Accuracy a Path to Wealth.

In this age of guesswork it is refreshing to read an article on the following, contributed to the *Methodist* by John D. Knox, of Topeka, Kansas, on the importance of exactness. The author commences with the importance of accuracy in the value of testimony, all depending on its exactness, and proceeds to say: The professed end of logic is to teach men to think, to judge and reason with precision and accuracy. S. Martin asks: "What makes the scholar? Exactness. What is most likely to secure success in the learned professions? Exactness. What raises men of various callings to the highest position attainable by persons in their occupations? Exactness. What makes a man's word pass current as gold? His known exactness. What, above all things, is essential in the laboratory? Exactness."

Mr. Martin is right. Exactness, accuracy, perfection in all the work you undertake will bring you a sure reward. And the record of a noted man is found in these words: "He became an honorable man, successful merchant, and bank president." His splendid career commenced in blacking a pair of boots well when a boy; and he continued "doing well" all through life, whether blacking boots or managing finance. What he did he did accurately, and, of course, it did not have to be done over or improved or mended, but always gave satisfaction and secured commendation.

President Tuttle, on "How to Get the Best Place," gives us this instance: "I saw a young man in the office of a Western railway superintendent. He was occupying a position that four hundred boys in the city would have wished to get. It was honorable and 'it paid well,' besides being in the line of promotion. How did he get it? Not by having a rich father, for he was the son of a laborer. The secret was, his beautiful accuracy. He began as an errand boy, and did his work accurately. His leisure time he used in perfecting his writing and arithmetic. After a while he learned to telegraph. At each step his employer commended his accuracy, and relied on what he did because he was sure it was just right.'

And it is thus with every occupation. The accurate boy is the favored one. Those who employ men do not wish to be on the constant lookout, as though they were rogues or fools. If a carpenter must stand at his journeyman's elbow to be sure his work is right, or if a cashier must run over his book-keeper's columns, he might as well do the work himself as to employ another one to do it in that way; and it is very certain that the employer will get rid of such an inaccurate workman as soon as possible.

I knew such a young man. He had a good chance to do well, but he was so inaccurate and unreliable that people were afraid to trust him. If he wrote a deed or mortgage or a contract, he was sure to leave out something or put in something to make it an imperfect paper. He was a lawyer without business, because he lacked the noble quality of accuracy.

Just across the street from him was another young lawyer, who was proverbial for accuracy. He was famous for searching titles, and when he wrote out the history of a title to a piece of property, it was taken for granted as just so. His aim was absolute accuracy in every thing. If he copied a conveyance or cited a legal authority or made a statement, he aimed to do it exactly. The consequence is, he is having a valuable practice at the bar and is universally esteemed.

"But," says some boy, "when I become a man that is the way I shall do. I mean to be very accurate." Perhaps so; I could tell better if I knew just how you do your work now. There are several ways of getting a lesson. One is to get it "tolerably well," which does not cost much labor; the other is to get it faultlessly well, which costs a great deal of labor. A boy can get a general idea of his lesson "in a jiffy;" but to get it accurately is very hard, and requires both time and industry. If you, my boy, to-day are getting your lesson in the slipshod way, you will grow up a slipshod man; but if to-day your habit is to get every lesson with perfect accuracy, I will warrant you will do that way when you become a man. How is it?

Millions of persons in the world are clamoring for work, and work is abundant; but they are careless, inaccurate, unreliable, untrustworthy. Shake off your stupidity, idle one; get wide awake and do your work well. Accurate, perfect, for even a dot or point may shelter you or turn you out of doors.

To illustrate the importance of accuracy and careful, honest work, take this instance of loss by bad penmanship: "A decision was rendered by Judge Van Brunt, of New York, which may be of interest to those who are careless in preparing manuscript, and think anything in the guise of handwriting will do that can either be deciphered or guessed at. It was a suit brought to recover damages from a telegraph company for errors committed in transmitting a message, by which the party suing suffered pecuniary loss. On the trial the original message, as written and handed to the operator, was offered in evidence, and was so illegibly written that no two persons could agree from the marks submitted what it actually did contain. Whereupon the judge instructed the jury that if people wrote their dispatches in such a hand that the contents are uncertain, they have no right to recover damages from the dispatcher because he failed to read it correctly, and that if damages do result from such causes, the sender and not the company should bear the loss. This was good common sense, which is the essence of common law."

