or refinement, matter and mind are denied an equally legitimate recognition as equally objects of immediate knowledge, all thus holding should, in the view which presides over the present discussion, be set down here as spurious dualistic realists. To this group many Platonists and a host of philosophers of different ages belong.

(2). Legitimate Dualistic realism. It was stated at the opening of the foregoing review of speculative hypotheses, that the hypothesis esteemed capable of vindication and hence legitimate and true, would be reserved to the last. The point is now reached where that ordeal must be passed.

The one point to be maintained is that matter and mind, phenomenally and substantially, are both equally objects of immediate knowledge; that neither rests on inference, and that each as known has as good a title to recognized reality as the other. They are twin sisters in the family of knowledge, without either having the advantage over the other of a superior claim to legitimacy or to the right of primogeniture.

Properly understood, it would seem that nothing could be more simple than the case before us. All the conditions of the problem are in the possession of every human being, so that there is no occasion to compass sea and land to gather the materials or to qualify one for an appreciation of its solution. It has too generally escaped attention, that metaphysics is not genetic but exegetic. Its business is not the creation of something new, but the faithful interpretation of what already exists. And as the question before us is not primarily one of logic but

of exposition, or interpretation, our appeal must be directed to each one's own common sense.

A simple concrete case, comprehensive of all the issues in question, will first be submitted in its spontaneous and simple form, wherein will appear only the common ground on which all stand; and then the abstract formulation of its supposed contents, where divergencies arise, will receive attention.

I am seated on a chair, with my arm resting on a table, pencil in hand, writing on a pad; my feet are crossed and resting on the floor. In this situation, without the slightest volition, my body, at several widely separated points, is in contact with surrounding objects which I immediately ascertain to be no part of my body, by rising and stepping away from them. Then, I resume my position as described and find myself experiencing again, the same firm support of and resistence to different parts of my person. There is here, in the main, no exertion of will; and yet the contacts with the chair and floor and table are sensibly felt. All this occurs when the body is in a relaxed, wearied and passive condition, and when there is no resistance of any voluntary effort, no arrest of any muscular exertion. The force exerted is wholly physical and yet I have an experience, a consciousness, of contacts and pressure and resistance, of an arrest of a tendency of the body to descend toward or below the floor, independently of any voluntary or conscious exertion by me of any energy. All this is a most palpable and matter of course knowledge of a simple state of fact, which is so natural and unconstrained that it would quite escape notice, were not attention deliberately fixed upon it. This knowledge is immediate and not the result of any process of inference or reasoning—I alight on it by simple introspection. It is a matter of

observation, and observation is a listening to nature, whereas experiment is a catechising of nature.

Undoubtedly, here is knowledge, a common sense knowledge, such as every human being has daily of himself and of something not himself. There is no conjecture nor speculation about it. It is plain matter of fact, which no one questions, nor can question, any more than he can question his own existence.

Now, what is contained in this concrete state of fact? This is a proper inquiry and our exegesis or explanation of this state of fact, must furnish the answer which we seek. The knowledge we have of these contacts, pressure and resistance as described, is sense-perception. This knowledge by perception, as we have seen, is not a matter of inference or reasoning, but an immediate or conscious knowledge of the states or affections of my physical organism, due to its contact with surrounding bodies with whose existence, so far forth as in immediate contact therewith, I am thereby made acquainted. If this contact be changed, the feeling or sensation alters correspondingly. In the case given, the feeling or perception exists only to the extent of actual contacts. If I rise and stand on my feet, free from contact with surrounding objects, except the floor, the feeling or perception of pressure is limited to the feet which alone are affected by the actual pressure from supporting the weight of the body. If one foot be raised, the sensation is then confined to the foot that remains in actual contact with the supporting body. If I again resume my position, in my seat by my writing desk, as at first described, the contacts are again felt as already described at several points, and over varying extents of surface, and separated from each other. This experience of a separation or relative *outness* of these affections and

affected parts should be particularly noted, as an instance of the direct cognition of an extended body, an experience of concrete extension. Moreover, the affections of these different parts are known at the same time and not successively. Reflect on this and see if the knowledge of the changed condition of the different parts affected is not taken in at once, and that no account whatever is taken of their nearness to or remoteness from the head. If, now, the will is brought into action on some part of the body, we have a like result as to the location and immediacy of the consequent affection of the part. Suppose attention be turned on the writing and the fingers are made to squeeze the pencil more tightly and then to relax,—the resistance to the muscular exertion is known by us, or perceived only where and when it occurs in fact, viz., at the ends of the fingers holding the pencil and at the very time of the volition. Now, join with me in the experiment and press your big toe against the floor. Are you not conscious of the resistance at the time and place of its occurrence? Repetition does not vary the result, and it cannot be denied that our knowledge of the resistance seems to be located in the toe just where and when it occurs. If this experiment be again varied and the contact with different parts of the body, as actual experiment has shown, be effected by a movement from without inward, instead of from within outward, the result is found to be identically the same, as the impressions made simultaneously on different parts of the bodily organism, if proper care be taken as to their relative sensibility, are felt instantaneously and simultaneously, and not successively at intervals corresponding to the relative distances of the parts affected from the head or any other imagined seat of sensation within the organism.

Without unduly extending this line of inquiry, remark that the sensations of touch or contact of pressure and muscular resistence are precisely the same in kind as all other sensations; and whilst it may not be satisfactory to say with Democritus that all sensations are only modifications of touch, it is doubtless true that no sensation is felt apart from an affection of our bodily organism.

In our exposition we have now reached the point where we are prepared to say that we see two things very plainly—one is, that we know our bodily selves; and the other, that we know something other than our bodily selves, it may be in contact therewith but separate or separable from the same. This knowledge does not result from reasoning or argument; it is not matter of inference or proof. You can neither prove it nor disprove it. It is self-evident—immediate, intuitive, indisputable.

That which is other than ourselves we may term the external *non ego.* And we have seen that it is only so much of this external *non ego* as is in direct or immediate sensible contact with our bodily *ego*, that we immediately and most certainly know. The portion of the house or of any surroundings, in contact with my physical organism, we have already plainly seen that I as consciously know as I do my own hand or foot. What is thus directly cognized may be termed the proximate external *non ego.* It is because we are thus conscious of so much of the external *non-ego* as is immediately in contact with our bodily selves, that, by analogy, corresponding reality and certainty of ixistence are ascribed to all other external things near and remote. I confidently submit that it is not possible for us to divest ourselves of the conviction and spontaneous recognition of the proximate external *non ego* as an existing reality, and

also as proof against all illusion, deception and fraud. In accordance with Reid and others, we may view the remote external *non-ego* as suggested by the proximate, but not the proximate itself, as thus suggested or inferred. We believe the proximate external *non-ego* to exist as an objective, extended reality because we intuitively know it to exist; but we believe the remote to exist only by analogy of appearance and inference. The proximate basis of faith is knowledge. The senses never deceive us within their appropriate sphere of action; and it must be borne in mind continually, that one sense cannot do the work of another. Each sense is discriminated from every other, but no sense has a vicarious function. By the eye we see only an image, or colored extension, and by acquired habit discriminate distances: so far as the eye is concerned, the house around me has no more reality than smoke. But if I undertake to pass though what appears to be a wall, the muscular sense of resistance reveals solidity in relation to voluntary movement, as the sensation of pressure reveals the same solidity in an involuntary relation; the tactile sense, as in Cheselden's case, can also give the superficies and forms of solids, and in general, when the senses are interpreted aright and each is allotted its proper testimony, the testimony as given is true; if any illusion arises it is from not attending to the checks of sense and of reason on sense, so as to put a truthful interpretation on the testimony given. The senses are not responsible for their misinterpretation. No man is conscious of the past, nor of the future, nor of the distant. No man is conscious of the sun in the heavens, but every one with his eyes open and turned toward that object must perceive the evidence of its existence in the image of it formed in his eye.

For we are percipient of nothing but what is in proximate contact, in immediate relation, with our organs of sense. Distant realities we reach not by perception, but by a subsequent process of inference founded therein. * * * It is sufficient to establish the simple fact, that we are competent, as consciousness assures us, immediately to apprehend through sense the [proximate external] non-ego in certain limited relations; and it is of no consequence whatever, either to our certainty of the reality of a material world, or to our ultimate knowlede of its properties, whether by this primary apprehension we lay hold, in the first instance, on a large or a less portion of its contents.—(H.'s Reid p. 814 a. and Hamilton's Lectures on Met. p. 315.)

That portion of the material world which is brought into immediate contact with our sensitive organism is the terra firma, the sure and indestructible foundation, on which we build. To the extent that the world thus encompasses us and presses upon us, we as certainly and as directly know it as we know ourselves; in fact, we only the more certainly know ourselves by their discrimination from this immediately intuited external non ego, as something not ourselves and no part of ourselves; and from the certain existence and reality of what is thus most certainly known, by analogy the equal reality of what lies outside of the present sphere of intuition is allowed by an immediate and justifiable inference. The external world is not, therefore, a fiction, a dream, a mental fabrication, a phantom, nor a mere object of possible knowledge, or at best only an unknown something believed in through some natural and constraining suggestions and impulse from the floating play of symbolic impressions and ideas. It is found to be a solid prosaic reality, at whatever point we come in contact therewith, and hence, judging so much of it as is unknown from what is thus consciously and solidly known, the human mind has, in all ages, instinctively, without logic and without reasoning, accepted the reality of the entire external world as resting upon a footing as secure as that of our individual existence. In this respect, there-

fore, the faith of the vulgar is the true faith of the philosopher, with only this difference, that the philosopher gives as a reason for the faith that is common the knowledge that is common: and every adventurous vessel that has loosed the flukes of its anchor from the bed-rock of this harbor of common sense and common consciousness, has been dismantled and drifted to sea as a rudderless and unmanageable hulk, by the storms and cross-currents of the unfathomable ocean of lawless speculation. Our anchorage is in the stable, clear, indisputable and insuperable intuition of the non ego. It is believed that the foregoing exposition of this most critical fact of experience as to the external world, will commend itself, as natural and truthful, to every intelligent and reflecting mind. Each one is in possession of all that is material to an independent opinion, as to whether the interpretation given faithfully mirror's the workings of his own mind. Be sure of the precise meaning of the necessarily somewhat technical language used, and then check off the errors if any be detected, and the author of this attempt to act as nature's interpreter will be placed under sincere and lasting obligations by being made acquainted with any criticisms thus elicited. Your attention is specially challenged in this exposition of dualistic realism, to the primary point of departure here taken as located in the intuition and discrimination of the external *non ego*, as different from, and yet, as being as certainly known, as we know our complex selves. It is a most remarkable fact and worthy of special note, as we shall see, that as we intuit, phenomenally and noumenally, only a segment of the whole sphere of the external *non ego*, so in like manner do we intuit only a small segment of the sphere of the internal complex personal ego. The subconscious or latent modifications of mind,

and the subconscious modifications of the physical organism in all its vital functions, constitute respectively a terra incognita relatively comparable to the terra incognita of the external world; but in each, the unknown must not be allowed to usurp the place of the known. My ignorance only heightens the value of my knowledge, as the density of the surrounding darkness only gives increased importance to the lighted lamp which I carry in my hand, or wear upon my brow as a miner delving for hidden treasures in the deep depths of the bowels of the earth. Here, again, we are brought to the border land and behold that the real transcends the known and the knowable, and that the outlying domains beyond the utmost boundary of the immediate knowledge of consciousness and intuition, internal and external, is the sacred and inalienable inheritance of faith. Faith presupposes and transcends knowledge with respect both of the *ego* and to the *non ego*.

It would be a waste of time to dwell on the fact that the common sense of men, without any refinements of speculation, has in all ages and among all peoples grasped the substantial truth that the external world is as real as our bodily selves. Those who have battled most stoutly against the soundness of this spontaneous judgment, concede its universal and obstinate reality. Lewes remarks that "all the stories about Pyrrho which pretend to illustrate the effects of his scepticism in real life are too trivial for refutation." In a passage already quoted, Hume concedes that "The great subverter of Pyrrhonism, or the excessive principles of scepticism, is action and employment, and the occupations of common life. These principles," he continues, "may flourish and triumph in the schools, where it is indeed difficult, it not impossible, to refute them. But as soon as they

leave the shade, and are put in the presence of the real objects which actuate our passions and sentiments, and in opposition to the more powerful principles of our nature, they vanish like smoke, and leave the most determined sceptic in the same condition as other mortals." Shelling labors to explain the fact "that mankind at large believe in the reality of an external world," and "that the man of common sense believes, and will not but believe that the object he is conscious of perceiving is the real one." Berkely says: "The former—the vulgar—are of opinion that those things they immediately perceive are the real things." It is pertinent to quote, in this immediate connection, the following passage from Sir William Hamilton:

> The past history of philosophy has, in a great measure, been only a history of variation and error ("variasse erroris est); yet the cause of this variation being known, we obtain a valid ground of hope for the destiny of philosophy in future. Because, since philosophy has hitherto been inconsistent with itself, only in being inconsistent with the dictates of our natural beliefs—
>
> For Truth is Catholic, and Nature one;
>
> it follows, that peilosophy has simply to return to natural consciousness, to return to unity and truth.

The other aspect of the case to which attention was asked is that in which we know our corporeal selves as distinct from what surrounds us just as we have seen that we know the proximate external *ego* as not self. When we restrict our attention to this inner sphere, the question recurs with renewed and peculiar interest and force, whether the distinction between self and not-self—between subject and object, between mind and matter, can be detected and expounded even here. As the object of our research and as man knows himself, he does not exist as pure spirit nor as pure body, but as a union of body and spirit in one individual person. My definition of sensation that it is an individual's consciousness of any modification of his nervous organism, is believed to be

valid in the case of each of the senses, and it is the basis of a new analysis of the senses considerably increasing the list beyond five. I do not say the modification of physical organism, because the total nerve matter in man only averages in weight about one-fortieth part of the weight of the body, and yet its distribution is so very minute and ramified that, roughly, the expression modification of the physical organism might be supposed a proper substitute for the modification of the nervous organism; but, as a matter of fact, this would be wide of the mark, for, not only are certain portions of the body as the hair, nails, cartilages and tendons wholly outside of all nervous distribution and hence destitute of contractility and sensibility, but the sympathetic portion of the nervous system which functions the internal and vital organs, as the lungs, heart, stomach, intestines, liver, kidneys, blood vessels, &c., is quite sub-conscious, or outside of the sphere of consciousness—so that, it is only a portion of even the nervous organism, strictly speaking, whose modifications are properly embraced within the above definition of sensation. It is a matter of familiar demonstration, that by destroying the sensory nerve supply of any limb, as the arm or leg, and then lacerating it by cutting or burning, though seen to affect these members of one's body, it makes no more impression than cutting or burning one's coat tail. They are, then, as foreign to consciousness as billets of wood hung upon us with strings. The following passages from Descartes who was an anatomist, are exceedingly interesting in this connection:

"I remark here first of all," he says, "that there is a great difference between the spirit and the body in this, that the body, from its nature, is always divisible and that the spirit is entirely indivisible; for, in fact, when I consider myself in so far as I am only a thing which thinks, I do not distinguish in myself any parts, but I

know and conceive very clearly that I am a thing absolutely one and entire; and though the entire spirit seems to be united to the entire body, yet when a foot or any other part is separated from it, I know perfectly well that nothing on this account has been taken away from my spirit; and the faculties of willing, of feeling, of conceiving, &c., cannot be properly termed its parts, for it is the same spirit which, in its totality ("tout entier"), is employed in willing, and which in its totality is employed in feeling, in conceiving, &c., but it is altogether contrary in things corporeal and extended."

Again he says:

"Nature has also taught me by the sensations of pain, hunger, thirst, &c., that I am not merely lodged in my body, as a pilot in his boat, but that I am united with it very intimately and in such manner confounded and mixed up with it that I compose with it a single individual. For if this were not so, when my body is wounded I would not feel on that account any pain, I who am only a thing which thinks; but I would perceive this injury by the understanding only, as a pilot by his sight, if something is broken in his vessel; and when my body has need of drinking or of eating, I would simply know this, even without being notified of it by vague sensations of hunger and thirst; for in truth all these sensations of hunger, thirst, pain, &c., are no other thing than certain confused modes of thinking which proceed from and depend on the mind and as it were the mixture of the spirit with the body." —(Descartes' Oeuvres, edit. Simon, pp. 124 and 120.)

These passages point with pertinence to the simplicity and persistent oneness and integrity of the conscious spirit in man, and within certain limitations, the presentation is unassailable. So long as the cord above the third cervical vertebra, and the vital point of the medulla, which by reflex action function respiration on which the circulation of the blood and consequent nutrition depend, be left intact, conscious sensation and voluntary movements are supposed to be detected in the mutilated organism. When, thus, we descend to the region of this dim twilight of corporeal life, the mental and physical forces still seem to be face to face in the co-action of spirit and body.

The citadel of materialism which sees only two faces here, as under all other conditions, of a single force is in the supposed function of the nerve cell in its relation

to the nerve fibre. The two ultimate anatomical elements of the nerve matter or tissue are the cell and the fibre. It is conveniently assumed that the fibres originate from the cells and that the cells evolve all the nerve force whose transmutations present the phenomena of thought, feeling and will. The favorite illustration drawn from the electric battery and circuit is a most unfortunate one, for in that case it is known that the wire conductors are metallic continuations of the poles of the battery, that a force is in fact conducted and that the force conducted is generated in the cells; whereas, in the nervous system, it is not known that the fibre has any such connection with the so-called cell, nor that the cell evolves any force whatever, nor that the fibre conducts anything at all, much less in the manner of a telegraph wire. As to the essential point of the connection of the fibre with the cell, the present state of science is seen in the following language:

> In the present state of our knowledge, however well we may be acquainted with the peripheric termination of a great number of nerve fibres, it cannot be said that the mode of the central origin of any single fibril has hitherto been proved.

This is the language of Max Schultze, than whom there is no higher authority, and it is quoted with approval in a recent edition of Gray's Anatomy. The various diagrammatic schemes, such as are presented in some physiologies and in Herbert Spencer's Psychology, for exhibiting the cell origin of nerve fibre and nerve force, are figments of the imagination and not portraitures of nature. It is astonishing with what assurance the critical and sacred facts of nature—in this most important domain of inquiry—have been supplanted by the veriest romancing, which utterly deceives and misleads the unwary. When such men as Huxley and Maudsley and others teach these nerve cell fictions for facts,

and none know it better than themselves, they remind us of the heathen priests described by Juvenal, who, whilst ministering at the altars of their false gods, farcically laughed in each others' faces, when they looked under their sleeves. This mockery of nature, by those who have been honored as her priests and interpreters, should be tolerated no longer. It is not known that any nerve force, little or much, wise or stupid, originates in the cell at all; it is at best a mere conjecture. Besides, it is perfectly certain that the fibre—the *axis cylinder*—and not the cell, is the fundamental element of the nervous organism, and hence the cell must be subordinate to it, probably by way of its nutrition. Moreover, the agency of a separate and superior force must be brought into controlling relation to the subordinate force of electricity, before the phenomena of intelligence, of mind will associate and blend with what would otherwise be the dull round of unrelieved physical action. It is positively known, in all cases of the display of intelligence in connection with electrical agency, that the result is due to a dual source of influence. It is conceded and agreed that the portion of the physical universe in proximate relation to mind is the nervous organism. And in our interpretation of the facts of our own constitution, we find two forces or a dual agency operative in the production of the phenomena of which we are cognisant. It is useless to look for mind and matter elsewhere in the whole compass of existence, if we do not find them here. Hence the distinctness and emphasis given to the foregoing line of discussion.

This point cannot be pursued farther at this time, but the explosion of the cell fiction of the physiologists, a pure but plausible invention to explain a supposed state of facts in nerve currents and in the relation of

fibres to cells, which probably does not exist, literally demolishes the citadel of unitarian materialism. This is one of Bacon's instances of an idolatry of images, false to nature, set up in the temple of the human mind; and it may be predicted that all clamor over the loss will be like that of Micah, "Ye have taken away my gods which I made * * * and what have I more?" No true worshipper at nature's shrine pays his devotions to any god of his own making, or if he does, it is liable to be taken from him. This cell-god is a fabrication of hasty speculation and the whole doctrine of nerve currents is open to question. A careful inquiry into the physiological aspect of this subject will be found in my *Thesis on the Dual Constitution of Man*, to which reference is made above.

The following passage from the First Alcibiades of Plato, presents the crude Socratic method of conducting the search after the dual constitution of man. As to this dialogue, "Socher and Stallbaum are of opinion that not a single substantial reason can be assigned for doubting its genuineness." The interlocutors are Socrates and Alcibiades.