Some persons take no care at all in anything they do, forgetting that the interests of others, as well as themselves, depend upon the character of their work. It is not only a matter of cents and dollars, but it is a matter of morals.

DESIGNS FOR VASES.

The engraving on this page shows three elegant designs for vases in metal or ceramics. These designs are from the firm of Villeroy, of Mettlach.

Astronomical Notes.

OBSERVATORY OF VASSAR COLLEGE.

The computations in the following notes are by students of Vassar College. Although only approximate, they will enable the ordinary observer to find the planets.

M. M.

Positions of Planets for February, 1879.

Mercury.

February 1, Mercury rises at 6h. 18m. A.M., and sets at 3h. 25m. P.M. February 28, Mercury rises at 6h. 43m. A.M., and sets at 5h. 24m. P.M.

Mercury is far south in declination, and if seen at all, it will be during the first few days of February, some degrees south of the point of sunrise.

Venus.

February 1, Venus rises at 8h. 2m. A.M., and sets at 6h. 18m. P.M. February 28, Venus rises at 7h. 33m. A.M., and sets at 7h. 26m. P.M.

Venus will be seen after sunset, and will set farther and farther north of the point of sunset, through the month. February 22, the moon and Venus will be in conjunction.

DESIGNS FOR VASES IN METAL OR CERAMIC.

Mars.

February 1, Mars rises at 4h. 35m. A.M., and sets at 1h. 31m. P.M. February 28, Mars rises at 4h. 10m. A.M., and sets at 1h. 11m. P.M.

Mars will be seen only in the early morning, it is far south in declination, among the small stars of Sagittarius

Jupiter.

Jupiter sets in the early part of the month soon after the sun, and in the latter part before the sun; it will probably not be observed at all.

Saturn.

Although we are more distant from Saturn than in January, the planet can be seen in the February evenings. February 1 Saturn sets at 9h. 7m. P.M., and on the 28th, at 7h. 36m. P.M. The planet passes the meridian in daylight, and the smaller moons are more and more difficult to be seen. The ring of Saturn is so tipped relatively to the earth, as to be seen nearly edgewise, and to extend as a line across and beyond the planet's disk. On the evening of January 10, Titan was seen (in the large telescope of Vassar College) on the west of Saturn. Rhea, which is much smaller than Titan, and shines with a bluish light, on the east, while Dione and Enceladus could just be seen as tiny points of light above and below the extreme eastern point of the ring. January 13, four of the small moons clustered in a group about the western extension of the ring, while Titan and Enceladus were on the east.

Saturn can be found, February 23, by its nearness to the crescent moon.

Uranus.

Uranus is the only planet which is well situated for observation in February. It is sometimes seen with the eye, and a small telescope will show a disk, and thereby enable one to distinguish it from a star. Uranus rises on February 1 at 6h. 56m. P.M., and sets at 8h. 16m. A.M. of the next day. On February 28, Uranus rises at 5 P.M., and sets at 6h. 24m. A.M. of the next day.

Uranus will be in conjunction with the moon (according to the American Ephemeris) at 11h. 40m., Washington time, on February 7; the planet will be a few degrees above the moon.

Uranus can also be found by its nearness to the star Rho Leonis.

Neptune.

Neptune cannot be seen except by very powerful telescopes. It sets February 1 a little after midnight, and on February 28 as early as 10h. 35m. P.M.

Care of the Eyes.

From the great demand for the eight numbers of the SUPPLEMENT to the SCIENTIFIC AMERICAN, in which appeared a series of articles on the preservation of the eyesight, it is evidently a subject in which most persons are more than ordinarily interested. As a writer on the care of the eyes, in an English paper, recently said: "All are anxious to do this, but few know how effectually to do so, and many never think of the matter till failing eyesight warns them that it is absolutely necessary. By the latter," says the same writer, "the following suggestions will be read with interest:

"The sight in most persons begins to fail from forty to fifty years of age, as is evidenced by an instinctive preference for large print; a seat near the window for reading is selected; there is an effort to place the paper at a convenient distance from the eye, or to turn it so as to get a particular reflection of the light; next the finger begins to be placed under the line read, and there is a winking of the eye as if to clear it, or a looking away at some distant object to rest it; or the fingers are pressed over the closed lids in the direction of the nose, to remove the tears caused by straining.