Soc. Come, now, I beseech you, tell me with whom you are conversing?—Is it not with me? Al. Yes. Soc. As I am with you? Al. Yes. That is to say, I, Socrates, am talking? Al. Yes. Soc. And I in talking use words? Al. Certainly. Soc. And talking and using words are, as you would say, the same? Al. Very true. Soc. And the user is not the same as the thing which he uses? Al. What do you mean? Soc. I will explain: the shoemaker, for example, uses a square tool, and a circular tool, and other tools for cutting? Al. Yes. Soc. But the tool is not the same as the cutter and user of the tool? Al. Of course not. Soc. And in the same way the instrument of the harper is to be distinguished from the harper himself? Al. It is. Soc. Now the question which I asked was whether you conceive the user to be always different from that which he uses? Al. I do. Soc. Then what shall we say of the shoemaker? Does he cut with his tools only or with his hands? Al. With his hands as well. Soc. He uses his hands too? Al. Yes. Soc. And does he use his eyes in

cutting leather? Al. He does. Soc. And we admit that the user is not the same with the things which he uses? Al. Yes. Soc. Then the shoemaker and the harper are to be distinguished from the hands and feet which they use? Al. That is clear. Soc. And does not a man use the whole body? Al. Certainly. Soc. And that which uses is different from that which is used? Al. True. Soc. Then a man is not the same as his own body? Al. That is the inference. Soc. What is he, then? Al. I cannot say. Soc. Nay, you can say that he is the user of the body. Al. Yes. Soc. And the user of the body is the soul? Al. Yes, the soul. Soc. And the soul rules? Al. Yes. Soc. Let me make an asser tion which will, I think, be universally admitted. Al. What is that? Soc. That man is one of three things. Al. What are they? Soc. Soul, body, or the union of the two. Al. Certainly. Soc. But did we not say that the actual ruling principle of the body is man? Al. Yes, we did. Soc. And does the body rule over itself? Al. Certainly not. Soc. It is subject, as we were saying? Al. Yes. Soc. Then that is not what we are seeking? Al. It would seem not. Soc. But may we say that the union of the two rules over the body, and consequently that this is man? Al. Very likely. Soc. The most unlikely of all things; for if one of the two is subject, the two united cannot possibly rule. Al. True. Soc. But since neither the body, nor the union of the two, is man, either man has no real existence, or the soul is man? Al. Just so. Soc. Would you have a more precise proof that the soul is man? Al. No; I think that the proof is sufficient. Soc. If the proof, although not quite precise, is fair, that is enough for us; more precise proof will be supplied when we have discovered that which we were led to omit, from a fear that the inquiry would be too much protracted.

We have here the germ out of which the Cartesian speculation was developed, for in it we see not only the pronounced discrimination between the body and the soul, but the same disparagement of the material part.

The poet has, in the following lines, measured his views by this subjective Cartesian standard:

> "This frame compacted with transcendant skill
> Of moving joints, obedient to my will;
> Nursed from the fruitful glebe, like yonder tree,
> Waxes and wastes—I call it mine, not me.
> New matter still the mouldering mass sustains;
> The mansion changed, the tenant still remains;
> And, from the fleeting stream, repaired by food,
> Distinct as is the swimmer from the flood."

Dr. Krauth has expressed his recoil from this unilateral view thus: "The attestation of consciousness is as real to

the substantial existence of our bodies as an integral part of our person, as it is to the substantial existence of our minds. * * As Philosophy alone knows them, there can be no mind conceived without matter, no matter conceived without mind. Materialism and idealism are alike forms of direct self-contradiction."

As bringing forth the doctrine of substantial duality into a strong light, the following passage, with two or three criticisms which it provokes, will serve most admirably our purpose.

But the meaning of these terms will be best illustrated by now stating and explaining the great axiom, that all human knowledge, consequently that all human philosophy, is only of the relative or phænomenal. In this proposition, the term "relative" is opposed to the term "absolute:" and, therefore, in saying that we know only the relative, I virtually assert that we know nothing absolute,—nothing existing absolutely; that is, in and for itself, and without relation to us and our faculties. I shall illustrate this by its application. Our knowledge is either of matter or of mind. Now, what is matter? What do we know of matter? Matter, or body, is to us the name either of something known, or of something unknown. In so far as matter is a name for something known, it means that which appears to us under the forms of extension, solidity, divisibility, figure, motion, roughness, smoothness, color, heat, cold, etc.; in short, it is a common name for a certain series, or aggregate, or complement of appearances or phænomena manifested in coexistence.

But as the phænomena appear only in conjunction, we are "compelled by the constitution of our nature" to think them conjoined in and by something; and as they are phænomena, we cannot think them the phænomena of nothing, but must regard them as the properties or qualities of something that is extended, solid, figured, etc. But this something, absolutely and in itself, i. e., considered apart from its phænomena, is to us as zero. It is only in its qualities, only in its effects, in its relative or phænomenal existence, that it is cognizable or conceivable; and it is only by a law of thought, which compels us to think something, absolute and unknown, as the basis or condition of the relative and known, that this something obtains a kind of incomprehensible reality to us. Now, that which manifests qualities,—in other words, that in which the appearing causes inhere, that to which they belong, is called their "subject," or "substance," or "substratum." To this subject of the phænomena of extension, solidity, etc., the term "matter" or "material substance" is commonly given; and, therefore, as contradistinguished from these qualities, it is the name of something unknown and inconceivable.

The same is true in regard to the term "mind." In so far as mind is the common name for the states of knowing, willing, feeling, desiring, etc., of which I am conscious, it is only the name for a certain series of connected phenomena or qualities, and consequently, expresses only what is known. But in so far as it denotes that subject or substance in which the phænomena of knowing, willing, etc., inhere,—something behind or under these phænomena,—it expresses what, in itself, or in its absolute existence, is unknown.

Thus, mind and matter, as known or knowable, are only two different series of phænomena or qualities; mind and matter, as unknown and unknowable, are the two substances in which these two different series of phænomena or qualities are supposed to inhere. The existence of an unknown substance is only an inference we are compelled to make, from the existence of known phænomena; and the distinction of two substances is only inferred from the seeming incompatibility of the two series of phænomena to coinhere in one.

Our whole knowledge of mind and matter is thus, as we have said, only "relative;" of existence, absolutely and in itself, we know nothing; and we may say of man what Virgil says of Æneas, contemplating in the prophetic sculpture of his shield the future glories of Rome—

"Rerumque ignarus, imagine gaudet."

—Hamilton's Lectures, pp. 96-7.

The two most salient and most important points of criticism are the following:

The first is upon the use of the word *relative*. Doubtless it is true, that we know nothing out of relation to our faculties. Any thing absolute, in any such sense as that it is out of relation to our faculties, can neither be an object of knowledge nor of faith; but to all intents and purposes, it would and must be to us as though it did not exist. But when, just afterwards, the author speaks of matter as thus absolute, i. e., as out of all relation to our faculties, it is on the assumption that it is so by virtue of being out of relation to it its own attributes. The language is: "But this something, absolutely and in itself, i. e., considered apart from its phenomena, is to us as zero." There exists, and to us there can be, no such thing as mind or matter in any such isolation or state of abstraction as is here supposed. There is and can be no

such thing as matter or mind believed, known or conceived apart from its properties, as there can exist in nature no properties except in the concrete. The same is as true of moral as of physical properties. And neither mind nor matter, as substance, is by any one contemplated as a real existence apart from its properties. The doctrine of relativity in its true sense, does not, therefore, cut off either substantive matter or mind from being objects of knowledge. There is and can be no such thing as a relation apart from the things related.

2. This leads to the second criticism which is, that we do not have any such naked phenomenal knowledge, projected on a back ground of total ignorance as is here described. Hamilton here as elsewhere most inconsiderately and inconsistently abandons substantial existence as outside of the reach of immediate knowledge. It is only placing Hamilton in a position consistent with his better self to utterly repudiate this superficial view of the case, although it appears and reappears so frequently and forcibly in his various writings as to have determined the opinion of very many against him as being a mere phenomenalist. But in numerous passages setting forth the fundamental features of Reid's system, he speaks of matter as well as of the mental self, as the objects of intuitive knowledge or consciousness. It is only by viewing his utterances in the light of the distinction between the phenomenal and noumenal intuitions, which has been taken and submitted in what precedes, that his better self stands forth in powerful vindication of the immediate philosophic *knowledge* of matter and mind, not only as phenomenal but as substantial realities. Indeed, this is the very point of his generous and magnificent exposition and defence of Reid, the founder of the Scotch school of Metaphysics, of which

Sir William Hamilton, who died in 1858, is by far the most learned and able disciple. A few citations will make this vital point sufficiently evident: "In an intuitive act," he says, "the object is known as actually existing." Again:

> In the first place knowledge and existence are then only convertible when the reality is known in itself because it exists, and exists since it is known. Nor did Reid contemplate any other.

Again he says:

> Of the doctrine of an intuitive perception of external objects, which, as a fact of consciousness, ought to be unconditionally admitted,—Reid has the merit in these latter times of being the first champion.
>
> But the very first fact of our experience contradicts the assertion, that mind, as of an opposite nature, can have no immediate cognisance of matter; for the primary datum of consciousness is, that in perception, we have an intuitive knowledge of the "ego" and of the "non-ego," equally and at once."

This I shall illustrate by a memorable example—by one in reference to the very cardinal point of philosophy. In the act of sensible perception, I am conscious of two things—of "myself" as the "perceiving subject," and of an "external reality," in relation with my sense, as the "object perceived." Of the existence of both these things I am convinced: because I am conscious of knowing each of them, not mediately, in something else, "as represented," but immediately in itself, as existing. Of their mutual independence I am no less convinced; because each is apprehended equally, and at once, in the same indivisible energy, the one not preceding nor determining, the other not following nor determined; and because each is apprehended out of, and in direct contrast to the other.

Such is the fact of perception as given in consciousness, and as it affords to mankind in general the conjunct assurance they possess, of their own existence, and of the existence of an external world.

Nothing can be imagined more monstrous than the procedure of these philosophers, in attempting to vindicate the reality of a material world, on the ground of a universal belief in its existence: and yet rejecting the universal "belief in the knowledge" on which the universal "belief in the existence" is exclusively based.

If these passages be taken as the rule of judgment, I know not how the doctrine of a noumenal intuition, which I have endeavored to explain and enforce, could

be more explicitly announced. The substantial *ego*, mind, and the substantial *non-ego*, matter, are "equally and at once," according to his language, objects of "intuitive *knowledge*." There is a power in truth which often unconsciously prevails over error.

There are several considerations of the nature of *postulates* which should now be recalled, as having been kept clearly before the mind in the foregoing discussion.

1. The first is that there is a presumption against two substances, if one is adequate to the explanation of the facts: *Entia non sunt multiplicanda præter necessitatem.* This is the import of the first of Newton's noted "Four Rules of Reasoning in Philosophy," which runs in the following words:

> We are to admit no more causes of natural things than such as are both true and sufficient to explain their appearances. To this purpose the philosophers say that nature does nothing in vain, and more is in vain when less will serve; for nature is pleased with simplicity, and affects not the pomp of superfluous causes.—(Newton's Principia, p. 476.)

In the fourteenth century, an English Schoolman, Occam, had used this rule of philosophising in the interest of idealism so sharply, that it became known as Occam's razor; and it is the same rule out of which Sir William Hamilton has made so much as the *law of parcimony*. This rule, let it be observed, is not in the interest of any particular hypothesis, but is only regulative and cautionary, and it may be as flagrantly violated by an insatiable thirst for unity as by an easy going acceptance of undue multiplicity. The position of dualistic realism is that neither matter, nor mind, alone, is adequate to explain all the appearances in nature,—the facts of knowledge—but that the two together are adequate and that to recognise more than these two, would "be to affect the pomp of superfluous causes."

2. The second criterion of a legitimate philosophy kept in mind is that its foundation be laid in knowledge, from which all inference is excluded. The primary question in philosophy is not one of logic but of interpretation or exposition, wherein our appeal must be directly to consciousness or our own intuitions. If matter and mind as substantial realities, are known only by inference, however short or natural the inference, then they lie outside of philosophy and we have only phenomenalism left as legitimated by this criterion; but if we directly intuit both matter and mind, then dualistic realism is legitimated and phenomenalism is discredited as spurious. If mind alone be intuited and matter be inferred, then idealism is true; and, on the other hand, materialism is true, if matter alone be directly cognised and mind be only an inference. In what precedes, this criterion has not been forgotten, nor evaded, but consciously challenged at every step of the procedure. Inference may enter into the superstructure, but not into the foundation as fundamental.

3. The third criterion which has presided over our thought is that, as there is no knowledge without an object, so the object of immediate knowledge must be individual and concrete. It cannot be a modification of mind, separated from a mind modified, nor a quality of matter, separate or apart from matter modified. Matter and mind are known in their individual attributes as concrete realities, each utterly incompatible with and antagonistic to the other—the one having trinal extension, picturable form and divisibility; the other, unpicturable and indivisible ubiquity; the one is obedient to the laws of mechanics and the formulae of mathematics; the other has free will and moral accountability. These facts in their totality cannot be reduced to less than two

groups, and hence our realism must be dual to correspond to the facts.

4. The subjective internal ground of philosophic knowledge is the possession of a knowing power or energy, which is native and ultimate, and which has the function of cognising simultaneously and necessarily both the apparent and the real. As to matter, this power of intuition is both sensuous and supersensuous; and as to mind, it apprehends not only the phenomenal but the real self. In what has been submitted, it is believed that the evidence shows that the phenomenal and noumenal demands of this power are met by matter as truly as by mind; and if so, then neither is entitled to push aside the other and to obtrude itself into the place of both. The demands of our internal cognitive power are alike met by each of these objects as objects of knowledge, and therefore the mind is constrained to give them equal recognition as substantial, legitimate and valid existences.

There are several *corollaries* from the philosophic doctrine of dualistic realism which should be announced, before passing to the consideration of Theistic Realism.

1. The acceptance of the substantial reality of mind and matter raises the presumption in favor of each, that it is naturally imperishable. Each is known as permanent in the midst of change. The rock that stands immovable amidst the surgings of tides and storms for centuries, we expect to survive like perturbations in the future. "When we say that matter has objective existence, we mean that it is something which exists altogether independently of the senses and brain processes by which alone we are informed of its presence. An exact or adequate conception of it, if it could be formed, would probably be very different from any conception which our senses will ever enable us to form;

but the object of all pure physical science is to endeavor to grasp more and more perfctly the nature and laws of the external world."

Physical science is based entirely upon the testimony of the senses in observation and experiment and upon the mathematical deductions therefrom. It "deals fearlessly alike with quantities too great to be distinctly conceived and too small to be perceived by the aid of the most powerful microscopes; such as, for instance, distances through which the light of stars or nebulae, though moving at the rate of 186,000 miles per second, takes many years to travel; or the size of the particles of water, whose number in a single drop may, as we have reason to believe, amount to somewhere about

$$10^{26} = 100,000,000,000,000,000,000,000,000.$$

[One hundred times one hundred thousand million times one hundred thousand millions=100 septillions, *French notation.*]

"Yet we successfully inquire not only into the composition of the atmospheres of these distant stars, but into the number and properties of these water-particles, nay, even into the laws by which they act upon one another. The grand test of the reality of what we call matter, the proof that it has an objective existence, is its indestructability and uncreateability—if the term may be used—by any process at the command of man. The value of this test to modern chemistry can scarcely be estimated. In fact we can barely believe that there could have existed an exact science of chemistry had it not been for the early recognition of this property of matter; nor in fact would there be the possibility of a chemical analysis, supposing that we had not the assurance by enormously extended series of previous experiments, that no portion of matter, however

small, goes out of existence in any operation whatever. * * * * * * This then is to be looked upon as the great test of the objective reality of matter. It is only, however, within comparatively recent years that it has been generally recognised, that there is someing else in the physical universe which possesses to the full as high a claim to objective reality as matter possesses, though it is by no means so tangible, and therefore the conception of it was much longer in forcing itself upon the human mind. * * * The grand principle of Conservation of Energy. which asserts that no portion of energy can be put out of existence, and no amount of energy can be brought into existence by any process at our command, is simply a statement of the invariability of the quantity of energy in the universe—a companion statement to that of the invariability of the quantity of matter. Just as gold, lead, oxygen, etc., are different kinds of matter; so sound, light, heat, etc., are now ranked as different forms of energy, which, has been shown to have as much claim to objective reality as matter has."—(Tait's Recent Advances in Phys. Sci., pp. 346, 4, 14, 15, 17, 2.) The fact is, however, that physical energy is not known apart from matter, nor is matter known apart from energy; so that, the non-ego which we intuit, or immediately cognise, is a concrete object possessing extension and energy. In like manner, as to our internal self-hood, no alembic nor crucible has ever dissipated our personal identity which surmounts all obstacles and survives all the mutations from the cradle to the grave, and even the grave may be only the occasion of its shaking the dust of earth from its wings and pluming itself for the bolder flight of another and an immortal life.

The natural reason for the imperishableness of the

soul is as legitimate and cogent as for the indestructibleness of matter—not its combinations, which are mutable and perishable, but its ultimate elements, whatever these may be. Those who hold the theistic theory of the universe, standing as they do in the recognised presence of omnipotence, esteem both the actual and the continued existence of each as contingent on the good pleasure of the Deity. "The doctrine of an immortal spirit will never come from the dissecting room nor the laboratory, unless it is first carried thither from a higher sphere. Yet there is nothing in these workshops that can efface it, any more than their gasses and exhalations can blot out the stars from heaven." Whatever be the soul's origin, it is naturally inferred from its simplicity and indivisibility, its persistent identity and individuality, together with its ever prevailing unity of consciousness, that it is so constituted as to be naturally destined to immortality, without the loss or impairment of its native powers or of its acquired treasures. Matter as known is real, and no part of it, nor of its store of energy, can be destroyed by any known means; and shall we say less of spirit and of its princely stores of energy? The natural and resolute presumption of the soul's immortality is the bed-rock on which may be built the superstructure of argument drawn from diverse sources; and this presumption casts the burden of proof on those who would deny our heirship to eternity.

2. Again: if mind and matter are reciprocally objective and concrete realities, then time and space must have objective and empirical reality. It is the presentment in consciousness of concrete phenomena, as actual and as in succession, which arouses into action the native noumenal intuition of space and time as permanent elements of the fact of knowledge. All movements, men-

tal and material, presuppose both space and duration. A thought, as certainly as the falling of an apple, must occur somewhere as well as somewhen; and thus we see that mind, as truly as matter, bears inexorable but wholly unlike relations to space. Hence, all attempts at localising mind other than where its presence is attested by consciousness, or at subjecting mind to the conditions of trinal extension, which are the space relations peculiar to matter, unwittingly, or purposely tend to its materialization, i. e., to its subversion as a substantial object of knowledge and existence. Love, hope, joy, fear, sorrow, thought and other mental states, are certainly appreciable as having a local habitation within the sphere of our bodily selves and as having intelligible degrees of rational magnitude, but no one conceives of them as capable of being adjusted by the points of the compass, nor as capable of measurement with yard sticks and tape lines. Those permanent elements of knowledge which exist independently of the existence or activity of our minds are obviously not originated by us. Such are time and space. We conceive, we do not constitute them: and so of mind and matter, we cognise, we do not create them.

3. Dualistic realism likewise reveals a duality of energy. Substance as comprehensive of attributes is necessarily potential, or a depository of energy. Energy is not an abstraction, but an attribute of substantial reality. It is the very essence of causality, which must be twofold as the only two concrete causal agents of which we have knowledge, are mind and matter. It was as a part of his philosophy of nihilism, that Hume denied causaiity. The conservation of energy, though not fully demonstrated, is, nevertheless, prudently accepted as beyond question; but it has not been

sufficiently considered, that its sphere is wholly within the domain of matter. The attempt to reduce the energy of mind to mechanical laws and thus to merge it in the energy of matter is a miserable failure—even living matter, in its lowest bioplastic condition, according to most careful and competent observers, "manifests certain phenomena not to be accounted for by physics." —(The Machinery of Life by Dr. Lionel S. Beale, pp. 19 and 45.) Again, it has not been sufficiently considered that, even were the phenomena of physical life reducible to mechanical laws, still realistic dualism would not thereby be invalidated. An accute and cautious advocate of the mechanical view says:

> It is certain that the materials of the organism are to a great extent subject to the common laws of mechanical and chemical forces. It is not proved that these same forces are incompetent to produce the whole series of interstitial changes in which the functions of life common to vegetables and animals consist. On the contrary, the more we vary our experiments and extend our observation, the more difficult we find the task of assigning limits to their power.

But whatever the ultimate determination of the problem of vital action in the physical organism, the distinctness of the spiritual part as the embodiment of an energy not to be confounded with nor merged into the energy of matter, is very strikingly put by this very author, who favors the mechanical view of bodily life. He says:

> If we take in a ton every twelvemonth, in the shape of food, drink, and air, and get rid of only a quarter of it unchanged into our own substance, we die ten times a year—not all of us at any one time, but a portion of us at every moment. It is a curious consequence of this, we may remark by the way, that if the refuse of any of our great cities were properly economized, its population would eat itself over and over again in the course of every generation. * * * We have no evidence that any single portion of the body resists decomposition longer during life than after death. Only, all that decays is at once removed while the living state continues.

If the reader of this paper live another complete year, his self-conscious principle will have migrated from its present tenement to another, the raw materials, even, of which are not as yet put together. A portion of that body of his which is to be will ripen in the corn of the next harvest. Another portion of his future person he will purchase, or others will purchase for him, headed up in the form of certain barrels of potatoes. A third fraction is yet to be gathered in a Southern rice-field. The limbs with which he is then to walk will be clad with flesh borrowed from the tenants of many stalls and pastures, now unconscious of their doom. The very organs of speech with which he is to talk so wisely, or plead so eloquently, or preach so effectively, must first serve his humbler brethren to bleat, to bellow, and for all the varied utterances of bristled or feathered barn-yard life. His bones themselves are, to a great extent, "in posse," and not "in esse." A bag of phosphate of lime which he has ordered from Professor Mapes, for his grounds, contains a large part of what is to be his next year's skeleton. And, more than all this, as by far the greater part of his body is nothing, after all, but water, the main substance of his scattered members is to be looked for in the reservoir, in the running streams, at the bottom of the well, in the clouds that float over his head, or diffused among them all.