"Favor the failing sight as much as possible. Looking into a bright fire, especially a coal fire, is very injurious to the eyes. Looking at molten iron will soon destroy the sight; reading in the twilight is injurious to the eyes, as they are obliged to make great exertion. Reading or sewing with a side light injures the eyes, as both eyes should be exposed to an equal degree of light. The reason is, the sympathy between the eyes is so great that if the pupil of one is dilated by being kept partially in the shade, the one that is most exposed cannot contract itself sufficiently for protection, and will ultimately be injured. Those who wish to preserve their sight should observe the following rules, and preserve their general health by correct habit:

"1st. By sitting in such a position as will allow the light to fall obliquely over the shoulder upon the page or sewing.

"2d. By not using the eyes for such purposes by any artificial light.

"3d. By avoiding the special use of the eyes in the morning before breakfast.

"4th. By resting them for a half minute or so while reading or sewing or looking at small objects; and by looking at things at a distance, or up to the sky; relief is immediately felt by so doing.

"5th. Never pick any collected matter from the eyelashes or corners of the eyes with the finger-nails; rather moisten it with the saliva and rub it away with the ball of the finger.

"6th. Frequently pass the ball of the finger over the closed eyelids toward the nose; this carries off an excess of water into the nose itself by means of the little canal which leads into the nostril from each inner corner of the eye, this canal having a tendency to close up in consequence of the slight inflammation which attends weakness of eyes.

"7th. Keep the feet always dry and warm, so as to draw any excess of blood from the other end of the body.

8th. Use eyeglasses at first carried in the vest pocket attached to a guard, for they are instantly adjusted to the eye with very little trouble, whereas, if common spectacles are used such a process is required to get them ready that to save trouble the eyes are often strained to answer a purpose.

"9th. Wash the eyes abundantly every morning. If cold water is used let it be flapped against the closed eyes with the fingers, not striking hard against the balls of the eyes.

"10th. The moment the eyes feel tired, the very moment you are conscious of an effort to read or sew, lay aside the book or needle, and take a walk for an hour, or employ yourself in some active exercise not requiring the close use of the eyes."*

*The following are the numbers of the SUPPLEMENT containing the series of articles on preserving the eyesight: 125, 127, 130, 136, 139, 142, 145, 147. They will be mailed from this office on receipt of 80 cents.

Notes on Electrical Lighting.

The latest electric lamp in the field is that of Mr. J. B. Fuller, who claims that it has been in practical use for a year or more. The first public exhibition of the lamp was made a short time since at the office of the New York Electric Light Company, in Mercer street. Its power was said to be equal to 2,400 candles; the electricity being furnished by a generator patented by Mr. Fuller. This lamp uses carbon points. Mr. Fuller claims to have invented also a platinum lamp of 20 candle power which solves the problem of domestic lighting.

The carbon lamp, Mr. Fuller says, has been in use a year in the factory where his apparatus is made in Brooklyn. The cost of the generator and lamp was $290, and they are both as good to-day as when they were first used. The power used was so little that no charge was made for it by the parties furnishing the steam power for the shop. The carbon points cost 4 cents per hour. The shop lighted is 100 by 40 feet, and the light furnished is much better than gaslight. Roughly estimated, the first year's saving on the gas that would be required in the shop is more than enough to pay for the entire apparatus for producing the electric light. Of course that saving would not be effected where an engine and boiler would be required for the sole purpose of furnishing the motive power to the electric generator.

Mr. J. M. Stearnes, Jr., of Brooklyn, points out a novel source of danger possible with the electric light, namely, its effect upon the nervous system. He says:

"The very high penetrating power of light waves from incandescent metal or carbon heated by electricity is well known. It is so high, indeed, that the shadows cast by the light are blacker than Erebus, indicating an immense absorption of force by the intervening objects, and to a large extent destroying their reflection and diffusion, as is the case with lights of lesser tension. A reflector used with an electric or calcium light does not produce anything like a corresponding effect as when used with a common gas flame, as persons familiar with calcium lights well know. And it follows, therefore, that the black shadows of the electric flame must be due to the absorption of light waves. Now in the light of an electric arc or incandescent lamp, one is to be subjected to a very powerful stimulant from the mere obstruction which his body affords. Our eyes cannot bear it at all, and there is no reason to doubt that every nervous tissue will feel its use. We have already in this climate enough of nervous stimulation, and a fearful catalogue of nervous diseases, arising from too much force."

Mr. Stockley, the engineer of the Brush Company, does not claim that more than 18 of that kind of lights have been maintained in one circuit with one machine, the lights being each equal to 2,000 candles. How many could be maintained with more machines is not yet known. Perhaps no more. Sawyer & Man, who have the continuous carbon, claim that they have burned 17 lamps with the power of 5 gas burners each with one machine, but say they can maintain 50. Edison claimed originally that he could maintain some such absurd number as 10,000 with a 500 horse power engine, but now claims only to be able to keep 480 lights going with an 80 horse power engine. But none of the inventors have made any extended experiments whatever. Their claims are all guess work.

Professor Morton recently exhibited in Hoboken the Sugg gas burner from London, a burner which gives a very perfect combustion of gas. A 50 foot gas burner is found to give a light equal to that of 300 candles. The burner has been tried by many of the engineers of the gas companies of the city here, and they find that a 40 foot burner gives a light equal to that of 250 candles, and a 50 foot burner one equal to that of 300 candles. If, now, this same stream of gas be supplied to ten 5 foot Sugg burners, each light would be found to be equal only to 15 candles, the total not exceeding 150 candles, as against 300. If the gas was supplied to 50 burners, little half blue flames would be created, which would hardly be lights at all. The explanation is, that in the large lights the particles of carbon are simply in a state of more intense incandescence by reason of the greater heat. The lower the heat, the less intense the incandescence, and the more feeble the light. This fact of the loss of light by the subdivision of a current of gas is now fully established. It shows that the loss of light by subdivision in electricity is not at all a unique circumstance. Intensity is lost both in gas lights and electric lights, and for exactly the same reason.

M. Carré, of Paris, finds it necessary to extend his establishment for the manufacture of carbons for the electric light. There are more than 6,500 feet of carbons per day turned out at his works at present.

Now that electric lighting successes have caused so many old devices to be dressed up as new inventions, the *Engineer* remarks that it is difficult to understand why some attempt has not been made to improve upon the idea of Allan, and to produce electrodes in the form of a screw. It quotes this reference to Allan's lamp from the *Mechanics' Magazine* of 1852: "The two electrodes are placed perpendicularly to one another, and in this relation are made to rotate by a simple clock-work movement. The result is that as the edge of the spiral is in the course of being destroyed by the action of the current, and the distance between the two thereby increased, it is always regaining the proper position by the rotation of the electrodes producing fresh points for action. In this manner a constant distance or relation is preserved, and hence a constant, steady light, the grand desideratum, the duration of which will depend only upon the length of the thread of the screw."

A. M. Bailey, of Paris, has invented an electric spark pen which possesses some points of interest. If a sheet of thin paper is attached to a plate of copper or zinc, it is stated that an engraving may be made with extraordinary facility by means of this pen. If one of the poles of a Ruhmkorff machine is attached to the plate and the other to the upper end of the pen, the current will run through, and in drawing the paper is perforated. When the drawing is finished, ink is laid on with an ordinary roller and the greasy fluid penetrates through the holes. The plate is then plunged in water, which detaches the paper, and it is ready for immersion in the acid. The advantage claimed for this method is that the artist does all parts of his work and has no more trouble than if he were working with an ordinary pencil. He can even work in a dark room without any other light than the glare from the induction spark.

Mr. W. H. Preece, electrician to the British Post Office, says that he has sought in vain, at Paris and elsewhere, for an electric light which should meet the following three conditions, namely: (1) That the light be absolutely steady; (2) that it be brilliant, giving a light of 1,000 candles, or more; (3) that it be durable. Of all the lights, the only one he had seen which came up to his standard of brilliancy was the Serrin; the only one which came up to his criterion of steadiness was the Werdermann; and the only one sufficiently durable was the Wallace, by which he meant one which would last all night, and nights in England sometimes lasted eighteen hours. But there were several which came pretty near these criteria.