For a certain period, then, the permanent human being is to use the temporary fabric made up of these shifting materials. So long as they are held together in human shape, they manifest certain properties which fit them for the use of a self-conscious and self-determining existence. But it is as absurd to suppose any identification of this existence with the materials which it puts on and off, as to suppose the hand identified with the glove it wears, or the sponge with the various fluids which may in succession fill its pores. Our individual being is in no sense approximated to a potato by living on that esculent for a few months; and if we study the potato while it forms a part of our bodies under the name of brain or muscle, we shall learn no more of the true nature of our self-determining consciousness than if we studied the same tuber in the hill where it grew.—The Mechanism of Vital Actions, by Prof. Oliver Wendell Holmes, M. D.

The following passage from one of the most eminent physicists, Prof. P. G. Tait, exempts mind from the domain of matter:

Sir W. Thomson's splendid suggestion of Vortex-atoms, if it be corret, will enable us thoroughly to understand matter, and mathematically to investigate all its properties. Yet its very basis implies the absolute necessity of an intervention of Creative Power to form or to destroy one atom even of dead matter. The question really stands thus:—Is Life physical or no? For if it be in any sense, however slight or restricted, physical, it is to that extent a subject for the Natural Philosopher, and for him alone.

There must always be wide limits of uncertainty (unless we choose to look upon Physics as a necessarily finite Science) concerning the exact boundary between the Attainable and the Unattainable. One herd of ignorant people, with the sole prestige of rapidly increasing numbers, and with the adhesion of a few fanatical deserters from the ranks of Science, refuse to admit that all the phenomena even of ordinary dead matter are strictly and exclusively in the domain of physical science. On the other hand, there is a numerous group, not in the slightest degree entitled to rank as Physicists (though in general they assume the proud title of Philosophers), who assert that not merely life, but even Volition and Consciousness are merely physical manifestations. These opposite errors, into neither of which is it possible for a genuine scientific man to fall, so long at least as he retains his reason, are easily to be seen very closely allied. They are both to be attributed to that Credulity which is characteristic alike of Ignorance and of Incapacity. Unfortunately there is no cure; the case is hopeless, for great ignorance almost necessarily presumes incapacity, whether it show itself in the comparatively harmless folly of the spiritualist or in the pernicious nonsense of the materialist.

Alike condemned and contemned, we leave them to their proper fate—oblivion; but still we have to face the question, where to draw the line between that which is physical and that which is utterly beyond physics. And, again, our answer is—experience alone can tell us; for experience is our only possible guide. If we attend earnestly and honestly to its teaching, we shall never go far astray.—Recent Adv. in Phys. Sci., pp. 24-5.

It is not the language of thoughtless flippancy but of scientific gravity, which is here used by Prof. Tait in characterising the attempt to refer the phenomena of consciousness and free will to the laws of matter as contemptible and ridiculous.

In a passage already quoted, Prof. Huxley says that "There is every reason to believe that consciousness is a function of nervous matter;" and on page 291 of the same work he says, "Why 'materialism' should be more inconsistent with the existence of a Deity, the freedom of the will, or the immortality of the soul, or with any actual or possible system of theology, than 'idealism,' I must declare myself at a loss to divine." Yet, on page 314, in summing up the argument of Berkeley, he says explicitly,—"I conceive that this reasoning is inefraga-

ble. And, therefore, if I were obliged to choose between absolute materialism and absolute idealism, I should feel compelled to accept the latter." Prof. Huxley here tells us, first, that there is every reason for believing in materialism and that he cannot divine in it the germs of any thing destructive of man's most sacred beliefs and hopes; and yet, in the next breath, he turns upon his heels, bows submissively to the Irish Bishop, and humbly confesses that in the alternative he would feel bound to accept of idealism rather than of materialism! The scientist and philosopher, like other people, is bound to act rationally and to accept and adhere to what, according to the evidence in the case, appears to be the truth, whether palatable or not. This, unfortunately, is not the only illustration of the unsteadiness of the mercurial nature of this distinguished scientist. Whatever value attaches to his testimony, we here have it in favor of both materialism and idealism, and therefore his complete testimony is either reducible to zero or valid only to the extent that it supports dualistic realism. It is believed to be rigorously true, that the rejection of the evidence in support of either matter or mind must issue in the rejection of both, for the testimony for both is given by the same witness, our intuition; so that the only consistent alternatives are nihilism or dualism—as the whole of our intuition must be accepted or rejected, there is either no causal energy in the universe or there is a twofold causal energy in the concrete active agencies of mind and matter.

The only true position and the one which it has been the present endeavor to emphasize is that mind and matter stand abreast in the path of knowledge; but if either be entitled to a superior claim to recognition, doubtless it must be mind, for we know matter only

through mind, i. e., by the exercise of the cognitive power of mind. The knowing self certainly cannot be less certainly known as existent and real than the not-self, the object known. But a discrimination adverse to either is fatal to both.

4. The reality of the moral factors, which play a supreme part in the history of the human race, finds its seat in the native constitution of the human mind. The importance of discriminating between the constitutional and the adventitious, and between functions normal and abnormal, is as important in the world of mind as in the sphere of organisms. The builders of governments and of civilizations, can as certainly count on the resources of nature as the builders of bridges and steamships.

5. The final inference which shall now be allowed a notice, is cautionary. It would be a total misconception of what precedes to understand it as in any way attempting to exhibit the maximum of our knowledge of mind and matter; on the contrary, it would be nearer the truth to understand it as giving the minimum of such knowledge. As intelligent corporeal beings, placed in the midst of our actual environments, we cannot but know ourselves and something not ourselves and believe and act upon the assumption of the reality and truthfulness of this knowledge. But after having gained this footing, we have picked up only a grain of sand from the ocean beach, and yet we are placed thereby in a situation to appreciate with keener zest the special sciences relating to mind and matter, all of which presuppose and assume in some vague and it may be unsatisfactory way, what metaphysics endeavors to supply in the way of exposition and elucidation. Hence its aim is not isolated but in common relation to the several sub-divisions of knowledge. When, in the light of reflection, the

primary and spontaneous act of knowing is interpreted and mind is ascertained to be immediately percipient of self and also of not-self or matter, we do not understand how this can be so but only the fact that it is so. Even Newton himself did not pretend to understand the ultimate nature of gravitation, but he deemed its reality and value beyond question. He says: "But hitherto I have not been able to discover the cause of those properties of gravity from phenomena, and I frame no hypothesis. * * * And to us it is enough that gravity does really exist, and act according to the laws which we have explained."—(Newton's Principia, pp. 506-7.) The most incomprehensible mysteries of the universe are epitomized in man himself, as expressed in the following language by Pascal: "Man is to himself the mightest prodigy of nature; for he is unable to conceive what is body, still less what is mind, but least of all is he able to conceive how a body can be united to a mind; yet this is his proper being."—(Pensee's partic. 1, art. vi, p. 26.)

What we intuitively know is only a small island in the midst of a boundless ocean. Setting forth from the sure haven of this island home, our inferential or discursive powers explore the surrounding heights and depths, and faith feels yearnings which can be satisfied only by the voice of the Eternal One.

3. Theistic realism. It has been said in what precedes, that ontology or metaphysics deals with the facts of consciousness, not merely *inter se*, as such, but in relation to realities existing out of consciousness; also, that the one point in common with all realists is that, in the act of knowledge, we grasp phenomena *plus*

substantial reality. The substantial realities which, as we have seen, are immediately known through our noumenal intuition, are matter and mind. The primary sphere of the manifestation of this distinction between mind and matter, as separate but intimately associated substantial realities, is in our sensible relations to an external world as different from ourselves and yet so far forth as in contact with us, intuitively known. If we find not in the constitution of man himself, the dual realities of mind and matter, it is in vain that we go in search of them elsewhere throughout the whole universe beside. But, having the light of this duality of our own constitution as a brightly burning torch in our hands, then in the search for God as distinct from the world, we can intelligently scrutinize what may purport to be the foot prints of an author of nature as distinct from nature itself. But to go forth without having first settled this preliminary question as to the reality and duality of matter and mind, and to expect to lay hold of this truth in some remote corner of the universe, is not a cautious and prudent way of attempting to rise through nature and nature's laws up to nature's God, but a rash attempt to lay hasty and violent hands on him by strategy. The sovereign reality cannot be thus captured. The heights of his abode must be attained by treading the narrow path of self-knowledge.

We must first know ourselves and the universe, if we would know God and the universe. *God is a spirit and they that seek him must seek him in spirit and in truth.*

We are not conscious of God. Taking consciousness in its fullest import as the organ of immediate knowledge both of appearance and of reality, of phenomena and of noumena, in other words, taking con-

sciousness as the full equivalent of the phenomenal and noumenal intuition, the statement here made is, that we do not know God intuitively, we are not conscious of God. He is not, in either its phenomenal or noumenal sense, an object of intuition. It is feared that the expression "inferential intuition" previously used may be misleading, unless it be so explained as that it will be seen and understood clearly, that whilst we may be conscious of the operation of mind which makes the inference, and of the inference itself, yet the inference is made by the discursive or logical power and not properly by the power of intuition, which, in its distinctive function deals with self-evident truths and not with inferences or logical arguments. The existence of God is not self-evident but inferential. It is a question of mediate evidence and cumulative proof, and not of direct knowledge. It is not a self-evident matter, but one of information. If we were conscious of God, we would have no occasion to seek Him. No: God-consciousness is the shibboleth of Pantheism.

The definition of God which the evidence adducible suggests is, that He is an omnipotent spiritual being, infinite, eternal, omniscient, good, just and truthful. The worlds of mind and matter show the impress of these attributes which can only exist as the attributes of a concrete Being. God is not the infinite, nor the absolute nor any other abstraction. We cheat ourselves in supposing it.

The evidence in proof of God's existence and character may be arranged under seven leading heads: 1. The historical, which undertakes to set forth the simple state of opinion touching this matter in the different ages among the different peoples; 2. the apriori, or so-called ontological proof, which proceeds as did Descartes, to

conclude the fact of an all perfect being from the idea of such a being; 3. the cosmological proof, or the interpretation of the principle of efficient causality relative to the phenomena of mind and matter; 4. the teleological argument, or a like exposition of the principle of final causes; 5. goodness; 6. justice; 7. truth. The last five lines of evidence have, it is believed, unanswerable value; the first two have more literary than logical import.

In the work of Prof. Tait already quoted, p. 26, he speaks of "the fact that all portions of our science, and especially that beautiful one, the dissipation of energy, point unanimously to a beginning, to a state of things incapable of being derived by present laws of tangible matter and its energy from any conceivable previous arrangement."

Says J. S. Mill, whom no one will suspect as prejudiced in favor of Theism: "There is nothing to disprove the creation and government of Nature by a sovereign will; but is there anything to prove it?"—(Posthumous Essays, p. 137.) This question he answers on subsequent pages, (174-5,) thus: "Leaving this remarkable speculation—'the survival of the fittest'—to whatever fate the progress of discovery may have in store for it, I think it must be allowed that, in the present state of our knowledge, the adaptations in Nature afford a large balance of probability in favor of creation by intelligence. * * * * * * The argument is greatly strengthened by the properly inductive considerations which establish that there is some connection through causation between the origin of the arrangements of nature and the ends they fulfil." As to the attribute of goodness, (pp. 190-1) he says: "Yet endeavoring to look at the question without partiality or prejudice and

without allowing wishes to have any influence over judgment, it does appear that granting the existence of design—[which is unmistakably granted in the passage just quoted], there is a preponderance of evidence that the Creator desired the pleasure of his creatures. * * * For whatever force we attach to the analogies of Nature with the effect of human contrivance, there is no disputing the remarks of Paley, that what is good in nature exhibits those analogies much oftener than what is evil." —(p. 118.) The essay on *Theism* from which all the above extracts, except the last, are taken, Mr. Mill's editress informs us (pp. viii and x),is "the last considerable work which he completed, it shows the latest state of the author's mind, the carefully balanced result of the deliberations of a lifetime." The logical conclusions as to intelligence and benevolence being evidenced in nature as attributes of its author, are fairly quoted, although his individual views were strangely discordant with what might be expected from these statements. But it is a fair reflection, that the reluctance of the testimony of this expert logician only adds strength to the support it gives to the doctrine of theism.

However, attention must be now withdrawn from the general argument, as it is not possible to do more than give this passing intimation of its drift.

But a general observation to which especial attention is called in this connection is, that this inferential procedure, however comprehensively and skillfully conducted, is not one of discovery but of construction. It seems to be very plain that man by searching could never find out the fact of the existence of such a being as this God—it is meaningless to speak of knowing the fact of his existence apart from his character or attributes. In a scientific procedure, the conclusion of an

induction must be no broader than the facts known. The house must not overlap but stand flush with its foundation. Concede that the whole universe of known mind and matter has been analyzed and then reduced to a synthesis; the facts not being infinite they could not suggest nor warrant the infinite as an induction of knowledge. No; the natural and inevitable doom of the human mind—of any finite mind, left to its own search in this finite universe for the ultimate ground of all things, is not theism. The doctrine of theism or of theistic realism is not a scientific discovery nor a matter of cognitive philosophy. The proofs mentioned above only serve to construct the evidence in support of the propostion that there is a God, such as defined, but not to discover it. It is like constructing the evidence at present in support of the law of gravitation. It took Newton to formulate and announce this law, but a school child can now understand its import and proof. *In the beginning God created the heavens and the earth.* But let the proposition which announces God's existence and character come whence it may, the evidence from nature in support of that proposition which chalenges our attention, when sifted and articulately compacted, constitutes what is known as Natural Theology. It has become my custom to treat Natural Theology as the highest phase of ontology or metaphysics, for it presupposes and subsidises rational and philosophic or noumenal ontology. There is perhaps no department of inquiry more in need of reconstruction than this one, and the present state of the sciences greatly strengthens its positions by new elucidations and vast stores of cumu lative proof.

It may be well to notice that, as the knowledge of God is contingent and not self-evident and necessary, its

fate is precarious; it may not exist, or it may die out. How often has it died out! The race probably started with it, but, tested by the standard of our definition which is believed to rest in all its parts on fair inferences from nature, the knowledge of this true God has been, as a historic fact, displaced among most of the nations of the earth. The plain and sad truth in this case is believed to be concisely stated in the following words of Leland:

> It is also observable, as I shall shew distinctly in another place, that when the Pagan authors, who lived before the times of Christianity, urge the consent of nations against the atheists in proof of a Deity, they generally speak of Gods in the plural and not of one God only. Yet, nothwithstanding their polytheism, and the many gods they acknowledged and worshipped, which was a great and most culpable defection from the true primitive religion, they still retained in some degree the idea of one supreme Divinity. But it must be owned, that it seemed at length to dwindle into the notion of one God, superior in power and dignity to the rest, but not of a different kind from the other divinities they adored, whom they looked upon to be really and truly gods as well as he, and sharers in the sovereign dominion with him. That this was the general popular notion will appear in the farther progress of this work.—(Leland's Chris. Rev. Vol. 1, p. 86.)

The only way to keep this doctrine alive in the human mind is by each family, school-room and church inculcating it upon the rising generations, just as each age has to be taught its alphabet and multiplication table. The state with us is not atheistic; nor is state education. The moral nature of man consisting of intelligence, freedom and conscience—this ultimate conscious fact of man's moral agency, is pre-supposed by every court house and by the whole machinery of law and government. All this finds its full explanation only in the justice and moral government of the author and ruler of man's nature.

It is already sufficiently evident that the power of mind by which we take in the result of all this instruction and proof is faith. Faith is as legitimate and as natural a function of the mind as intuition; it is in

fact a form of knowing, and is what would correspond to our inferential intuition. But we know God not properly by intuition but by faith. The object of a true faith is as real as the object of consciousness, but the light in which we see it is not that of self-evidence. Theistic realism, therefore, takes its place properly by the side of philosophic realism as its complement and completion and not as its substitute nor as its rival or antagonist. "There are three spheres of wonder in thought. The lowest is simple matter, with its mysteries and beauty and grandeur. The highest is pure Spirit, the self-existent cause of the universe, and his angels. Midway between is the being in whom spirit takes to itself matter, not that they may mechanically cohere, but that a new world of wonder may arise—mysterious forces, and forces which neither simple matter nor pure spirit in their isolation possesses. Matter and mind conjoined do not merely add their powers each to each, but evolve new powers, incapable of existing outside of their union. * * * The philosophy of the future—its universe shall be one of accordant, not of discordant matter and mind—a universe held together and ever developing under the plan and control of the one Supreme, who is neither absolutely immanent, nor absolutely supramundane, but relatively both—*immanent* in the sense in which deism denies his presence, *supramundane* in the sense in which pantheism ignores his relation. Its God shall be not the mere maker of the universe, as deism asserts, nor its matter, as pantheism represents him, but its Preserver, Benefactor, Ruler and Father, who, whether in matter or mind, reveals the perfect reason, the perfect love, the perfect will, the consummate power, in absolute and eternal personality." (Dr. C. P. Krauth, Vice-Provost, University Pa.)

The two groups of second causes are those of matter and those of mind: and the assumption of a first cause is entitled to consideration only as being compatible with their known distinctive efficiency. In brief, the dependence of all second causes is such that, without the original action of the first cause, they had never existed and its integrity and sufficiency would not be impaired by their ceasing to be. Moreover, during their co-existence and continuance, the first cause bears to the second causes the twofold relation of sustaining and controlling them. In the ordinary operations of nature, the inherent and peculiar energies of matter and of mind are not suspended nor superceded as held by Cartesians, nor abandoned to themselves as held by Leibnitz, but are actively and unceasingly sustained and controlled by omnipotence under the guidance of omniscience tempered by goodness, justice and truth. Nature's operations point to an ab extra source of power as explanatory of their initiative and also of their continuance; so that by nature's own teachings, the God of nature is not to be confounded with nature itself, nor with nature's operations; nor is nature allowed to supercede its author and governor. And thus theistic realism is seen to involve a dualism most profound, with the finite universe of matter and mind on one hand, and, on the other, God the Creator, Preserver and Lord.

Jonathan Edwards, 1703-1758, heads the list of American philosophers, and is one of the first thinkers of all ages; and as his towering genius grappled with the more abstruse questions in philosophy, whilst pursuing his labors in theology, he never lost sight of the axiom, whose quotation shall close this discussion—*That whatever is true in theology can be shown to be both true and reasonable in philosophy.*

SUPPLEMENT.

The following three lectures by Profs. A. F. Fleet, J. S. Blackwell and Conrad Diehl, though not included in the original course in the first portion of this volume, have been inserted as a supplement by the request of the Faculty of the Missouri State University. These supplementary lectures appear in the order of the appointment of their authors and are presented as their inaugurals upon entering on the labors of their several departments. They were delivered in the University chapel on the mornings of January 14th and 15th, 1880, in the presence of the Curators, Faculty and Students.

INAUGURAL LECTURES.

ADVANTAGES OF CLASSICAL STUDY.

By A. F. Fleet, Professor of Greek and Comparative Philology in the University of the State of Missouri.

Mr. President, Gentlemen of the Board of Curators, Ladies and Gentlemen:

No educational question has been more warmly discussed during the nineteenth century, and none has had more ardent champions and more violent opposers than the question of the "Advantages of Classical Study," on which I design to speak to you briefly to-day.

Nor has its consideration been confined to our own century, or to our own age; for from the time of John Locke, and later in a somewhat different form, of Dean Swift and Sir William Temple in England, and Fontenelle in France, to the present day, this question has been the arena on which rival educational factions have poised the lance in many a hard fought battle, often more eager, perhaps, to gain the

victory for their respective sides than to advance the cause of truth; or to discover that between the two extremes in this, as in most other warmly contested questions, lay always the safest and the wisest course. Permit me to state, therefore, on the threshold of my address, that I come not before you as a blind defender of the study of the Greek and the Latin to the exclusion of the modern languages, or mathematics, or the physical sciences, or of history, or philosophy—not as a professorial Don Quixote, armed *cap-a-pie*, and anxious to encounter in mortal combat any and all scientific windmills I may chance to meet; but taking off my hat to these invincible giants, and carefully avoiding any encounter by a full recognition of their real merits, I purpose, nevertheless, in the true spirit of a genuine disciple of St. Crispin, to argue with all comers that on earth there is nothing like leather! And still lest I may seem too eager, as was said to be the wont of the ancient sophists, to make the worst appear the better reason, I beg you carefully to note the argument, and, if possible, to detect the error in history or in logic.

A prejudice against the study of the classics is not new. It has existed in all countries in which these languages have formed an important part of the educational course. In Germany, in England, in Scotland, the conflict has been long and bitter between the advocates and the opposers of classical learning, and with varying success—the victory now leaning to one side and now to the other. Nor is it entirely a new question in our own country. Nearly a hundred years ago a distinguished scholar of Philadelphia published a pamphlet on the subject in which he says, "The expulsion of Latin and Greek from our schools would produce a revolution in society and in human affairs. That nation which

shall first shake off the fetters of those ancient languages will advance further in knowledge and happiness in twenty years than any nation in Europe has done in a hundred." Forty years later, in 1824, there appeared in a Boston paper a series of anonymous but powerful articles in which the writer took the ground that "the *dead* languages are no guide to the signification of English words;" "no guide to English Grammar;" "no benefit to style;" "that classical literature is of little value as a source of knowledge;" "that classical studies are not the best means of strengthening the understanding;" "and of not much value as an aid to the study of modern languages."

About the same time Hon. Thos. S. Grimke of Charleston, S. C., a most accomplished scholar, and for many years a diligent and successful student of the classics, in an address on the "Character and Object of Science," speaks as follows: "The whole system of education is destined to undergo an American Revolution in a higher and holier sense of the term than that of '76, by the substitution of a complete Christian American education for the strange and anomalous compound of the spirit of ancient, foreign, heathen, states of society with the genius of Modern American Christian institutions."

Sentiments like these uttered by scholars of acknowledged ability in different parts of the country could not but have their influence, and the faith of many was shaken in the old curriculum, in which the Greek and Latin had heretofore held an unquestioned prominence. Some of the colleges yielded to what seemed a popular demand, and in 1827, Yale appointed a committee to consider the expediency of dispensing with the study of the "dead languages." About the same time

Amherst College proposed two parallel courses of study, one to *include*, the other to *exclude* the classics, but substituting other studies therefor. In both institutions, however, the new departure soon ran its course, and the classics were restored to their original place in the curriculum.

The general agitation of the question elicited a thorough and exhaustive discussion. A large number of able addresses were delivered in their defence, and elaborate articles with the same import, were published in the leading journals of the day, and for many years the question was considered settled in favor of the classics. But as in nature we look for periodic returns of epidemic diseases, and in the religious world we expect at least once or twice every century a recurrence of religious questions long ago met and triumphantly answered, so in the literary world, and especially in this fast and utilitarian age, in a day when the institutions of centuries are swept away by the stroke of a pen, when the foundations of governments painfully elaborated from the brains and hearts of purest statesmen and unselfish patriots are shaken to their very base; in an age when such colossal fortunes are amassed as our ancestors had only read of in oriental story; in an age when the foremost question to every proposition is "Will it pay?" —in such an age is it strange that there has arisen a new philosophy despising the old land-marks, and declaring in defiance of the sentiment of all the wisdom of the past, that there *is* a "royal road to learning," and that the "Open sesame!" to all useful and profitable knowledge is a few months spent in a study of the physical sciences, or better still in getting a "*practical*" knowledge of arithmetic and book-keeping, and banking and telegraphy and penmanship? Why even in our own

state, and in some leading institutions, it has been said that many a hungry student has been given a stone when he asked for bread, has been refused even a drop to slake his thirst when his soul longed for deep draughts from the Pierian spring of ancient lore.

The sentiment which took its rise in the East grew much more rapidly in the West. Let me illustrate by an incident in my own experience: Meeting a few months since a distinguished graduate of one of our best western universities, he congratulated me upon my election to a chair in this institution, and remarked that I would have an easy time in my new position, "For," said he, "You will not find more than three or four students in the University who will take Greek!" Thanks to my learned predecessor, and to my present able and distinguished colleague in the classical chair, there may be seen to-day on our catalogue as large a proportion of students in the departments of Latin and Greek as are found in most of the colleges and universities of the country, and there is every reason to hope that in another decade the classical students of this university will equal both in enthusiasm and in numbers those of any other institution in the land.

The discussion to which allusion has been made, has been revived on both sides of the Atlantic within the past fifteen or twenty years. Defects and abuses in the methods of instruction were found to exist in England and Scotland, and at once the inference was drawn that there was a similar waste of time in the acquisition of classical learning among us. In England Prof. Atkinson discoursed upon "Classical and Scientific Studies;" "Remarks on Classical and Utilitarian Studies" by Dr. Jacob Bigelow appeared; a collection of "Essays on the Culture Demanded by Modern Life," edited by Dr. You-

mans in this country, and later "Essays on Liberal Education," edited by Rev. F. W. Farrar, since become famous for his radical views on some theological subjects. The tendency of all these books and essays is to depreciate the value of the study of Latin and Greek, and to dissuade the young from entering upon it, although admitting to some extent the advantages to be derived from it. The popular journals also often question and disparage the usefulness of such studies, and create in the public mind a distrust of the courses so long adopted in the leading colleges and universities of the country. It has not been long, since one of them contended that "Scientific education will steadily supplant classical education during the present half century. Step by step the champions of classical training are retreating from their oldest, if not their strongest positions." And another, that "Classical education has no apologists, but is assailed equally by men of science and by scholars." Or, "The sciences are of infinitely more importance to the men of the country than Greek roots." A teacher at one of our educational conventions not long ago declared that in his opinion "the study of the classics was leading us back to barbarism;" while a member of the School Board and one of the highest teachers in Massachusetts, a state of boasted culture, affirmed that six months was enough for the study of Latin, and that three months was better—less enthusiastic, it is true, but hardly less ignorant than the backwoods preacher, who declared to his city brother, after an able disquisition on the beauties of the original Greek of his text, that he meant to know Greek if it took him six weeks to learn it!

What shall we say then to such statements made with so much confidence and self-assertion? Readily

might they be met by counter statements and opinions of the most eminent scholars known to fame in Europe and America, whose breadth of culture and world-wide reputation would claim for them at least a respectful consideration; but we would rather rest our cause upon a few of the many arguments which might be presented in behalf of these studies.

In order, therefore, that we may fully appreciate the merits of the question under discussion, we must learn on the very threshold what is the meaning and what the true end of all education, and in what way the study of the classics will aid the diligent student in strengthening those powers of mind which will qualify him for the consideration of any and all questions arising before him, and upon which he may desire to concentrate his thoughts, or exercise a correct judgment.

Even the meaning of the word and the objects to be attained have been the ground of controversy. There are those who maintain that all education should have as its object professional training, or the acquisition of such knowledge as may be turned to use in practical life; that if a young man is to be a physician, his knowledge of mathematics need only extend so far as to enable him to weigh out his medicines or cast up his accounts; of geography, as to find his road to the homes of the wealthiest families; and that he need only read well enough to get through the long words in his anatomy and physiology without spelling out more than half; while, if he is to be a farmer he should attend his District School at least two or three days a week during the winter months, that he may learn to read his county paper without much trouble, and get writing and arithmetic enough to figure out the price of so many head of cattle at so much a pound; or as the culmination of

mathematical and business knowledge, to be able to calculate interest compounded every quarter at 1½ per cent. a month!

But there are others—old-fashioned people perhaps, not abreast of the times, who have the idea that education means something more than this; that it is the training and developing and disciplining of all the powers of the mind, just as gymnastic exercises develop and strengthen all the muscles of the body; that education is designed to widen the mind so that it can take broad and comprehensive, instead of narrow and contracted views; that education should enable a man to take up any subject and think patiently upon it, until he has seen every side of it and seen *through* it; that education gives sound judgment, enables one to reason to right conclusions, gives him the ability to express his thoughts tersely and vigorously. Look, for example, at our successful business men. How broadly comprehensive must be the views of a merchant prince, a great manufacturer, an extensive farmer, a large dealer in grain or stock, a railroad king! He can look into a subject until he sees through it and knows all about it that is worth knowing; until he has just and correct views of things, and can give such clear and forcible expression to his views as to make others think as he does. He it is who will always rise above his fellows, will control their labor, will acquire wealth and will be a master among men. In many cases these men have gained their education or training slowly and painfully in the school of life, and often have reached middle age before they have attained this point. Now, if it is possible for us to select certain branches of knowledge and so to combine them as that by putting our student through them we can develop all the faculties of

his mind, we anticipate the discipline slowly and painfully gained by contact with his fellows, and give the young man of twenty-five much of that breadth of thought, soundness of judgment and accuracy of expression which in the school of life he could hardly have attained before reaching fifty years of age. It is a remarkable fact that the real foundations of wealth of three of the richest men of our country, John Jacob Astor, George Peabody and Cornelius Vanderbilt, were not laid until they had passed beyond fifty years of age. If, by some educational process they could have been so trained as to have known at thirty what they had learned at fifty, what immense material possibilities would have lain before them in their long lives!

In this sense, therefore, education is not so much designed to impart information and store the mind with knowledge, as to awaken the desire and supply the power of acquiring knowledge; not so much to furnish special training for particular pursuits, or to prepare a man for his future calling, as to give general culture and fit him for any calling; not to leave him a slave, confined to one single path of securing a livelihood, but to make him a freeman by elevating him above the common level, and enabling him from his commanding height to select any path in life which seemed to offer him the most advantages; in short, by bringing out and training all those powers and habits of mind which will enable a man in his social or business capacity to deal successfully with his fellow-men, and exert a wholesome and useful influence upon all within his sphere of action. To confine education, therefore, to what is purely technical or professional is to take a very narrow view of the subject, to forget that man has other duties to perform besides those of his trade or his profession, or of making

as much money as he can within a given time. He has to be the ruler and counsellor in the home circle to whom wife and children look up for advice and direction; he has to meet his neighbors and friends in daily intercourse; he has to bear his part in political and business and church affairs; and his education is to fit him for all these religious, social, civil and political duties as well as for his profession or trade. Such an education cannot be attained simply by the acquisition of knowledge. No amount of knowledge will enable him to grasp all the subjects and grapple successfully with all the difficulties which meet him in ordinary life. Nothing, in fact, but the vigorous and healthy action of all his faculties will give him power to quit himself like a man in the great battle of life. Then, too, a generous and thorough culture is the best preparation for any special work, and should therefore be the primary end to be aimed at in education. For our American people, especially, we are sure, as had been said by a distinguished writer, there is something higher and better than "to draw existence, propagate and rot." We presume it is our ambition to become a cultivated, literary nation, and we have failed to read aright the signs of the times if we have not observed the wonderful advance made in this direction in the past few years. Ours is no longer a new country. In material and mechanical advancement we have gone far beyond European nations already well advanced in all the appointments of civilization and culture before our nation's birth; and that we may keep pace with material, there must be rapid and thorough mental progress also. In a few years, beyond doubt, it will be considered absolutely necessary in order to satisfy public opinion, that the acceptable lawyer, physician, editor, teacher, shall possess here, as in Europe, a carefully acquired

general education, as well as a thorough training for his special profession. And the time may come in the Golden Age of the Republic when we will have in our American Civil Service, as Great Britain has long had in hers with the happiest results, competitive examinations for all positions of emolument or honor under the appointment of the government, and when the fact of a man's knowing something of the language and literature of a foreign nation, will not be taken as *prima facie* evidence of his unfitness for his appointment to that country, because, forsooth, he is so unfortunate as to be one of "them literary fellows."

By the expression "Classical Study" is meant the study of the Greek and Latin languages and their literatures. The origin and meaning of the word is derived from the political economy of Rome. In listing the Roman citizen for taxation, one man was rated according to his income in the fourth class, another in the third class, and so on; but he who was in the highest class was said emphatically to be of *the* class, "*classicus*," without adding the number, as in that case superfluous. Hence, by a plain analogy, the best authors were rated as "*classici*," and as those of the best class or rank were Greek and Roman writers, so the term classics has been applied to the best literature of those nations of antiquity.

How did the Greek and the Latin languages gain the position they have held for nearly twenty centuries in all the courses of liberal education? The bright and beautiful Athens, the eye of Greece, under the far-reaching plans of Pisistratus, and nourished by the wealth and taste of Cimon and Pericles, became the home of European literature and the source of European

civilization. Athens drew to her bosom and then sent back again to the business of life the flower of European and Asiatic youth for a long thousand years. "Hither then," says Cardinal Newman, "as to a sort of ideal land, where all the archetypes of the great and the fair were found in substantial being, and all departments of truth explored, and all diversities of intellectual power exhibited, where taste and philosophy were majestically enthroned as in a royal court, where there was no sovereignty but that of mind, and no nobility but that of genius, where professors were rulers and princes did homage, hither flocked continually from the very corners of the *orbis terrarum*, the many-tongued generation, just rising or just risen into manhood, in order to gain wisdom."

After the death of Alexander the Great, the Greek tongue spread rapidly through the East, and became the means of blending Oriental and Western modes of thought. Commerce effected a change of ideas, and the Greek, offering a new philosophy for the old religion of the Jews, secured for Europe the more precious gift of Christianity. Christianity had Greek for its mother-tongue. St. Paul, a Roman citizen, writes in Geeek to the Christians at Rome, and in the same language were written the epistle to the Hebrews, and that of St. James to the twelve Jewish tribes scattered abroad. For nearly 300 years, says Milman, the churches of the West were mostly Greek religious colonies. The Apostolic Fathers, the apologists and historians, and the great theologians of the early church wrote and spoke Greek. The proceedings of the first Seven Councils were carried on in that tongue, for it was hardly possible to treat the profounder theological questions in any other language. St. Augustine could

not find words to speak of them in Latin, and even seven centuries later Anselm undertakes the task with diffidence and hesitation. And thus, when Christianity became the State religion, and the Emperor took part in the discussions of Nicaea, it was a last and signal spiritual triumph of captive Greece over capturing Rome.

The ancient church encouraged acquaintance with heathen literature, and Origen made a study of the poets and moralists preparatory to that of higher Christian truth. His master, Clement, taught his disciples that the Grecian philosophy was the schoolmaster which led them, as the Mosaic law brought the Jews to Christ; and to this day, along the porticoes of Eastern churches, both in Greece and Russia, are to be seen portrayed on the walls the figures of Homer, Thucydides, Pythagoras and Plato, as pioneers preparing the way for Christianity.

As Greek had been in the East, so Latin became under the Roman Empire the medium through which literature, science and wisdom were transferred to Western Europe. In Spain and Gaul, Latin became the mother tongue and the laws of the Western Empire, the last and greatest product of the ancient Roman mind, were adopted by the Gothic, Lombard, and Carlovingian dynasties. What at first had been a Greek, became in Western Europe a Latin religion. A new Latin version of the Septuagint and of the original New Testament superseded the time-honored Greek, and Latin became indispensable for church preferment.

In the Middle Ages, therefore, Latin was made the groundwork of education, because it was the language of the educated throughout Western Europe, and was employed for public business, literature, philosophy and science, above all, by God's providence, it was essential

to the unity, and therefore was enforced by the authority of the Western Church.

This then brings us down to the time when the great European Universities were founded and some of them were at the meridian of their glory, where the Greek and the Latin were taught because there was little else worthy of the name that could be studied.

And now let us consider some of the arguments which may be adduced in favor of the study of the classics in our schools and colleges and universities.

1. In the first place it greatly aids and strengthens the *memory*. The learning of the declensions of the nouns, pronouns and adjectives, the conjugations of the verbs, the committing to memory of the vocabularies, and phrases, and passages from famous authors; the constant necessity of acquiring and retaining the large mass of historical, geographical, mythological and antiquarian knowledge necessary to a correct understanding and a proper appreciation of the meaning of the classical authors, (and without all these the training would be grossly defective,) all afford constant practice to the memory, and therefore greatly develop and strengthen that faculty.

2. In even greater degree it cultivates the *judgment* by the constant investigation of the appropriate meaning of words, and of the exact rendering of clauses and sentences by bringing out the full force of each word and particle; by determining from the elasticity of the ancient languages the exquisite shades of thought that can be expressed by the simple change of the arrangement of the words in the sentence; in the comparison of rules and principles with examples of their use, and of different passages of an author with

parallel passages of the same, or of different authors in different languages; all of which requires discrimination and decision, the two essential factors in the formation of a correct judgment.

3. It educates the *analytical faculty* by encouraging the student to trace words to their ultimate sources, to note carefully the changes undergone in different combinations, to separate compound words into their component elements and discover the mutual influence of the parts, to dissect sentences and to put them together again—many of them involved and complicated—with clauses whose dependence upon each other are not at once obvious and in which the words, which in our own language would be consecutive, are often widely separated from each other in the sentence.

4. The study of the classics cultivates the *reasoning powers*. "Correct syntax is nothing but a correct process of reasoning." The arrangement of words and sentences in accordance with certain fixed principles must correspond with the reasoning process going on within the mind, and hence the study of syntax must be a constant exercise of that faculty. Then, too, the student is constantly engaged in following out the connection in thought between different clauses and sentences and paragraphs, all of which correspond with the mental processes of the author whose works he studies. And if we remember too that in history, philosophy and oratory, the classical authors afford us the most perfect specimens of close reasoning which any literature has yet produced, we will clearly see how greatly a close and minute attention to these models will tend to develop and expand the reason.

5. It will be acknowledged on every hand, except perhaps by here and there a disciple of the authors

quoted in the earlier part of these remarks, that classical study give an inexpressible assistance in the acquisition of other languages, and great precision in the knowledge of our mother tongue.

> Wer fremde Sprache nicht kennt,
> Weisz nichts von seiner eignen.

"He who knows no foreign tongue, knows nothing of his own," says the acknowledged master of German literature. What can give a better exercise in discerning the exact force of words and phrases, and of clothing ideas in appropriate dress—the perfection of the operation of the faculty of language—than the careful and minute study of the complex and yet perfectly constructed sentences of the best Greek and Latin authors, and the daily habit of analyzing and reconstructing these into models of pure and idiomatic English? And what more fully cultivates the taste than this method of translation and composition in which we have constantly and carefully to consider how the exact idiom of the classical languages may be elegantly expressed in our own, and conversely how idiomatic English may be rendered into Greek or Latin—the task of deciding how all the nice distinctions and shades of thought expressed by the inflections of one language may be rendered without loss of force or meaning in another—a task requiring the closest discrimination and the most refined taste because of their great difference from our own language in structure and mode of expression.

6. Nor can any other study do more to exercise and cultivate the *imagination*. The classics contain some of the finest works of the imagination which the world has seen, and the length of time which, because of the difficulty of the language, the student necessaaily spends in acquiring an accurate conception of their con-

struction and meaning affords him a far better opportunity of imbibing and appreciating the imagery or sentiment than if he had hurried through them, as he would be apt to do in case of his own, or of any modern language, thus losing the effect of the development which such close and long application would afford.

There are many other arguments besides those that have been adduced which claim our attention. Among them, one which has been carefully elaborated by Dr. Whewell in his work on "Liberal Education:"

> The Classics are an indispensable part of our education course because they connect us with the intellectual efforts of past ages; they are stamped, as it were, upon the history of the civilized world, and their study preserves the traditions of moral and intellectual life; and true nobility of intellect consists in the ability to trace the descent of ideas. To omit the study of the classics then is to cut us off from the experience of the intellectual world, to make it impossible for us to investigate the progress of the thought of civilized man, and to destroy what may not inaptly be called the aristocratic element of human knowledge.

2. Another argument is based upon the paramount influence of the Greek and Roman mind and character upon our civilization. Mr. Wm. E. Gladstone, with whose name we are all familiar as one of the ablest of a noble line of British premiers, and whose views are certainly entitled to consideration, declares it as his opinion that classical training is paramount, not simply because we find that it improves memory, or taste, or gives precision, or developes the faculty of speech—"All these," says he, "are but partial and fragmentary statements, so many narrow glimpses of a great and comprehensive truth." "That truth he takes to be that the modern European civilization from the middle ages downwards is the compound of two great factors, the Christian religion for the spirit of man, and the Greek (and in a

lesser degree the Roman,) discipline for his mind and intellect. * * "The materials of what we call classical training were prepared, and we have a right to say were advisedly and providentially prepared, in order that it might become not a mere adjunct, but (in mathematical phrase) the complement of Christianity in its application to the culture of the human being, as a being formed both for this world and the world to come."

In the same train of thought in his "Considerations on Representative Government," Mr. John Stuart Mill observes that "The Jews jointly with the Greeks have been the starting point and main propelling agency of modern civilization," and M. Guizot in his "Meditations on Christianity" endorses the same view and declares that "Modern civilization is in effect derived from the Jews and from the Greeks. To the latter it is indebted for its human and intellectual, to the former for its divine and moral element." The fact is that the civilization of Modern Europe, and secondarily of our own country, is so interpenetrated and impregnated by classical influences, its human element is so entirely derived from classical sources, that its nature and tendencies cannot be rightly understood and duly estimated without a knowledge of the mental productions, the civilization and the inner life of ancient Greece and Rome.

3. Another argument against removing the classics from their time-honored place is that the intellectual life of our educated classes has been so completely formed by them, and that our whole literature has been so interpenetrated with them, that it is impossible for one who is not a scholar, even with the aid of labored and copious annotations, to gain a just, and much less a lively and limpid conception of thousands of the finest passages in our modern prose or poetry. If any one

doubts this let him open for example the "Paradise Lost," and read a half dozen pages anywhere, and he cannot but confess that this opinion is well founded. So full and constant are Milton's allusions to classical and oriental literature, and so reverently and devoutly does he imitate those ancient models in whose footsteps he was proud to tread, and so perpetually would we be obliged to recur to the classics that, without an acquaintance with them we could never enter into the spirit of the author or comprehend a tithe of his beauties—indeed if we strip Milton of his translations and imitations of the classics, and still more of those direct and distant allusions to particular thoughts or expressions of theirs, he will be found, to use one of his own phrases, "shorn of his beams." So intertwined, therefore, are all the modern classics with the ancient that we could not abandon the study of the latter without a great shock to our hereditary system of thought, and opponents of the classics should certainly show very good reasons why they should be abandoned, and give very cogent arguments in favor of those studies they propose to put in their stead.