The Papaw Tree, and its Digestive Juice.

The papaw or papaya (*Carica papaya*) is a small tree, a native of tropical America, and cultivated particularly on the wooded slopes of the Andes. It seldom attains a height of over twenty feet; and its trunk, one foot in diameter at the base, gradually tapers upward without branching, and bears at its summit a crown of long-petioled leaves deeply cut into seven irregularly gashed lobes. The male and female flowers are borne on separate trees, and hence the tree receives from the natives the name "papaya," or "mamai," according to such views as each individual may entertain as to the pre-eminence of the sex.

The ripe fruit of the papaw is a melon-shaped berry about ten inches long and half as wide, with a thick, fleshy rind of an orange yellow color, which is sometimes eaten raw with sugar and pepper, but oftener cooked with sugar and lemon juice. The most interesting and important property attributed to the fruit, however, is the power of its juice to rapidly render hard flesh tender; and what is more remarkable still, newly killed meat, merely suspended among the branches of the tree, or wrapped up in its leaves, becomes tender in a wonderfully short time; and this fact, according to Professor Orton, is taken advantage of by Brazilian butchers to make their very toughest meat saleable.

As far back as the year 1750, Griffith Hughes says of the juice of the papaw fruit, in his "History of Barbadoes:" "This juice is of so penetrating a nature that if the unripe peeled fruit be boiled with the toughest old salted meat, it quickly makes it soft and tender, and if pigs be fed with the fruit, especially unripe, the thin mucous matter which coats the inside of the intestines is attacked, and if the food be not changed, is completely destroyed."

According to Browne, meat becomes tender after being washed with water to which the juice of *Carica papaya* has been added, and if left in such water ten minutes, it will fall from the spit while roasting, or separate into shreds while boiling. According to Karsten, the use of the papaw juice when boiling meat is very general in Quito, but in Venezuela and Costa Rica the practice is unknown.

Some further experiments were made by Roy, who, by making an incision in a single fruit, obtained 28·39 c.c. of the milky juice, which, after evaporating to dryness and again diluting with water, had a powerful action upon flesh, albumen, and gluten, while starch remained unaltered by it. Very recently Herr Wittmack has investigated the subject, and an account of his researches and experiments formed the subject of a paper communicated to the Berlin Natural History Society at one of its late sessions. The author obtained, after several incisions of half or unripe fruit, 1·195 grain of a white milky juice of the consistency of cream; the odor and flavor of this recalled that of petroleum or of vulcanized rubber. A portion of the juice was dissolved in three times its weight of water, and this was placed with 10 grammes of quite fresh lean beef in one piece in distilled water, and boiled for five minutes. Below the boiling point the meat fell into several pieces, and at the close of the experiment it had separated into coarse shreds. In the control experiments, made without the papaw juice, the boiled meat was visibly harder. Hard boiled albumen, digested with a little juice at a temperature of 20° C., could, after twenty-four hours, be easily broken up with a glass rod. Fifty grammes of beef in one piece, enveloped in a leaf of the papaw during twenty-four hours, at a temperature of 15° C., after a short boiling became perfectly tender; a similar piece wrapped in papaw and heated in the same manner, remained quite hard. Some comparative experiments were also made with pepsin, and the following conclusions are arrived at by the author: (1) The milky juice of *Carica papaya* is (or contains) a ferment which has an extraordinary energetic action upon nitrogenous substances; (2) it differs from pepsin in being active without the addition of a free acid, and, further, it operates at a higher temperature (60° to 65° C.) and in a shorter time (five minutes at most); (3) the filtered juice differs chemically from pepsin in that it gives no precipitate on boiling, and further that it is precipitated by mercuric chloride, iodine, and all mineral acids; (4) it resembles pepsin in being precipitated by neutral acetate of lead, and not giving a precipitate with sulphate of copper and perchloride of iron. An analysis of the juice of the papaw made in former years by Vauquelin, showed it to contain *fibrine*—a substance which at one time was supposed to be confined to the animal kingdom, but was known to exist in several vegetables.