4. Another argument will be universally recognized, viz., that a knowledge of Greek and Latin is highly advantageous for young men preparing for what are known as the three learned professions, law, medicine and theology. The text books and the works of reference of the lawyer are full of Latin expressions left untranslated! Many of the greatest works on Jurisprudence have never been translated from that tongue, and the earliest precedents of his profession are in the Latinized French of the Normans, all of which must remain utterly unintelligible without a knowledge of the Latin language. Classical study is also the best, if not an in-

dispensable preparation for that part of a lawyer's duty which involves the interpretation of constitutions, statutes, wills, ordinances, contracts, and indeed of legal documents of every description. And then, too, if the lawyer aspires to eminence in his profession, and even to the ability of practicing in certain courts of our country, and to a systematic knowledge of the principles constituting the science of Jurisprudence, he must of necessity be able to hold constant communication with the great works of the civil law, the Justinian code, that peerless monument of juridical wisdom, which he will find still locked up in the Roman tongue.

So in the medical profession, to say nothing of the fact that without a knowledge of the classics the student cannot avail himself of the writings of Hippocrates, Celsus, or Galen—the fathers of the medical science—he will find it well nigh impossible to comprehend and remember the technical terms used in his art. How simple to a Greek student, for example, will it be to remember that *anatomy* is "the doctrine of the structure of an organized substance, learned by dissection," when he recollects that *anatemnein* is to cut up. Or that *physiology* from *phusis*, nature, and *logos*, a discussion, treats of organs and their functions. Or that *hyperaesthesia* from *huper*, over, and *aisthanesthai*, to feel, means an over amount of sensibility; while an *anaesthetic* is something given to produce insensibility. That *anaemia*, is want of blood, *hemorrhage* is the bursting of blood vessels, while *malanaemia*, for which he would vainly look in Webster's Unabridged, any Greek sub-freshman could tell him comes from *melas*, black and *haima*, blood, and denotes an excess of venous blood. Or how will he feel when the learned physican whom he calls in for consultation gravely announces that "having care-

fully considered the pathology as well as the aetiology of the disease, he has arrived at the solemn conclusion that the patient is suffering from leucocy-thaemea, superinduced by a chronic torpidity of the chylopoietic organs, and that he would advise a hypodermic insertion of some ferruginous compound!"

And in the profession of theology, which Sir Wm. Hamilton has defined to be substantially, "applied philology and criticism," no one who has not received a thorough classical training can reach the highest standard of theological attainment. Do they not know that all the works of the early fathers of the Christian church, all the productions of the Mediaeval theologians, and that many of the masterpieces of comparatively modern divines, such as Turretin and Calvin, are written in the languages of Greece or Rome, and hence are sealed books to those who have no classical culture? When we add to this, that an accurate acquaintance with the manners, customs, institutions and literatures of Greece and Rome is indispensable for the correct understanding and explanation of many of the figures and allusions in the New Testament and other ancient theological writings; and for tracing out the influence of Christianity upon the civilized races with which it came in contact, and in investigating its effect in reforming and renewing the elements of human society, what shall we say of the nepohytes who madly "rush in where angels fear to tread," and who undertake to instruct others in Christian doctrine when they are themselves unable to interpret the original writings in which the Sacred Oracles have been handed down to us?

Another argument in behalf of the classics is the intrinsic value of the literature of Greece and Rome. It may be truly said that that literature contains some of

the most inspiring poetry, the most fervid eloquence, the most profound philosophy, and the wisest and most impartial history. And indeed without attempting to draw a comparison between the classical and modern literatures, no unprejudiced person can decline to grant that the languages in which Homer and Virgil composed their epics, Demosthenes and Cicero uttered their orations, and Thucydides and Tacitus wrote their histories, are eminently worthy of diligent study for the sake of the literary treasures of which they are the key. To Greek this argument applies with special force. In it are found the earliest examples of epic, and dramatic poetry, and perhaps the most perfect and elaborate specimens of the drama which we possess; in it were written histories not only the oldest, if we except the sacred ones, which have been handed down to us, but also unsurpassed if not unrivalled by any of the histories of the modern times; it was the language of the greatest orator which the world ever produced; in it wrote the masters of logic, metaphysics, moral and political philosophy to all succeeding generations; men unexcelled by their pupils, with all the increased experience of two thousand years; in it were composed the inspired records of Christianity—records which are the basis of the Christian faith, and the guide of the individual christian in all that concerns his spiritual and eternal welfare.

For the American scholar and statesman also, what school can be found like the study of the Grecian and the Roman republics and what errors may our country in the future escape by noting carefully and avoiding the rocks upon which they were broken into pieces? To none is classical study more essential than to us as Americans, for, as De Tocqueville has said, "No literature places those fine qualities in which the writers of democ-

racies are naturally deficient, in bolder relief, than that of the ancients; no literature therefore ought to be more studied in democratic times."

Another argument for maintaining the prominence of the ancient languages and their literatures in education, though not often noticed in the discussion of the question, is the superiority of the books of instruction in this department of knowledge to those offered as substitutes. The student of Greek, for example, from his first step onward, "finds himself walking in paths which have been trodden by acute and cultivated intellects for centuries. He is under their guidance, in communion with their thoughts, stimulated in every step to exercise an independent judgment, yet cherished in every impulse to wild or hasty reasoning by their united authority. The books with which he becomes familiar are not hasty outlines of the present state of some science, likely to be superseded at any time as the science itself may undergo a revolution by some single discovery. The great body of classical scholarship has continued for at least ten generations to be the common heritage of intelligent minds, steadily growing in mass, in perfection of form, in finish of detail, every change of new acquisition increasing the value of that already secured.

One serious obstacle to the successful study of the classics is the habit of going over in the early part of the course especially, of too much ground in a given short period of time. The preparatory course being the first effort of the pupil to a critical study of language, any defect in it preventing the formation of right habits of study, or giving a wrong bias to it, may be fatal to the future success of the student. Where there is so much to do, and so little time in which to do it, there is every temptation to do the work superficially. In this

most emphatically, haste makes waste. There is no place here for mere cramming; but the student must take time to investigate and see that his way is clear at every step, to reason and compare, to adjust delicate questions, to get well-defined ideas before moving onward. Many a student, hurrying rapidly over the ground with no time to imbibe the spirit and beauty of what he is studying, without strengthening his memory, refining his taste, quickening his perception or invigorating his reasoning faculties, loses all interest in the study and confidence in himself, becomes discouraged and demoralized, and charges to the classics the failure which should rather belong to his own hasty and confused and ill-directed manner of studying them.

If on the other hand he begins aright by learning the symbols of the language, the *words*, with their roots, their comparative etymology as traced through all the cognate tongues of which he may know something, their forms and all their changes with the reasons therefor; the force of moods, tenses, and voices; the arrangement of words and sentences; the reason for one position rather than another, the general laws of agreement and construction; the comparison of the Latin with the Greek, and both with other languages;—if then he goes forward with higher topics, to the finished translation of the author he reads, the study of synonyms, antiquities, mythology, the manners and customs of his day, the prominent subjects of thought at the time of the writing, and the peculiar circumstances which gave coloring to the writer's views; the logic, rhetoric, oratory and poetry; the history and civilization, the science, politics, philosophy and religion of the times; the connection between the past and the present—in a word, all that a language contains, every-

thing that will serve to photograph in his mind the strange and busy scenes of the past; the thinkers and actors in their surroundings, and to make him a conscious sharer in the movements of a world so different from his own—it, we say, a student goes forward semester after semester in the investigation of subjects like these, treading with a surer and firmer step as he advances, he will find himself constantly entering new fields of thought and enquiry, and will discover each day new beauties and attractions in the compositions of the great masters of antiquity, will never be careless or listless in the study so conducted, nor complain that he learns little new year after year except the cold and dry rules of syntax.

And finally what more shall I say to impress you more fully with the importance, nay the absolute necessity of classical study in order that you young ladies and gentlemen may reach the ideal of true scholarship to which you aspire? Need I quote from Victor Cousin, the master philosophical mind of France, when he says "that these studies are in truth beyond comparison the most essential of them all; conducting, as they do, to the knowledge of human nature which they bring us to consider under all its variety of aspects and relations; at one time in the language and literature of nations who have left behind them traces of their existence and glory; at another, in the frequent vicissitudes of history which continually renovate and improve society; and finally, in the philosophy which reveals to us the simple elements and the uniform organization of that wondrous being whom history, literature and language successfully clothe in forms the most diversified, and yet always bearing on some more or less important part of his internal constitution. Classical studies maintain the sacred

traditions of the intellectual and moral life of our species. To cripple, far more, to destroy them, would in my eyes be an act of barbarism, an audacious attempt to arrest true civilization, a sort of high treason against humanity."

Or of Sir William Hamilton, the acknowledged metaphysician of his age, who declares that "The study of ancient literature, if properly directed, is absolutely the best means for the harmonious development of the faculties, the one end of all liberal education."

Or of Dr. William Smith, the English antiquarian and historian: "I hope the day is far distant when the study of classical literature will cease to be essential to the education of the English gentleman; and that whatever changes, in this reforming age, may be made in our universities and public schools, classical literature will stand as the foundation on which every thing else is based. For whether we regard the language as a means of sharpening the intellectual faculties, or the literature as a means of elevating and purifying the taste, it would be easy to show that no subject could take their place or accomplish the objects which they effect."

Or of Macaulay, in his beautiful apostrophe to the literature of Greece: "From that splendid literature have sprung all the strength, the wisdom, the freedom, and the glory of the Western World. * * What shall we say when we reflect that from hence have sprung directly or indirectly, all the noblest creations of the human intellect; that from hence were the vast accomplishments and the brilliant fancy of Cicero, the withering fire of Juvenal, the plastic imagination of Dante, the humor of Cervantes, the comprehension of Bacon, the wit of Butler, the supreme and universal excellence of Shakspeare? All the triumphs of truth and genius

over prejudice and power, in every country and in every age, have been the triumphs of Athens."

Or of our own countryman, Edward Everett, who says, "There are other advantages besides the intrinsic merit of the ancient Classics amply sufficient to repay us for devoting a few years to the study of Greek and Latin. We know no kind of labor so well adapted to the general improvement of the faculties in early youth."

Or of Professor Moses Stuart, the foremost American scholar of his time: "Is the pursuit of classical literature worth the time expended on it? From the deepest and fullest convictions of my heart, I answer, Yes. I would I could answer so loud as to be heard in every part of my country. I have never yet engaged in any exercise which afforded more salutary discipline than that of translating difficult passages from a foreign language; * * and I am certain that few of my hours have been spent to better purpose in their influence over the habits of the mind."

The time would fail me if I attempted to give the views of such eminent thinkers and educators as Dr. McCosh of Princeton, Presidents Porter and Elliott of Yale and Harvard, with a noble company of others acknowledged by all the world as being at the head of European and American scholarship, who with one accord and in no doubtful voice declare in clarion notes, that come what may, the Classics must not, shall not go!

VIEWS ON THE STUDY OF LANGUAGE.

By Prof. J. S. Blackwell, Professor of the Semitic Languages and Literature in the University of Missouri.

Of the studies which challenge the attention and call forth the energies of the youth of our generation, there is a present tendency to a dual classification,—a classification arbitrary, illogical and unscientific. The Sciences on the one hand, (the term being limited to the various departments of Natural History, on account of the preponderant importance of its vast performances) and the languages on the other, find their respective advocates and enthusiasts. The ulterior purpose of both is the same: to discover in the universe of the knowable that elusive truth that moves between light and darkness, to fix its orbit, and describe its path; to unify the diverse, and harmonize apparently conflicting forces whether in the realm of nature or in the multitudinous manifestations of mental action. The actual supplements the potential; by labor in the one branch of study we increase the wealth and material comfort, enlarge the sphere, promote the longevity and enhance the civilization of the individual man; in the other, we take hold of man in his prime differential faculty, dissect the

body of reason in speech, reveal the psychological unity of the human race, catch the faint murmur of man's ante-historical lispings, increase our power of expression, gain larger combinations for the laboratory of the imagination, and push farther on the horizon that skirts the border land of the discoverable. It is not my aim to decry the one and unduly to elevate the other of these noble explorers in their expedition into the Land of Promise. Indeed, such a course would be nugatory and futile. Both studies are necessary factors in the product of finished education. We may well have reason to pronounce that the time is not near, as presaged by the able editor of the *Popular Science Monthly*, when educators will be compelled to elect between the Sciences and the Languages, as to which shall occupy a paramount place in the schools. The statement is an outgrowth of that intense utilitarian frenzy which is now prevalent throughout the world. A thing to commend itself to the mind of this age must evidence to a complete demonstration some practical results. We cease to take delight in unsubstantial abstractions and to risk our lives in the support of inane and issueless speculation. Realism and Nominalism wage no more wars. The problem of education belongs to the people, and they will solve it to productive results. But in their intense love of the practical, they cannot lose sight of the genuine elements which constitute practicalness. Practical education does not altogether consist in the ability to guide a plow along a furrow, to wield a hoe, brandish an axe, carve with tools, or in being merely skillful in the mechanical arts. Dexterity in these is compatible with a great amount of stupidity and ignorance. Clearly, practical education cannot leave out of view the disciplining of the mental faculties, the acquisition of useful

knowledge and of the power of expression. Practicalness connotes a condition of mental improvement, such that the individual shall be able to recognize the aims and the objects of action, and to apply the proper aids in all circumstances that may arise, with promptness and energy. It demands the possession of ideas, and a reasonable amount of knoweldge.

Now, knowledge can be acquired in but one definite and precise way, and that is, by language. No one will contend that the vocabulary acquired at the mother's knee, will subserve the highest ends of life, nor that the paucity of ideas struggling through into a mind wholly occupied with the labor of learning to read and write in common-school education, will full up the blank. That a student may appropriate and assimilate ideas, he must have a full consciousness of the language expressing those ideas, and to understand language, he must study the body of Language itself. To study the body of Language he must have recourse to its original sources. Hence, the English student is driven in spite of all preconceptions to the study of the Latin tongue, without which our language and our literature would be an enigma at which the fabled sphynx would have guessed in vain. It is by persistent study of language that we reach the thought which has its living exponent in the word. Language is not the vesture of thought, not a magic armor that flexibly fits the thought, whether small or great, nor is it thought's correlative; it is thought itself symbolized in sound. Thought and language are only logically separable. He who cannot speak, whether in words, or in the dumb show of finger language, cannot think. "To think is to speak low, to speak is to think aloud." Children who speak are not conscious of the syllables they utter. They are like pigmies parad-

ing in a giant's garments; like puny riders seizing the ocean's mane. Now, if a proper understanding be the first element of progress in education, (and who can deny it?) we must make our starting-point in seeking to acquire the significance of words. To do this nothing is so convenient as translation, and nothing so essential as translation from the originals of our English speech. We thus become familiar with the inmost intent of the words which we employ, rise to a consciousness of the powers with which we are dealing, grow as giants to fill a giant's garments and toy with the mane of steed that its rider knows.

The proper use of language and the ability to employ it effectively are the qualities which constitute eminence, not only in the lawyer, the orator, the statesman, the poet, the rhetorician, the teacher, the clergyman, but also the successful business man. The man who cannot talk if he will, cannot think if he will. Poverty of language means poverty of thought. No one ever yet really knew anything that he could not tell. He may utter it in hesitating, stammering speech, or he may phrase it in the easy precise and thunderous eloquence of a Burke. The difference in the language arises from a difference in the amplitude of thought, and practicalness of education—the one's thought being the faint, blurred caricature of an awkward and untutored mind, the other's, the living, breathing picture sketched by a deft and skillful brain. An ignorant man may have seen the greatest wonders of the world, its towering mountain chains and snow-clad peaks, its golden sunsets, its rolling oceans heaving in tremendous billows, its works of art, glorious in beauty, its heaped-up treasures, and its gorgeous palaces, and be able to say in description of it all, that it was all "mighty fine." The hero in Southey's

poem of the Battle of Blenheim, the old man who had met the foe in the shock of conflict, could say naught else of the signal triumph than that "it was a glorious victory;" much as Jefferson Jones wrote the history of our late war in the concise manner peculiar to men with remarkable inaptitude for thought and speech in the nervous declaration that "it was a powerful skeery time."

The great Schopenhauer stands sponsor to the thought "that he who does not know foreign tongues walks through this world in a fog." It is not meant that the knowledge of languages, as children learn them, necessarily implies consequent mental development. Mental culture does not necessarily come with speaking many languages. Many a druggists' clerk, and many a bar-tender, has a facile tongue in four or five languages, and yet has never heard of "parts of speech" and "grammatical accidence." Language learnt without effort, without reflection, without self-consciousness, make quite a different accomplishment from language learnt by the slow process of grammatical and lexical training in which the critical powers, the faculty of discrimination, of taste, and of judgment, the highest powers of the human mind, are evoked and enlisted from the start. And herein lies an insurmountable objection to the so-called "Natural Method" of instruction in languages which claims to have hewn out and paved a royal road to learning and to reach the longed-for goal with lightning speed. The memorizing of long strings of words and expressions is a very different thing from the exercise of reason. A student in the primary department of our academies could take a position above a Grecian sage in certain memorized points of to-day's familiar knowledge, but would not have a millionth part of the mental power that burned in the brain of an

Aristotle. The one's facts are mere matters of memory, mere word-labels ticketed with sounds unrealized in consciousness; the other's trained intelligence could pour a steady ray upon the most recondite and baffling questions, peer with Jove-like prescience into the probabilities of the future and adumbrate their history; the one's short steps cannot compass a manly gait, the other bestrides the world of thought like a huge Colossus.

The apprenticeship to knowledge in any department is slow and painful, even when ambition fires the youthful soul, and the midnight lamp glares upon the studious page. If the student would handle his mind, and turn it about to his purposes with rapidity, directness and effectiveness, he must resolutely scourge himself to his task and carve again at the granite block of unwilling destiny. In a word he must submit to the routine which educators have wisely established. If educators yield to popular clamor, and remodel the time-honored course of study in obedience to inexperience and thoughtlessness, we shall soon find that the so-called "practically" educated have little, if any education at all, and are turned out of college upon society in that vealy stage of semi-ignorance which prompts to butt at impossibilities and to toss gorgeous nothings on its sprouting horns. The dangers of half-knowledge are many and insidious. It opens the mind to depressing doubts, groundless fears, and gloomy superstitions. It has deluged the world in blood and raised many a pyramid of ghastly skulls. It has laid its spectral hand upon the sacred altar of religion. It has blasted the unity of faith, and filled the world with the fragments of broken creeds. It scowls in dark suspicion, gloats on revenge, and riots with the ghouls of crime and death. It hurls its portents into the councils of knowledge, and befouls

the feast of reason with its harpy fingers. It forebodes disaster, croaks defeat, and raises from the sea of every adventure a shadowy giant hand.

We may be very sure that the prevalence among educators of such convictions as I have outlined will in the future as in the past bring multitudes of souls famishing for knowledge to slake their thirst at the open fountains of ancient lore.

But there is a large body of old literature which merits attention and investigation on many grounds. From a literary point of view the claims of the Semitic languages are not to be lightly esteemed. Many of their performances are equal if not superior to the sublimest compositions of Greece and Rome—at least, in the treatment of the productions of feeling and of fact. The Semitic peoples were inferior to their western contemporaries in point of versatility of genius. To the former, the plastic arts, except in their grosser materialistic elements, were unknown. The canvas of Apelles and the superb creations of Phidias would have awakened in the stern and sedate Semite only the affections of abhorrence and contempt. That abhorrence, unborn and frenzied, was realized in action whenever and wherever, under the proclamation of Islam, a Semitic hand could shiver with a battle-axe, or a Semitic scimeter efface and destroy. The kindred art of poetry, the realization of the exquisite creations of the soul, could rouse the sober enthusiasm of this grave and majestic people. No Grecian lyre could sound the strings to softer raptures than could the tuneful harp of the son of Jesse. No tenderer ditties could swell the lover's heart with fond desire than were intoned by the dusky Anacreons and the rhythmic Horaces of the pre-islamic deserts. No pastoral redolent with dewy thyme and

grassy Italian meadows could recall fonder glories of earth and sky and mountain than the rural strains of the rose of Sharon and the lily of the valley. No more awful grandeur, no more terrible symbols of obscurity and darkness, vastness and solitude, wrath and power, startle from the page of Aeschylus than mutter in the sombre imagery of Job, and flash in lurid lightnings from the solemn gloom of Isaiah. There is no Semitic Homer. Among a people always incapable of compact military organization, the "delight of the warrior" found no responsive echo. But the songs of Miriam and Deborah, with their noble martial air, and even the petty campaigns of Saul and David chanted in the proud extravagance of the Israelitish maidens who came forth to meet them with tabret and with harp, have the true heroic ring. Extended composition such as is required in epic poetry with its relentless unities was impossible to the Semite, so long as the verse with its sententious paragraphs was *de rigeur* in every kind of literature. The dread tyranny of the verse rules from the Pentateuch to the Koran, nay, until the conquests of Islam brought the Muslim in contact with Grecian civilization and Grecian culture. It was then among the scholars of Edessa and Baghdad, of Egypt and Cordova that the subtle abstractions of Plato and the dialectics of Aristotle won the conquerors of the world to metaphysical research. The Semitic mind, simple and pure, knew nothing of the drama, of wit and humor, of grammar, mathematics, physics, technology, medicine, bibliography and scholastic theology. Herodotus has been called the *father of history.* But long before the simple tale of the Halicarnassian challenged the applause of the assembled athletes of the Panhellenic world, one learned in all the wisdom of the Egyptians

had penned the scroll of inspiration. The story of plain facts is plainly told, "simple in its neatness," direct in its truth, ungarnished by any art, single in its purpose, comprehensive in its humanity, and pathetic in its episodes. It has been the singular fortune of the Hebrew literature to be the prose and the poetry of mankind. Thousands who have known and know no other literature have lived and are living in the world, and some of them, like Bunyan, have made their ineffaceable marks upon the ages. The hills and the valleys of Palestine, its brooks and its seas, its mountains and groves, its cities and towns are familiar spots to the readers of two hundred and fifty-five languages. Its idioms and its metaphors, its parables and its allegories, its word-plays and its poetic parallelisms are the common literary heritage of our common humanity.

A discussion of the respective literary claims of different nations naturally calls attention to the languages in which they are written. The ancient languages differ in many characteristics from the modern. To two characteristics, the synthetical and the concrete, I would now briefly direct remark. The early mind of the world is everywhere unanalytical. It seizes the salient points of things and leaves the hearer of its utterances to fill out the picture the outline of which only is sketched. Hence, synecdoche plays a large *role* in the scene of verbal and nominal origination. The agglomeration of many elements into a confused whole, the subordination of accessory notions to some arbitrarily assumed principal idea, the lumping of accidentally related conceptions into one heterogeneous mass under some one vocable furnishes a striking exemplification of the illogical characteristics of early tongues. The Latin *regat* may mean *let him rule;* the Hebrew *tomlak*, *thou wilt cause*

to rule. The literary Arabic partakes in some degree the strange indefiniteness of the Chinese, and the long definitions often irrelated and directly opposite, attached to its roots in the Arabic lexicon are sufficient to bewilder the most laborious and experienced student. In that tongue the synecdoche attains almost infinite possibilities. An Arabic lexicographer claims to have found in his language 12,305,412 words and more than 10,000 roots. He gives 500 names for *lion*, and 200 for *serpent.* Firuzabadi, the author of the *Kamus*, counted more than eighty words for *honey*, and then relinguished the task. He claims also a thousand words for *sword* and 400 for *misfortune.* Von Hammer in his monograph on the *Camel*, catalogues, one after the other, 544 words descriptive of the "Ship of the Desert." "Such facts," says Renan, "cease to appear extraordinary when we consider that these synonymes are most frequently but epithets substantivized, or tropes employed accidentally by a poet." The advantages accruing to style from this lexicographical wealth, are conciseness, elegance of diction, limitless poetical freedom, musical and harmonious arrangement. The disadvantages are mental obfuscation, mutual misapprehension, limitless possibilities of error, mysticism and self-deception. When an Arab writes a letter, if in the literary dialect, after which all strive, he often sends along a messenger to read it. The comfort of the Arabic student is that the Arabs are often puzzled more than we, with our methodical habits of study, over the mysteries of much of their literature. The analytical languages are the product of modern times which will not be baffled in its resolute purpose of perspicuous expression. The language fitted for obscurity, for subterfuge, for equivocation, for treachery, for cowardice and slavery, as well as for noble thoughts and

glowing eloquence was a source of disquiet to the delicate linguistic consciousness of many an ancient Roman. The Emperor Augustus, says Suetonius, began the practice of using prepositions to mark relations clearly and precisely—a practice which the analytical mind of the 19th century sees carried to its fullest extension in the neo-latin dialects. The notion that every concept should have a separate word indicative of all its relations, possible and conceivable, has given, in its approximate realization, an immense impetus to psychological, linguistic and critical research. Now the Semetic tongues contain the elements of both the synthetical and the analytical stage. They have been petrified, so to speak, on the border-land of each. They have a fitness, as in Hebrew, *sui generis*, to excel in the loftiest flights of the imagination and to collect the awfulest images of terror and of grandeur, and, as in the Arabic, which is substantially the same tongue, to give out of its immense verbosity the clearest expression to mathematical, logical and critical truth. The stream of Semitic speech, in its substance, is pellucid to the bottom, but the spirit which plays with its current and ripples its surface, is fugitive and evanescent. The triliterality of its roots, their consonantal idiosyncrasy, their stony immutability, their internal vowel modifications are the most patent peculiarities of the family. Other languages grow old, and present the aspects of corruption and decay; the English of Alfred the Great we painfully explore with grammar and dictionary, but the student of the Pentateuch finds the same words, the same phraseological and syntactical turns in the prophets separated from it by a milliad of years. The literary Arabic of to-day uses the same vocabulary with the earliest fragments of the fifth century and with the *surahs* of the

prophet of Medina. The Israelite of three thousand years ago fresh from the Egyptian house of bondage might rise to-day and hold intelligible domestic converse with the swarthy *fellah* of the Nile. How wonderful, how persistent, how equable the vitality which electrifies through the chain of ages, from the farthest discoverable link in "the dark backward and abysm of time," lightens in the sublimities of Job, plays in Solomon's song, and equally flings above the antediluvian horizon the phosphorescent flashes of the poetic *maschal* of Lamech!

The phenomenon of analytical minuteness in the childhood of man, and of the crystallization of inorganic linguistic elements in the minds and mouths of all the children is a fact and a wonder worthy of the attention of those scholars who would limit the marvels and interpret the wonders of language from the narrow field of Aryan philology, in its *lautverschiebungen*, its phonetic corruption, and its dialectical regeneration. Where else has the empire of decay not left the blight of its desolating breath? Where is that other immutable tongue fit for the inspiration of an immutable God? Why should we seek for other causes of the tenacity of the Semitic mind of its ancient faith and its ancient ceremonies.

Again, the concrete character of the ancient mind must have struck every student of the classics. The mind of man in his early communion with nature was impressed with things rather than qualities. Thrown into a world new and strange, the aspect of the starry heavens, the "rounded red sun sinking to rest upon his golden car," the swift wrath of the lightning, the sudden boom of the darkening clouds, the hoarse music of the storm-god,

> "When the Wind, that grand old harper, smote
> His thunder-harp of pines."

The vast extent of the ocean, the solemn stillness of the pathless woods, the green billows of grassy fields, the sweet incense of flowers waving their censers to the morning sun, the glitter of arms, and the pomp of ambitious warriors fencing in a world with swords, attract the thought and engage the mind of the primeval man. The stern necessities of life leave no leisure for that calm and sedate stage which conduces to reflection and philosophical introspection. If we examine the body of ancient speech we shall perceive that the *thing* is prior in importance to the *quality*, the *substance* to its *attributes*, the noun stands before the adjective. The outside world is the aim and the object of existence. The modern generalizes; the ancient specializes;(*) the modern is philosophical; the ancient is picturesque. We should say, "The world hates ingratitude;" the Latin would say, "*omnes immemorem beneficii oderunt*"—"all men hate the man unmindful of a favor;" we should say *strength*, the Latin *sanguis* (blood); we, *vigor;* the Latin *lacerti* (arms); we, *sentiment*, the Latin *vox* (voice); we should say, "He utterly defeated them;" the Hebrew "*vayyakh otham shokh al-yarekh*"—"and he struck them leg upon thigh;" we, "Saul reigned a year;" the Hebrew "*Ben shanah Shaul b'malkho*"—"Son of a year Saul in his kingdom." I mention these brief particulars and peculiarities to call attention to the necessity of the study of ancient languages in order to a full appreciation of the history of mental evolution and to the grave importance which attaches to the subject of a proper interpretation of the oracles of truth, and their proper presentation in the colorless and less graphic phraseology of the present

(*) See Farrar, Chapters on Language, page 199.

day. Herein we have an interesting field for philosophical research, and one that loudly calls for the scholarly energies of our times. A literal version of any tongue loses much of the force and much of the sense of the original. The form of the thought may be depictured, but its strength and vitality are gone. The wine may be there, but its delicate *bouquet* has exhaled. How tamely does Goethe sound in a literal dress; and often how incomprehensible! and yet Goethe shares the thoughts and the sympathies of modern times. Where is the rotundity of the Ciceronian period, where the concrete impetuosity of Demosthenes furious against Aeschines in the verbatim translations of undergraduate verbal and expressional poverty? Where are the wit and the satire of Horace to the average reader? Indeed, many a young student has wondered unavailingly why the ancient classics have set the scholarly world in an uproar for ages, and been held as the model for imitation for poets and essayists in all refined and cultivated lands.

The idioms of ancient speech are often difficult of determination. It is only latterly that the phraseology of the Vaidik poets has yielded a possible motive under the patient investigation of the comparative mythologist. It may be safely said that the Bible is the most literally translated of all books, and of all books it and the Koran lose most, inasmuch as they are furthest removed from occidental thought, method, and contemplation. In transporting himself from the realm of Aryan philology to the world of Semitic speech, a world unheard-of, unexpected and *bizarre*, the student will find ample room for investigation to original results, ample opportunities and great encouragement in a field not fully occupied.

But there are other reasons why the scholarship of

our land should spend some of its energies in the direction of Semitic research. There are greater interests for our youth than the oft-told story of the wrath of Achilles, the strifes of the Grecian and Trojan heroes, the harangues of Nestor at the ships, and the wiles and woes of the crafty Ulysses. The most singular spectacle in the history of literature is the ceaseless song of the blind bard of Greece giving the key-note to the strains of every age. Shall we be employed forever in hearing of the battles and of the men who wore away ten years around a city whose very existence has been questioned, and whose story has been called a mass of myths? Let us turn awhile from the combats of the gods of fable to the contemplation of Jehovah, and in His solemn attributes and eternal perfections, forget the petty abominations of Olympus.

The Semitic mind has given to humanity the sublime doctrine of monotheism, uncovered the dark Hereafter, and brought life and immortality to light. Under its serene ray anthropomorphism has vanished in a sublime amorphism—ancestral and hero worship in the pure cult of the only living and true God. The uncompromising dogma, "*La ilaha illa 'l-lahu*," (there is no God but God), *Sh'ma*, *Yisrael*, *Yehovah elohenu*, *Yehovah ehadh*, (Hear, oh Israel, the Lord our God is one Lord), the central point of all Semitic thought and feeling is of more practical importance to mankind than all the dialogues of the Socratic school and all the speculations of the loungers of the *agora*. The thoughtful world has blessed this iconoclastic truth. Shall we be idle spectators of this great revolution of human opinions? Shall we have no personal active sympathy in the history of man's religious enfranchisement? Shall we not rather pore upon the words that Moses syllabled,

the prophets thundered, and that thrilled to the sweepings of David's harp? These reflections come with especial emphasis to the student of biblical literature, yet they have not wrought an adequate effect in stimulation to continued endeavor in his proper line of research.

The study of Hebrew as a means of broad culture recommends itself alike to minister and layman, but to the minister it is imperative as a necessary part of his theological equipment. How could a man deliver lectures on Schiller without a knowledge of German? What would Gladstone's Homeric studies profit the reading public, if he were not a most accomplished Grecian, and were driven for his materials to the translations of Pope, Cowper, Derby, and Bryant? It is not denied that many great and good men have bettered the world and given glory to the pulpit, who could not have named correctly the Hebrew alphabet. But the chief function of the minister is to teach, and in order to teach he must *know*. Knowledge here, as everywhere, is power. This is so clearly recognized in regard to Hebrew, that there is no Theological Seminary worthy of the name but insists strongly upon the study. Princeton, the catalogue of which alone I have examined, devotes three years to the work, and gives optional instruction in Chaldee, Syriac, and Arabic. The time is not far distant when Hebrew education will be demanded of our ministry in general, and when facility in theological dogmas and ecclesiastical history will not suffice. It may be emphatically said that no man can expound with authority unless in christian humility, laborious conscientiousness, and a profoundly pious and reverential mind he has explored the depths of Hebrew and Syriac literature. No man can seize in its entirety the thought of the writers of the New Testament, and cognize it in all

its relations unless he has a feeling consciousness of Syriac thought and Syriac language. The life and the soul of the speech of Matthew, Mark, and John are Syriac; the dead body is the Hellenistic Greek; the faint, expressionless picture of that dead body is the English translation.

Even the Greek of Luke which is the purest of the New Testament and abounds most in classical idioms, is filled with Syriasms and Hebraisms, from the evangelist's familiarity with Hebrew and Syriac models. Although Paul was by far the best educated of the apostles, his Greek is defective and betrays in ever chapter his Jewish character of thought. He acknowledges his imperfections himself on that score, in writing to the church at Corinth. Paul was a "Hebrew of the Hebrews," of the conservative sect of the Pharisees, and being "brought up" from boyhood at Jerusalem at the feet of Gamaliel the Elder, it is doubtful whether he ever attended any of the excellent schools of rhetoric which made Tarsus in the opinion of Strabo (XIV, X, 13,) equal to Athens and Alexandria. The unwritten Talmud had pronounced, before Hillel's time, on account of the skepticism introduced during the Syrian persecution, a curse on him who should study Greek; and hence the Jews did not attend generally (says Josephus in his Antiquities), and least of all the Pharisees, the philosophical institutions of the heathen. Indeed the Jews even yet prefer instruction from their rabbis. Certain quotations current throughout the Greek-speaking world, as certain passages from Shakespeare among us, were known to Paul, and indeed he cites a passage that is found in the Thais of Menander (1 Cor., XV, 33), one from Aratus (Acts XVII, 28), and one from Epiemnides (Tit., 1, 12). Paul in his epistle

to the Galatians (1, 14), makes known his zeal in the study of the Talmud, which had been drawn up partially in six volumes by Hillel, B. C., 32. His evident preference is for the Syro-Chaldaic or "Hebrew" of the metropolis of Judaism. Jesus in the vision on the road to Damascus, won the ear of Paul in the sweet, sacred home tones of the Hebrew tongue. Paul's language throughout is saturated with this strict Hebrew education and his Hebrew habit of viewing things. To attain to a living consciousness of the thoughts of this wonderful genius and noble christian hero, we must go over in some sort the educational ground which he traversed, and con the mass of learning which formed the *human* mental furniture of the first and sublimest of Christian theologues.

What is the cause of our criminal neglect of this branch of education? Is it the indolence of the student, the incompetence of the teacher, or the difficulty of the study? To a mind already drilled in classical grammar, the Hebrew lays no larger tax on the memory than the French, and is of immensely less labor to learn than the German, the Latin, or the Sanskrit.

Children of five, six and seven years are often among the Jews set to the work of Hebrew study. Prof. Young, of Harvard University, in his pamphlet on the "Value of the Study of Hebrew for a Minister," instances the case of the daughter of Dr. J. W. Etheridge who at five years of age began to learn Hebrew in the way of pleasant pastime, and became in time fully conversant with the word of God. Heloise, the companion of the philosopher Abelard was a good Hebrew scholar at the age of twenty years; Margaret of Navarre, at twenty-one. Maimonides, who in his early youth was banished from his father's house because of his refusal to

study, subsequently fell in with a teacher, and concludes his commentary on the Mishna in these words: "I, Moses, the son of Maymon, commenced this commentary when 23 years of age, and finished it at the age of 30 in the land of Egypt." Rashi, commonly called Jarchi, from the Hebraization of his city Lunel, in France, completed his commentaries at 33. On the contrary, Hillel, who became president of the college at Jerusalem, who stands as *Hannasi*, or the chief in Israel in the Talmud, some of whose sayings are quoted in the New Testament and stamped with divine sanction by our Savior, and who died four years after the birth of Christ, began his study of the law at the age of forty. Instancing the value of the study, the following examples may be cited: "Jerome, at great expense, secured a Rabbi to aid him in his Hebrew studies. Luther said that his knowledge of Hebrew was limited, yet he would not part with it for untold gold. Melancthon declared that the little he knew of Hebrew he esteemed of the greatest value on account of the judgment he was enabled to form in regard to religion (*propter judicium de Religione.*) Milton devoted several hours every morning to the Study of the Scriptures in Hebrew; he recommended it in his treatise on education, and his own writings both in prose and poetry, attest how much he was indebted to that study. Coleridge used to read ten or twelve verses of Hebrew every evening, ascertaining the exact meaning of every substantive; and he repeatedly expressed his surprise and pleasure at finding that in nine cases out of ten the bare primary sense, if literally rendered, threw additional light on the text. (Table Talk, p. 86). Bunsen wrote to his son in 1840, "My good boy, do learn Hebrew well, else you will continue unripe as long as you live, in many respects. It is com-

paratively an easy language, and yet in our time scarcely any one is fluent in it. Only become possessed of the inflections and common roots; they must be taken by storm." (Memoirs, 1, 561.) The Hon. Robert Lowe, of England, ex-Chancellor of the Exchequer, who was Home Secretary in the Ministry of Gladstone, delivered an address on the education of boys, in which he said: "There is one language which I think it is a great pity is almost entirely excluded from school education in England. It is the most ancient, and perhaps the most interesting in itself of all languages—I mean the Hebrew. I cannot understand how a man can consider himself as having completely mastered the elements of Theology, when he is not acquainted with that language. It is not merely the knowledge of the language itself, but the light which it throws, and which nothing else can throw, upon the text of the New Testament, for instance. The view that a man has, the knowledge that a man gets of the Bible, when he reads it standing on the vantage-ground of a knowledge ot the Hebrew, is infinitely greater than can be got by taking these books up and passing to them not naturally from the knowledge of the Hebrew of the Old Testament, but from the Greek classics. I hope to see the day when in our schools there will be at any rate an option for the study of Hebrew. Nothing could tend more to develop a thorough and sound knowledge of the Bible.' (Prof. Young, l. c., pp. 26, 27). An extension of these views in thier application to all alike is practically carried out in the Missouri University, the only institution in America, as I am informed by the United States Commissioner of Education, where the study is put on a basis not necessarily connected with theological pursuits. The recognition of the facts, as stated in the pre-

amble to the resolution establishing this chair that "this University is patronized by the inheritors and students of a Christian civilization, whose historical, literary and ethical springs had an oriental origin, greatly neglected but nevertheless challenging the attention and study of the highest order of statesmen and citizens of culture," is in itself a terse generalization of many special reasons, a grateful acknowledgment of an incontrovertible truth, a justification of and a demand for the founding of the Hebrew chair.

The Semitic tongues have not in America received the treatment which they deserve. The study of language has almost entirely confined itself among our linguists to the Indo-European branch. We have added a Whitney and a March to that brilliant *coterie* of savants, who, under the leadership of Bopp, Grimm, Pott, Schleicher, Benfey, Kuhn, Curtius, Burnouf and Max Muller have constructed a most fascinating science. It is natural that we should fall in with the headlong enthusiasm of Germany for this field of Linguistics, forasmuch as we are Germanic in tongue and lineage, and our language is a shoot of the old Indian stock. The traditions, the nursery tales, the folk-lore and the mythology of our race are in kind similar to those of the most Aryan time, and have the coloring and the fragrance of that Asiatic table-land whose ante-historical breathings are whispers of the sunset, the darkness, the dawn, and the day. We have less congenital sympathy with the lore, the gnomes, the sagas, and the endless unconnected and inconsequential disquisitions and exegeses of the law which abound in the Talmud and the Midrash. The literature of Aram, of Babylonia, of extra-biblical Palestine, of Ethiopia, of the post-Islamic world is to most of our countrymen in its original

materials, a doubly-sealed book. We have no names but those of Stuart, Robinson and William Henry Green to add to those of Gesenius, Ewald, Delitzsch, Furst, De Sacy, Quatremere, Renan, and others equally distinguished. The student of the best thoughts of Orientalists must seek his aids in untranslated books of German and French, so little is the demand of English scholars for Semitic instruction.

It has not always been so in America. From a historyof Harvard University which was kindly put in my hands by our able president, and from information furnished me in a pamphlet already noticed, by the Hancock professor of Hebrew in Harvard, I learn that more than 200 years ago it was deemed by the overseers of that great institution as important to know Isaiah and the Psalms in the original, as to know Homer and Aeschylus: "Under the presidency of Dunster [in 1642] no one could receive his first degree unless he was able to render the original of the Old and New Testament into the Latin tongue. * * In 1708, at morning prayers, all the students were ordered to render a verse out of the Old Testament from the Hebrew into Greek, except the Freshman. * * Orations in Hebrew were spoken at Coommencements." The last of these was given in 1817. "The study of this language was made obligatory upon all, regardless of what was to be their destination in life; for it was held, as a vote of the President and Fellows of Harvard College declared, 'that the knowledge of it is necessary to the divine, useful to the scholar and reputable to the gentleman; and it is, therefore, required that the students of the University be instructed in the elements and first principles of this simply ancient and venerable tongue.'"

The western world is moving in the direction so

ably pioneered by the old engineers of discovery, and we behold year after year Hebrew professorships established in our best institutions. Harvard University, as I have shown, took the lead, and speedily was followed by Yale, Cornell University, Vanderbilt University, Johns Hopkins University, and about fifty other universities and colleges, until so strong an invitation has been given to investigation in this beforetime neglected branch of knowledge, that any university, to maintain prestige, exhibit advancement, and claim equality with its fellows can no longer dare to treat with indifference the sacred language of inspiration. Missouri has not been behind in the great privileges which she affords her sons and daughters. To-day we behold the great spectacle of the immense West and Northwest clamorous for a position in education, intelligence, and refinement proportionate to their great wealth and ever-increasing population. The lavish liberality of their gifts will be repaid in the vastly increased products of educated labor, in accession of population, and in a wider prevalence of order and social security. And who shall say that we shall not in our own good time return to the East warmer rays of genius and learning, beaming back from our sunset land? Who shall say that upon these foundations of early culture we may not set up an empire of mind co-extensive with our territorial greatness? In all these aspirations, I have none greater than that in the cultivation of the high questions of nature, mind, and destiny, we shall excel in that branch of investigation for which the chair I represent was established. We walk in many linguistic wonders. Who knows but in some curve of the labyrinth through which we grope we may behold the daylight of escape from some long-torturing mystery?