The Color of Human Hair.

In the current number of the *Journal of the Anthropological Institute* appears a paper by Mr. H. C. Sorby, describing some researches in which he has endeavored to isolate the pigments of the hair, and to subject them to chemical and spectroscopic scrutiny. Hitherto little has been really known respecting the causes of the difference in color, and the distinctive characters of the various capillary pigments. Mr. Sorby concludes that hair is a colorless, horny substance, tinted in different specimens by three, or possibly four, distinct pigmentary bodies. Ordinary solvents, such as water and alcohol, have no action on the pigments, since these are protected by the horny matter. Sulphuric acid, more or less dilute, appears to be the best medium for separating the coloring principles. By this means the author obtains from different kinds of human hair a reddish, a yellow, and a black pigment. It is possible that the red, which is an unstable body, may pass into the yellow by a process of oxidation. Very red hair is characterized by the presence of the red constituent, unmodified by other pigments; dark red hair contains also some of the black pigmentary matter; golden hair has less of the red and more of the yellow principle; in sandy brown hair the black and red constituents are associated with a large proportion of yellow coloring matter; in dark brown hair the black pigment increases at the expense of the others; while in black hair this dark coloring material completely overpowers the associated pigments.

It is a notable fact that Mr. Sorby found in some very black hair of a negro just as large a proportion of red pigment as in a very red hair of European origin. We may, therefore, safely conclude that if this negro had failed to develop the black pigment his hair would have been, not white, but as bright red as that of any red haired European.

Perverted Ingenuity.

The Boston *Journal of Chemistry* thinks there is a good deal of perverted ingenuity in the world besides that which is directly criminal or mischievous in its purpose. It is indirectly criminal because it is a waste of labor and skill, sometimes even of health and life, in doing a difficult but utterly useless thing merely to show that it can be done, or for the sake of the notoriety which the achievement is likely to gain. Every museum has specimens of this misapplied toil and ingenuity—miniature models, carvings, and the like, which are marvels of delicacy and elaboration, but of no real artistic merit and of no possible practical value. If a solitary prisoner in his cell beguiles the weary years of his confinement with such patient labor, for the lack of other employment or diversion, we pardon while we pity him. We may even forgive the ubiquitous old woman who displays at the country fair the quilt of fourteen thousand and odd pieces of patchwork, as fearful in design and coloring as it is complicated in structure; for it may never have occurred to the worthy dame, and no Christian friend may have reminded her, that the time and work spent upon it would have served to knit some hundreds of pairs of hose for the barefoot poor, and have counted more to her credit on a certain long-running ledger than the coveted "premium" or "honorable mention" at the village show. But when sensible and cultivated people deliberately combine in planning and carrying out some silly performance of this kind, they ought not to receive the eulogies of the public press or the honors of international exhibitions.

These criticisms have been suggested by the accounts in foreign journals of a book which we are told was put into the market at the close of the French Exhibition. Its claim to distinction is the fact that it is the smallest book in the world. It is a "128mo" edition of Dante's "Divina Commedia," printed at Padua last year; a volume of 500 pages, measuring 5 centimeters (a trifle less than 2 inches) high, and 3½ (less than 1½ inch) broad. Only a thousand copies have been printed, and the type has been destroyed. It can be read only with a powerful magnifying glass.

Verily a noble example of "the art preservative of all arts!" Blindness and ophthalmia for the workmen engaged upon it, and the result a volume which nobody can read without a microscope, and which nobody will care to buy except the insatiable book hunter or curiosity monger! Is not this a worthy tribute to the great Florentine poet in this nineteenth century? Could he with prophetic vision have anticipated it, would he not have dedicated a warm corner in his "Inferno" to the special accommodation of Signor Gnocchi and Cantù, or whoever else is responsible for this infinitesimal monument of perverted ingenuity?

A Costly Telescope.

M. Camille Flammarion, of Paris, has recently published a number of articles to prove that the moon is inhabited, and is now organizing a committee to collect the necessary funds to construct a refracting telescope of sufficient power to see them. He calculates the cost of the instrument at one million francs.