ART—ITS RELATION TO EDUCATION AND THE INDUSTRIES.

By Conrad Diehl, Professor of Art in the University of the State of Missouri.

Art is the means for the embodiment or the consummation of the inspirations of man's creative powers. These inspirations either elevate the mind above coarse matter, or they enable us to make matter subserve our wants and purposes. The first of these are esthetical, the last utilitarian.

We can hardly assume that the man who was the first to conceive and apply the wedge, the screw, the lever, the steam-engine, was less inspired, or exalted, than the man who produced the first soap or gunpowder; or he who sprung the first arch or spanned the first river; made the first plow, wagon or ship; substituted the alphabet for the hieroglyphics or made the first printing-press, lithograph or light-picture; chiselled the first statue, covered the first canvas, wrote the first poem, or composed the first symphony. The inspiration, in either case, must have been genuine, though of differing intensity and duration.

The world uses the word Art as something specific, and ignores the fact that Art is a generic term which

embraces the fine and Mechanical Arts—Architecture, Engineering, Warfare, &c. All these have two things in common: their basis is Form; their expression Form-Language or the utterance of Nature.

It is the common acceptation in our country that Art is a hot-house plant, only capable of cultivation among nations that have reached the highest stage of their development, whilst, virtually, it has been the chief means to attain to it. This presumption can easily be accounted for, in that we receive the products of what *we* term Art, at second hand from abroad; and even this foreign supply does not fail to stamp its impress on our home-products of industrial manufacture;—this, simply, because all other things being equal—that article which bears the stamp of this priestess, who ministers to the innate sense of the beautiful in man, determines our choice, even at expense and sacrifice. Not only are the objects of use products of Art, but even the instruments and implements by which they were made: every devise to arm or supplement the hand or eye; for Art stands in contradistinction to Nature, and as Nature is one, so must Art be one.

Products of Utilitrian Art, that are devoid of beauty, are at best but useful crudities. Beauty is ever the inseparable attendant on their perfecting. Look at the graceful plow of our day, which can be handled with more ease by a half-grown boy and horse, than could the cumbersome, unwieldly implement of yore, by two men and a yoke of oxen. Let us look nearer: compare the first steam-engine, steamboat or locomotive with the marvels of our day; "but," will be interposed, "these are results of mechanical improvement;"—granted. What does mechanical improvement mean? It means a nearer approach to

Nature: an epytomizing of its organic structure to a conformation with Nature, by utilizing and adapting the lessons learnt in nature. Beauty and fitness are inseparable; for when the attempt is made to beautify at the expense of the useful, Art proper ceases, and Artifice, i. e., desception, fraud—that vilest of all substitutes for the true and the beautiful—asserts itself: Artifice is Art-shoddyism.

In order that the Arts may become indigenous in our country, it is the mission of our race of teachers to bring out the minds of the rising generation into sympathy with nature. They must be like priests and priestesses: ever celebrate the nuptials of the useful and the beautiful, by teaching in connection with every subject: Natural Science, geography, &c., form-reading and writing, parrallel with the course of instruction in word-reading and writing.

Another argument that may be made, is the plea that the American people have not yet reached that stage of opulence, that will admit of giving attention to anything beyond the material necessaries of existence. The prodigality with which capital is squandered in manias, such as horse-racing, yachting, walking matches; the building of cracker-castles, betting, gambling, and other shoddy-extravagances, render this plea exceedingly weak. The sums annually expended in vulgar, ostentatious display, in the shape of dress, furniture, &c., would besides securing the most elegant and tasty wearing-apparel, interior appointments, &c., go far to beautify our cities and towns if invested in landscape-gardening, and monuments, besides insuring for those who are able and willing, more substantial satisfaction and enjoyment of their investment.

The youth of our land squander their patrimony in

demoralizing indulgences, in large part, because the cultivating influences of true Art and Taste have never lifted their souls to an appreciation of something better.

The encouragement of Art has a conservative influence to save us from the evils of prodigality and wastefulness, and to utilize, in its highest form, the untold wealth of our natural resources.

The productive, social, and political prosperity of a nation has ever been determined by the standard of its educational system, and the extent to which educational interests have been made popular. In most of the European states a department is established to define and enforce a course of study in every pursuit, whilst in America, on the contrary, the people themselves have the government of this matter in their own hands. Here the citizens elect men from their own midst, to whom they entrust the sacred charge of supervising their educational interests; thus giving into their hands the future development of national prosperity and the maintenance of liberty

The School Directors assume the guardianship over our children, and to their guidance alone, must we look for a redemption from the abuses perpetrated by our national, state and city officials. No position is more honorable than that of Director and Guardian of Public Schools, and no office implies a tender of greater confidence and trust, nor can such be accompanied by greater responsibilities, not even that of chief magistrate of a city, state, or nation.

In our internal development, a great want has made itself felt for years, the true cause of which has not been seriously traced, and hence has not been appreciated.

The causes of the American revolution, the outrageous acts on the part of Great Britain: "Navigation

Law," "Restrictions on Colonial Manufactures," "Stamp Act," and "Tea Fraud," to tax the Colonies, were but slight items when compared with the tax and dependence which we voluntarily impose upon ourselves, not alone in our relations to England, but to the entire European continent.

Europe imports from us cotton, grain, dried,smoked, salt and fresh meats; England returns to us hardware, stoneware and textile fabrics; France and Bohemia, glassware; Germany, woodenware; and all of them products of industrial and aesthetical Art.

The State of Missouri alone, can furnish the American market with iron ore of a superior quality; the best clay for all kinds of manufacture is found all over this continent; the Chrystal City Glass Company has recently proved that the material abounding in the United States for its manufacture, is not inferior to that found in Europe.

The argument is not unfrequently made, that despite the heavy premium we pay on European manufactures, we are still the gainers, because we cannot compete with them in point of cheapness. The inference we must however draw, is simply this: we cannot compete, because we are not educated from childhood to convert raw material to our uses (that process which has been so pointedly styled "raw produce mixed with brains,") owing to our one-sided or literary education, and the total exclusion of *manual preparation.* Thus we pay tribute to skilled labor alone, and use our excellent raw material principally in such manufactures as require but little skill, and for whose importation we cannot afford to pay the cost of transportation.

If the basis of our National Economy were philanthropy towards Europe, we should do well to continue

the present mode of exchange, at the double sacrifice of a larger use of our raw products, and the development of our native undeveloped talent and thrift.

By examining the Annual Reports of the Boards of Education of the great cities of our Union, the statistics will show that but a slight per cent. of the graduates of the higher departments enter upon a technical career; these few following either architecture or engineering. In Europe there is a line of higher schools which offers to those aspiring to excel in industrial and mechanical pursuits, special and superior advantages for developing the native resources of the respective states. Similar advantages not being offered here, as a part of the public education to the latent talent and genius, it is even surprising that any of our High School graduates should follow industrial or art—industrial vocations.

We have no cause for wonder if we find that our workshops and offices, however closely or remotely connected with thinking and working in form, are in a great measure dependent on the influx of this element from abroad. Skilled mechanics and artisans come to us, ready made, and bring with them a passport that is valid all the world over; all of them being more or less familiar with the universal language, FORM. They prove a valuable acquisition in our workshops before they can speak our language, because they can read a design, or even improve upon one, and are skilled in *manual execution.*

Owing to these disadvantages, the native graduate cannot compete with the stranger on entering into practical life; for he has laid a foundation for only the hitherto principal pursuits: commerce, law, and politics. Let a prominent business man advertise for a native head-clerk, and a machine builder for a native foreman;

(the salary of the latter invariably exceeds that of the former,) the merchant will receive one hundred applications from competent men, to every one received from a competent machinist by the builder.

Some of the greatest evils in our social, as well as political conditions, we must attribute solely to the fact, that too few channels are open to our talented and ambitious youths, whose education has not prepared them (to become producers, that they may enter upon a more independent and legitimate career,) than that of tasking their wits to live upon the producing portion of our nation. The supply for the above named pursuits (commerce, law, politics), being greater than the demand, accounts for the flourishing condition of certain places of amusement, frequented and sustained, principally, by bright young men that are without proper employment, to make their worthless existence endurable; besides this, young aspirants, in order to keep up appearances, wear better clothes and make greater demands on the luxuries of life, than young men who are fully interested and absorbed in useful labor; the former consuming the produce of their fellow-men, the latter enjoying their moderate share, and contributing to the welfare of others, besides insuring their own independence and happiness. The crying evil of our society is: too many drones, too few producers.

From day to day it becomes more apparent, that the great states and cities of the Union must take measures to insure for themselves a greater enjoyment of their home produce.

Twenty years ago, the tide of emigration did not flow far beyond the western limit of this state. Farmers were then obliged to bring their products to the cities on wagons, in exchange for other commodities. St. Louis

and other Western cities, as marts of exchange between the great producing West and the manufacturing East, grew and prospered in the measure in which transportation, and thus emigration was facilitated. Owing to the extensive shipping facilities at the present day, the farmer needs no longer haul his crops to the nearest great market; on the contrary, arrangements are being more and more perfected on the part of Eastern merchants, to load the produce on the spot upon which it was cultivated, and to make their exchanges direct; thus saving the heavy tribute which formerly fell to these cities. It is not venturesome to predict that in less than forty years, three-fourths of the commodities that are at present shipped to St. Louis for distribution westward, (which still constitutes the most lucrative feature of this city's commerce) will be made available to the consumers at their homesteads at rates as low as in St. Louis; but what can prevent our state from supplying the great West and South with these necessaries within that period, or even from sending articles of superior manufacture to the New England States?

The Eastern states have long taken steps to further other interests beyond those of commerce, agriculture and mining, namely industry and manufacture; and their commercial centres are now making strenuous efforts to compete with Europe in their highest branches. Massachusetts has made drawing an obligatory study in all her public schools, which proves that this State is determined to make her citizens an Art-Industrial people. Cincinnati has, within the last few years, taken energetic steps in the right direction, owing greatly to the munificence of Messrs. McMicken and Probasco. The merchants and manufacturers of St. Louis held a mass-meeting in the Mercantile Library on February 11th, 1873,

for the purpose of deciding upon some definite plan to further these interests. From remarks made by several prominent citizens, the assembly could but conclude that the only thing necessary for developing industrial enterprise in that city, is the establishment of a permanent industrial exposition.

It is difficult to comprehend in what measure such a permanent exposition could further our productive interests, under the present conditions of our industry and manufactures. Samples of all kinds of produce are brought to the Merchant's Exchange, and their market value is quoted in the newspapers daily. All new inventions of any practical value, are placed on exhibition at our annual fairs, and are duly announced and discussed in the press, and advertised—not alone in its columns—but also by circulars, bills, and show-cards.

We must candidly admit, that we cannot compete with foreign countries, and of late not even with New England, nor shall we ever become independent of them, unless we do as they have done, i. e., establish schools for the development of taste, for the protection of home-industry, and in them cultivate our home talent. But we can go a step beyond Europe and New England in our educational programme, by teaching the a, b, c, of FORM (geometrical plane figures), simultaneously with the alphabet of written language, and by teaching children to read, write, analyse, and construct form, parallel to the course adopted in teaching spoken language. Classes thus trained and educated will, after graduating, be as well prepared to pursue any branch of mechanical or industrial enterprise, as to enter upon any occupation in which reading, writing and cyphering are the chief requirements. For the higher development of the more talented, it will pay every community in this country—as

it does in Europe—to offer superior advantages, by establishing technical and polytechnical schools, which when conducted on Krehling's plan at Nuremberg, not only become self-sustaining, but offer a remuneration to the advanced pupils.

Every unprejudiced teacher will admit, that children American-born, are fully as talented as those of any other country; the American child having one great advantage, that of an early consciousness of the truth, that its future welfare is dependent upon its own individual exertions and achievements. This consciousness forms the main stimulant and incentive of American ambition and go-a-head-a-tiveness, which achieves great ends, despite the almost entire absence of technical education in our Public Schools. I have never witnessed, either in Munich or in Paris more tenacity, and in consequence more marked progress, than that displayed by American students.

Gifted young men, having a pronounced talent for either sculpture, historical or genre-painting, are obliged to go to Europe for their education and training. Those, who are destitute of means to secure such an expensive education, must abandon all hope of attaining to any degree of excellence.

The amounts which America pays to Europe for Art-Education would suffice for the maintenance of two National Art-Schools.

Most American Artists of distinction, become so thoroughly Europeanized, that they remain on the Continent. America in patronizing its own Artists abroad, contributes to the wealth of Europe in no less a measure, than by patronizing European talent; besides barring itself from the refining influences of their presence.

Several attempts have been made in America, to

establish Art-schools. In only a few instances more has been attained, than the erection of extravagant exhibition buildings. The fact, that public-spirited men have contributed sums sufficient to make the building of such costly toys possible, shows a heartfelt desire on the part of our people, to give the Fine-Arts a home in this country.

It is erroneous to believe that we can import a branch from the blooming and fruit-bearing tree of European Art (that has been growing for ages), and by planting it, reap great harvests. In order that we may reap the fruit, we must plant and nurse the seed.

The cause of failure of all attempts hitherto made, to provide an American City or State with an Art school, can easily be explained.

The origin of the Academies of Design in New York and Chicago, was the clubbing together of young aspirants, for the purpose of decreasing the individual expense attending the study from life (Academy Figure). From the moment that Art-loving citizens became interested in the movement, and monies flowed into the treasury, the character of these organizations underwent a change. A so-called Academy Building was secured, and the greatest exertions made to make the galleries, or fashionable picture salesrooms, a financial success; whilst the schools were merely continued to keep up the appearance of philanthropic design on part of these associations.

It may appear in bad taste that I now indulge myself in a few personal remarks, but as the greater portion of my conscious existence has been devoted to Art-Study, and inasmuch as it has fallen to my lot to organize and conduct the first Art-Classes in the West, that offered, essentially, the same advantages to the Art-Stu-

dent, which I had to seek abroad,—some explanatory statements may not be deemed out of place: At the age of 17, my father sent me to the Munich Academy. I then firmly set my mind on preparing for the task of offering at a future day, those facilities to our home-talent which I was obliged to seek abroad. I remained five years in Munich, under the direct influence of Kaulbach, and then visited Paris, where, during a two years' sojourn, I strove to enlarge my views and knowledge in the field of Art. Soon after my return, I was placed in charge of the Academic Department of the Chicago School of Design, and established, on my own account, a day life-class,—which was the first ever established in the West; and prior to this, I had never heard of one in operation in the East. To the students I gave my services free. Since the Chicago Fire, my labors have been continued in St. Louis, where shortly after my arrival, the St. Louis Art Society was organized, and under its aupices an Art School. For the furtherance and use of the latter, the St. Louis School-Board appropriated a room on the fourth floor of the Polytechnic Building. Several prominent citizens contributed sums aggregating $600.00 for the maintenance of the schools, and it proved one of the most hard-lived enterprises on record. The room assigned, had for upwards of ten years been unoccuppied, and about a year after it had been made available, it was annexed by the Normal School. During the course of that year however, and through the generosity of Mr. Jas. E. Yeatman, the same advantages were extended to the Art-Student that are offered by European Academies;—those of a Day Life-Class. In July the result of that years work was exhibited in the Art Club Rooms on Boylston street, Boston, and was pronounced superior to the exhibit

made, but a week previously, by the National Academy of New York City. The work of the school was suspended for a term of six months, and the students were obliged to return to their respective homes; two of them to Chicago, and one to Milwaukee,—as the school had attracted professional students from most of the Western and Northwestern States. Accommodations were again provided by the School Board, in a room adjoining the Library; and after the work had been gotten fairly under way, the room was divided into two floors, which again set the School into the open air for a term of nearly four months. During this period the Washington University opened an Art Department, and virtually attracted to it the body of this class. When possession was given the School of one-half the room, i. e., one-half of the lower half—the work was resumed with unabated ardor until the Dean of the Polytechnic Department of Washington University, who was appointed Chairman of the Library Committee, appropriated the room to the use of the Librararian, as a private office, and had his action ratified by the School Board,—which virtually disposed of the Art School. During the term of its existence, it extended its benefits, gratuitously, to about 22 students, the remainder paying but a nominal fee. Some of the works of the School are still on exhibition in the International Exhibition Co.'s exhibit at Philadelphia, and were pronounced by Mr. John Sartain, the President of the Philadelphia Academy of Fine Arts, the best School work there displayed.

The recognition of matter is an impossibility. To us; FORM is everything. *Drawing* is related to *form*, as *writing* is to *language*. The alphabets of written languages are manifold; the alphabet of form is universal, and is exhausted in *plane-geometry*. The sign

which represents the sound *a*, is different in nearly every language. In many languages even a variety of signs exist for representing this, and also for many other sounds; whilst regular plane-figures, such as the equilateral triangle, the square, circle, ellipse, &c., are forms that are conditioned by given laws, and hence unchangeable all the world over.

In the study of form, the power of perception must chiefly be developed and cultivated. The eye being the direct intermediator between that by which we are surrounded, and our recognition of its presence, cannot be cultivated too highly; hence, every rational and sound mind must conclude, that all methods of drawing should strive to develop this organ; as the most essential feature in the study of form. Unfortunately this is not the case. All elementary drawing methods with which I am acquainted, seek, as their highest aim, to train the hand mechanically, and in this particular endeavor: one method ever strives to excel the other. With their accompanying manuals, they address that to the hand and ear which can only reach the seat of intellect through the eye. The first task that is invariably imposed upon children, is the drawing of straight lines, free-hand. Several works of recent publication even augment this practice by an endeavor to transform the pupils into automatic yard-sticks. The inculcation of ideas for acquainting them with the principles that condition the formation of given standard forms, and phenomena, is considered as unimportant, and the children are thrown upon their own resources to discover them unaided.

A thorough acquaintance with, hence a knowledge of a subject must precede its teaching; for all teaching that is not based upon knowledge cannot be educational. Any person, of whatever limited mental ability, can col-

lect a store of facts, but only master-minds are capable of grouping them under the laws from which they spring, i. e. *generalize.* A teaching of *facts*, is *training* in its meanest sense. The inculcating of universal laws and principles, is true education; which enables the receipient to deduce facts. Since very few persons who engage to teach drawing, can trace their own ability, or the proficiency of others to a practical and natural source, but flatter their own vanity, by believing themselves—and in their efforts to convince others—that this ability can only be acquired by persons who are particularly endowed with talent and genius,—good-naturedly deceive themselves and others, to their mutual disadvantage.

We know that animals are susceptible of training, and some,—such as mice, birds, dogs, horses, and even elephants, are so to a very high degree. We have, therefore, no cause for wonder, if the majority of mankind entertain a profound aversion for such practice.

A trainer can make a pupil perform certain feats, or do certain things to a certain degree; the pupil being dependent upon his trainer, can do nothing without him. Another trainer taking him in charge, must either study the tricks already acquired by his new pnpil, or the pupil must forget his old tricks, that he may be benefited by his new master. No teacher can infuse the holy fire of genius into his pupil, but he must guard against extinguishing by main force, the sparks existing. The methods that are most generally in use at this day, are most admirably adapted to accomplish this latter.

As the Public school course, as well as that of the University, has but one mission: To lay a general foundation for preparing the future citizen for all pursuits,—every study therein embodied must have its natural, gradual, organic development. In the preparation of a

course, which embraces the elements of all that may be comprehended as underlying form-reasoning, as well as the pictorial imitation of natural phenomena, I have carefully avoided to act in the class-room, as though the work under my charge were the only work of importance; especially, as its development and shaping depended mainly on the regular teacher. I have ever striven to steer clear of defeating my aims, by avoiding to arrogate to myself any undue authority, or by the enforcement of arbitrary measures for securing immediate results; yet I have given earnest and special attention to detail, but without losing sight of the whole structure.

My entire course of proceeding has differed in every respect from that of the ordinary specialist, who enters the school-room with "*thus thou shalt do*," but whose ear is deaf, if not his understanding, to "*why shall I?*" and *how can I?*"

Let us briefly consider the features of the "American Text-Books of Art education," which are generally considered a model course for district and high schools. They are: 1. Free-hand geometric drawing; 2. Outline representations of objects, plant-forms, &c.; 3. Conventionalization; 4. Historical ornament; 5. Outline drawing from geometric objects; 6. Original design. The first of these I shall not attempt to confute, simply because its absurdity is manifest, and will therefore only treat of the latter, owing to their apparent plausibility: Of what practical use to the student can be these imitations of black-line transcriptions of historical conventionalized type-forms, at the expense of suffocating those faculties and powers, which in a latent state, the average school-child as fully possesses, as does the Artist; who only learns to utilize them in the measure as he becomes

familliar with Nature's products, laws and phenomena.

A perusal of Owen Jones "Grammar of Ornament" or "L'Ornement Polychrome" by Racinet, (copies of which should be made available for consultation in every library in the land), will convey more of the character and beauty of Conventionalized Historic Art in an hour, and stimulate a greater desire to cultivate its earnest study, than would all the black line transcriptions thereof in a life-time. The meaning, i. e., the charm, the glow, the fullness of an Oriental or Mediaeval decoration, can no more be conveyed to the mind by these cold and meaningless diagrams, than could the luscious savor of tropical fruits, by chewing a few parched leaves of the plants which bear them. But what would prove immeasurably more effective than the above, would be the construction and decoration of a few rooms in the High Schools and Universities, strictly in imitation of the best historic types, and making them accessible to the student. This would not only advance the Art-culture of the communities enjoying their possession, but would attract swarms of strangers to enjoy their benefits.

Ask the Sculptor, who stands at the head of *his* profession, what *conventionalizing* (style) means, in Art. He will show you, if his vocabulary should fail him to formulate in words, that it means: the transmutation of Nature's type-forms into type-forms of Art. Ask the Painter, who stands at the head of *his* profession, the mission of outline-representation in Art; he will tell you that it is chiefly resorted to where the sublime, and the purely imaginative is to be portrayed, in order to make the resemblance to material reality less palpable. From both you will learn that the means in question, are only proper mediums to be employed by the master, and that practice on the part of the student in these Art pro-

cesses, must leave him a tyro in Art, on a level with the savage; who conventionalizes in outline diagrams, from inability to reproduce what he sees, or desires to represent,—by other means. This illustrates forcibly that "*extremes meet*," that the step from the "sublime to the rediculous" is but one: what the master of his art resorts to, to elevate his work above the matter of fact reality, the savage practices from want of power to imitate the fact. Conventionalization is in Form-Language, what metaphor is in word-language: generalization from lack of ability to specialize, or generalization in its highest sense.

The most marked feature of this model course, however, is *Original Design.* The child or student is given a few *units of ornament* which he is directed to arrange or *repeat on an axis*, vertical, or horizontal, or oblique; —or around a centre. This latter direction, indicates the aim for a quality in original design which is of the highest order, viz., a central idea. The scope of this idea is, however, very limited as applied or developed, in this Model System of mind calisthenics, in comparison with that of the Decoration of the Vatican, the Sixtine chapel, the Arsenal and Opera House at Vienna; the Museum at Berlin, the Royal Residence at Munich, or the Wartburg, &c. This enumeration may seem farfetched, even ludicrous; but we must bear in mind, that the initiatory steps must be made in the direction of the goal; the possibilities of Art. No person can compose or design a detail of ornament, unless he is capable of designing a complete decoration. Let us but look at a detail of decoration in the true sense; for example, some of the upright panels of the Vatican: the "Seasons or Fates;" and no matter where the eye will wander: the central idea will force itself upon the mind. The prin-

ciple underlying Composition in Art, or as the paraphrase terms it *Original Design*, is essentially the same, as that underlying a work of architecture, engineering, machinery, poetry, music or a scientific treatise, viz., that the disposition of all the component parts shall be so made as to form one harmonious whole. Let us now look for the central idea of the work that is the outcome of this Model System: the only central idea of which the child or student producing the design, is conscious of, is the centre proper of the geometric diagram, around which the given elements have been arranged in a meaningless manner. Now let the author of this devise consult his own conscience, and say if this is not the central idea which was uppermost in his mind when he laid down this course of *Original Design*.

No amount of practice of this kind can possibly lead the student to the attainment of results beyond those of the merest mediocrity; even in the special direction in which these and like methods purport to lead them. May good fortune, or what is better, timely effort, preserve us from *such originality* of *design*.

Our work is conducted with the use of charts and models, which take the place of the text-book, for giving the child and the student the traditions of Form-Study and Art, and for acquainting them with Art-processes and practices in order that they become apt pupils of that greatest of all teachers,—*Nature*. The District school pupil is put to no expense, save that involved in securing clean paper, that is especially prepared for our work, and a pencil; also, when far enough advanced, a cheap set of instruments for geometric drawing.

The first notions that are given the child are on the two form-properties, viz; straightness and curvature. After teaching the circle and its parts, the directions

which straightness can assume, the two properties of curvature are proceeded with. Then the difference and fixed relations of direction, the division curves into measurable and free. The free curves are then presented as the elements of all free-curved ornamentation; then the development of all geometric plane-figures is proceeded with (which forms the *alphabet* proper of *Form-language*) and their construction is illustrated. The child is next made familiar with the laying out (development) of the superficies of the regular solids, also taught to fold these and its observation is stimulated by showing how surfaces of bodies, turned towards the light, appear lighter than those receding or turned away from it; also how the latter surfaces can be illuminated by reflecting light upon them. In order that the child may learn to observe these phenomena in nature, it is given examples in the representation of surfaces in light, shade, and shadow; and all that may be said regarding the impracticability of this practice, only tends to show how little the education of the eye is considered in the ordinary schemes of form-instruction styled "Systems of Drawing." Spirit away light, if but for a moment,—and of what use becomes this valuable organ: *The presence of light is the immediate cause of all visual phenomena.*

It is with the building up of a healthful mental, and moral condition, as with that of a healthy physique. The proper food for the stomach is organic substance; that for the brain concrete ideas.

What water is for the assimilation of food, light is for the assimilation of exact notions and ideas. The per cent of water in the physical system is quoted as ranging from 75-78; what the proportion of light should be in the mental system, has not been determined, nor measured; yet, it is the mission of education to supply it

in such quantities, as may enable the recipient to conduct his future actions by the *light of reason.*

Examples in the light and shade are, however, never given, before the child has been shown the forms that are to be represented. These are drawn with a knife, out of a soft substance; such as a potato, turnip, or soft wood,—and thus the child fully understands the conditions which it attempts to reproduce. In order to assist the child in making correct observations, and accurate representations of the appearance of simple surface-forms, as seen under various conditions, the shadows of the square and circle are projected. These shadows show exactly how the surfaces themselves would appear, when seen from the position of the luminous body. The child is also taught to observe, that small objects held near to the eye, will close out from view larger objects that are removed from it; also, that through a small orifice near the eye, greater objects can be seen entire at a distance from it. By an arrangement of parallel planes, it can be led to realize, that, whilst but one magnitude of one plane, held in the direction in which it looks, may be visible, more of the surfaces of the other tins will be seen, in measure as they are farther removed from this plane. With these and many other practical experiments, the child is unconsciously made familiar with the distance point, and horizon of perspective. Beginning with the third school-year, the child is not alone taught to use instruments in the construction of geometric problems, but also directed and encouraged to exercise the eye and hand in tracing the apparent boundaries of objects, and the surfaces enclosing them, and to imitate the relative lights and darks thereof, at home. To assist it in this work, it is shown that the formation of most objects of ordinary use, is based on the regular geo-

metric forms, principally on the rectangle and circle; and it is directed to select such objects for imitation, as are based on the forms that are considered in the class-room. Of the free curves of Ornament, the Sigmoid is particularly dwelled upon, as in no instance in the History of Art, has a greater fertility in varying the application of a simple element been shown, than did the Greeks with the S-curve in their flower-ornament (*Anthemion*). This curve can be traced through the history of all nations, i. e., their *applied Arts*. The Wave Line and Rolling-Curve are also traced through all the styles and periods of Ornamentation.

Whilst I have recognized the importance of making ample provision for mechanical and scientific drawing, I have nevertheless given the greatest attention to stimulating and directing the child's observation to "Nature:" the source of all things;—and to initiating it into the laws of Symmetry, Harmony, and the Beautiful.

I can safely assert, that the means which I have created for accomplishing this, cannot be supplanted by speculative theories. What I have successfully carried into the school-room, cannot be spread on text-books, or covered by them. The subject matter, when brought before children, presents itself in its essence, without theories. Practical experiments are, after all, the only sound basis for theories, and are paramount to them with children.

The teachings of science are laid down in standard works, and every specialist finds a complete library at his service. A general preparation is infinitely more valuable than is a special one, even to the student of a specialty.

Let us now inquire into the means, methods and appliances, that shall prove most effective in imparting

to our rising generation, the elements of that knowledge, which is chiefly instrumental in enabling a member of society, to contribute directly towards the increase of its wealth; the elements of that knowledge which constitutes the *producer:* the study of Form.

From a *literary* point of view, this study has been excellently provided for in our educational institutions; but not so in its *essence.*

Education has but one true mission. It is that of furnishing the pupil or student with *all* the means, that may be necessary, for enabling him to mark out his own course through life, in whatever pursuit his inclinations or endowments may prompt him to follow.

The cry for *Industrial* Art-Education, deafens the just demands on the study of Form as a necessary branch of general education. Every man, whatever be his vocation,—whether commercial, professional or in the trades, has a constant need for expressing ideas in form, whether it be for arrangments and appointments of his business interior, the organization of his domestic abode, his office, workshop or factory, his dining-room, kitchen or laundry, his garden, field or pasture; whatever he *plans*, is based on and comprehended in this study. The scientist, of whatever speciality, has a constant use for this knowledge and often discovers to his great regret, when too late, that he is deficient in, if not entirely destitute of, one of the most valuable agencies for giving expression to his discoveries, for communicating or perpetuating his experience, and must take recourse to, or what is worse, place himself and the interpretation of his ideas and labors, at the mercy of a skilled hand and eye. How much more could he have achieved, had he received a liberal education in Form-reading, and a rigorous training in Form-writing!

In former times the Artist worked up to an exalted position from an humble apprenticeship in the trades, as a stone-cutter, iron-forger, but principally from the workshop of the gold-smith. To-day, these conditions are changed: apprenticeship, in the true sense, is one of the lost arts,—and *professions* to *proficiency*, but too frequently, occupy the place of *proficiency* in a *profession*.

Formerly, the Artisan and Artist were so nearly allied, as to justify the acceptation that they were essentially *one*. Processes of Art, as well as the exercise of what are at this day considered *special branches* of Art: Painting, Sculpture, Architecture and Engineering, were, no farther back than the Middle Ages, practiced with equal success, by one and the same Artist. Of this the great dome of St. Peter's Cathedral in Rome, planned by Michael Angelo; Albert Durer's treatise on fortifications, which was the best of that age; the celebrated "Rubens tower" at Antwerp, &c., bear testimony.

This proves that Art-Education proper, is paramount to a special preparation for any of its pursuits, as in their *essence* it embraces them *all*.

Let us not, therefore, in contemplating the hill near at hand, lose sight of the mountain in the distance; the cry is for Indastrial Art! this I heartily applaud, provided: that it is made in the sense that we should set to work, spare neither time, nor energy, nor *industry*, in our efforts to make Art indigenous in our midst; if, however, it be the sense of this cry: that we shall lose sight of all else in the Domain of Art, or Form-study, but mere conventionalized surface-decoration, such as patterns for wall-paper, oil-cloths, calico-printing, lace-collars, &c.,—then I caution that we stop here, to reflect, and carefully weigh the consequences of such a step—before we take it.

What applies to the conventionalizing of *plant forms*, must of necessity also apply to the human figure and to animals;—yet,—who would place before a child, or student, the conventionalized types of Egyptian, Assyrian, Greek and Mediaeval figures and animals, before making him thoroughly familiar with their prototypes.

The study of historical ornament is one of the greatest importance to the student of Form,—but, he will enter into the spirit of these *transcriptions*, *translations* and *transmutations*, only in the measure as he has become familiar with the history,—political as well as social,—of the nation, or race, of which they are the expression.

The value of surrounding the child or student with the best models that are typical of all ages and climates, cannot be over-estimated;—but, the salutory effects of these are greatly impaired, when they are only collected and arranged in the form of fragmentary reproductions, or even by collections of original fragments, as is the case in most museums: English Industrial manufacture does not so much owe its excellence to the peculiarly English methods of Art-instruction, as to the establishment of a National museum at South Kensington,—which is a model that excites the admiration and envy of the world. Yet England, despite this possession, remains but a mere bartering nation. Whatsoever does not pay she does not foster: she even sells casts from works, whose originals are distributed amongst the Galleries of the Continent, to us, much cheaper than the countries which own them, respectively; and Yankeedom out-herods England by securing samples of English, and other European manufacture, and flooding our Western and Southern states with articles and goods, whose patterns cost it nothing, and by so doing, stifles

and suffocates home Art-enterprise, ingenuity, talent and genius.

In the erection of the English National Museum neither perseverance nor capital were spared. Lord Elgin's *Guineas* divested the Athenean Parthenon of its Frieze. The great feature, that which causes envy, is not so much the intrinsic value of the collection, as the exemplification of the meaning of the parts of which it is formed: by reproducing, in a great measure, the surroundings for which they were originally designed. Thus, the work of a nation and period is displayed in rooms that are constructed to illustrate the architecture of such nation.

For the consummation of projects that have been on foot in our country for many years, we *must* follow the example of England:—We must create Art and Art-Industrial museums. In connection with these, schools of Art and Technology. Every State of our Union needs a complete outfit for the protection of her material interests; else she will be obliged to go boarding around among her sister states, or to subsist on the remnants of their surplus. Most of the material for building up our galleries and museums must necessarily be imported from abroad; from Nations that have an Art history. But we can not stop there. We must also import their practices and traditions direct through *living agents*, by bringing our Art-students home again—by patronizing them at home.

When we contemplate the systematic order in which the written languages are taught, which are evidently not conditioned by a law of nature, but arbitrarily established by an agreement of human families (nations): first,—by coining words to represent objects and ideas, then,—by fixing signs to represent words, the

question forces itself upon us: why is it that the structure of written language is so highly perfected, its knowledge and use so universal, whilst a familiarity with that which forces itself upon our senses, viz: form and phenomena, still remains the property of a few? especially when we consider that form can be taught without the aid of any spoken language, whilst the teaching of a written language without form, is an utter impossibility.

The world of form lies open before the deaf and dumb, and the blind can feel it.

The growth of language in the primitive state, must have depended on the progress made by man, to adapt the existing raw material to his uses. Ideas can only be generated by a familiarity with that by which we are surrounded, and words are formed to perpetuate ideas. Words are *not* ideas;—they are merely the *frames*, the *settings* of *these jewels*.

Primitive labor must have been drudgery, and it stands to reason that every member of the human family, who, by dint of brute force, or cunning, could exempt himself therefrom, did so. History bears us out in the assertion; that the lower the standard of culture of a race or nation, the greater is the contempt for the laborer, the slave; whilst in the measure as civilization advances, the higher the laborer, the producer, the maintainer of social welfare, rises in the esteem of his countrymen and kind. This progressive elevation has gone on, until, to-day the cultured nerve and skilled muscle of the Artisan are ruling the world. The world is now engaged in eliminating the intellectual Don Quixotes—in transforming itself into an INDUSTRIAL WORLD. The van was led by the little Swiss nation in the manufacture of watches and mathematical instruments. The

industrial fever spread to the summits of its Alps. Every senner and woodsman contributes some specimen of Swiss industry to the world's market. Every village has its Sunday school in the holiest and most religious sense. That man may become more alike unto his Maker, and that thereby he may prove a more valuable member of human society, his productive and creative faculties are there developed.

The England of to-day is an *industrial island.* WORK IS KING! Germany has more than doubled its industrial educational facilities since the Paris Exposition in 1867; despite this, France, whose Art-industrial products have controlled the world's market for centuries, stood at the head of the list at the Vienna Exposition, by the consent of all nations that were there represented.

Few men realize that the same knowledge, which enables a carpenter, or joiner, to make a chair, table, or case—only in a higher development—underlies every product of the highest order in Painting, Sculpture, Architecture and Engineering. Very few mechanics in our time, and more especially in the United States (where the mechanic is trained in the performance of special parts of a trade) become thorough masters. When such mechanics have the misfortune to be thrown out of employment in their speciality, they can seldom turn their hands to other industrial pursuits; and hence it comes that in vocations, such as clerking and standing behind counters—of every description,—going on errands, carting, pauper-labor, and other occupations that require little or no preparation—the supply is ever greater than the demand. Doubt it as you may,—close your eyes to it if you will; yet, the great question before the American educator to-day, is: What education will give versatility?

When a state shall be prepared to invest one-half of the amounts, now applied to show and superficial pretensions in cities like New York, Philadelphia and others, in good substantial training accommodations, by providing for a staff of competent professors in all special branches of the Arts as well as in the Sciences, together with spacious and well lighted rooms, standard models and apparatus, then, and not till then, can it look forward to a great issue.

It is safe to predict that *that* State University in the Union, which will take the first steps towards establishing such schools, will draw towards itself the most valuable raw product in existence, i. e., talent and genius, and with it enterprise of a creative order. By the time that such schools shall have achieved results, we will undoubtedly be able to devise means for exhibiting our products to good advantage, though we may not possess a ginger-bready marble-front edifice with a palatial stair-hall. Should we even fail to accomplish this in our own state, then we can send our products to Eastern Exhibition buildings.

History shows that those nations have been most prosperous, whose best Artisans were also its greatest Artists, and as such, established the standard of perfection in all technical and mechanical aims by precept and example. In order that we may insure future welfare, we must prepare our children—our future citizens—for this important work, by training them from the start in the proper use of their eyes and hands, and by preparing them for all the special studies of polytechnical schools as well as for those of colleges.

It will be impossible for us to build up any interest of great importance unless, as a practical people, we take hold of it in a practical and business-like manner.

There is no propriety in disguising the fact that there are *three* factions which are inimical to the dissemination of true Art-principles and the building up of our National Art-interests upon a sound basis.

The *first* of these is composed of certain publishers, their avowed agents, their abettors and accessaries—whose Art-standard is the "almighty dollar." A rational and well-developed system of Art-education must give the death-blow to their pernicious and expensive confidence-schemes.

The *second* is made up of the Art-Literati and Dilletanti, who disport their ignorance of the elements, processes, and practices of Art, with a self-asserting vanity that puts truth,competency, and qualification to the blush.

The *third* is formed by the rapacious, selfish, supercillious combinations, which have misappropriated the name of Art school, Academy or School of Design, built up by private corportions, and under the pretense of philanthropy, sway the public sympathy,—insinuate themselves into public confidence,—and thus, in a great measure control, in their misdirected interest, the purse-strings of the wealth of communities.

It has been my fortune, during the many years of devoted effort to promote and popularize the true interests of Art in the schools of the West—for the children of the poor rather than of the rich—to have an experience of the selfish and misguided influences to be surmounted, which may be a lesson of value in the future: but it is no small gratification and reward, to know that my methods are adopted, and my labors are now practically utilized in one-half of the District schools of the City of St. Louis.

The hour has come when the States of our Union should see it to be their true interest to take control of

these great factors of National prosperity and renown. It is an unwise policy to leave this feature of the work of public education without suitable provision, and exposed to the precarious fortunes of *private* and *local* patronage and caprice.

Every state must—as a means of self-protection—establish Art and Art-Industrial schools or Schools of Technology. The State Universities being the great nurseries of the productive industries of our country, must embrace them—must foster them.

What of the seven wonders of the Ancient world? The Mausoleum of Artemesia, the Temple of Diana at Ephesus, were the marvels of Architecture; the Pyramids of Egypt, the Pharos of Alexandria, the walls and hanging gardens of Semiramis, of Engineering; the Colossus of Rhodes and the Statue of Jupiter Olympius, of Sculpture: all of them products of Art.

Why are Athens and Rome the goal of the Art Pilgrim? Because they are the holiest shrines of Art, whose works speak with a thousand tongues the glory of past civilizations. The Art of a Nation forms and records its history. The Art of war (engineering) on one hand; the Arts of Peace: Painting, Sculpture and Architecture on the other. What constitutes the greatness of France? Is it the conquest of territory?—the blood spilled on the field of battle? No! it is the Louvre which is filled with the glorious Art-Record of the French Nation and the pillage of Nations, that were momentarily subdued by France, and robbed of their holiest, possessions: their Art-treasures. But that which imbues the Frenchman with the martial spirit and national pride, so peculiar to him, is the record of his nation's glory and triumphs in the highest form of expression of which Art is capable: the *Paintings* at Versailles.

The Louvre and Versailles are the fountain-heads of the national inspiration, and of what is known as French *taste.* Every Frenchman at some period of his life, fills his soul with rapture and exaltation at these sacred altars of the Nation.

What inspiration does the American imbibe in his National Capitol at Washington! If a foreign Artist of the highest rank should happen into that National Monument, and examine the paintings, purely as works of Art, and remark that America can have no National Art and hence but a one-sided National Pride,—else *such* paintings could not possibly disfigure the Nation's Sanctuary,—his language would, no doubt, prove exceedingly offensive, yes, even sacrilegious, to the American whose moral associations render them fit objects of admiration and patriotism;—especially, as he knows that no Kingdom has ever been more lavish in its appropriations of funds, for a like object, than has the American Nation in securing them. Yet,—the time may not be distant when American Artists will be so educated in the true principles of Art, that they may share these sentiments.

Before the time of Archimedes, a kingdom could not have purchased a gross of the most ordinary screws,—nor in the balmiest days of Greece, a bar of common washing-soap. The highest order of scientific knowledge was required to produce them, whilst the lowest order of intellect can use them to good advantage. Art-works are the crystallized thoughts of Nations. They are the exponents of their civilization and the stepping-stones to future triumphs.

A great Frenchman says: "We say Art-Industry;—Art-Industry does not exist,—It is Art applied to Industry! Art is one of the mightiest machines of Industry!" We shall have no Industry—of a high order—without Art, and yet—no Art without Industry.

Let the State of Missouri make ample provision, and this University will soon afford a full harvest.