

MISCELLANEOUS NOTES AND QUERIES,

WITH ANSWERS.

"To believe without knowing is weakness,—
to believe, because we know, is power."—ELIPHAS LEVI.

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Mahatmas and Chelas.

A Mahatma is an individual who, by special training and education, has evolved those higher faculties, and has attained that spiritual knowledge, which ordinary humanity will acquire after passing through numberless series of reincarnations during the process of cosmic evolution, provided, of course, that they do not go, in the meanwhile, against the purposes of Nature, and thus bring on their own annihilation. This process of the self-evolution of the Mahatma extends over a number of "incarnations," although, comparatively speaking, they are very few. What is it that incarnates? The occult doctrine, so far as it is given out, shows that the first three principles die more or less with what is called the physical death. The fourth principle, together with the lower portions of the fifth, in which reside the animal propensities, has *Kama Loka* for its abode, where it suffers the throes of disintegration in proportion to the intensities of those lower desires; while it is the higher *Manas*, "the pure man," which is associated with the sixth and seventh principles, that goes into *Devachan* to enjoy there the effects of its good *Karma*, and then to be reincarnated as a higher personality. Now an entity that is passing through the occult training in its successive births, gradually has less and less (in each incarnation) of that lower *Manas* until there arrives a time when its *whole Manas*, being of an entirely elevated character, is centered in the individuality, when such a person may be said to have become a Mahatma. At the time of his physical death, all the lower four principles perished without any suffering, for these are in fact to him like a piece of wearing apparel which he puts on and off at will. The real Mahatma is then not his physical body but that higher *Manas* which is inseparably linked to the *Atma* and its vehicle, the sixth principle,

—a union effected by him in a comparatively very short period by passing through the process of self-evolution laid down by occult philosophy. When, therefore, people express a desire "to actually see a Mahatma," they really do not seem to understand what it is they ask for. How can they, with their physical eyes, hope to see that which *transcends* that sight? Is it the body, a mere shell or mask, that they crave or hunt after? And supposing they see the body of a Mahatma, how can they know that behind that mask is concealed the exalted entity? By what standard are they to judge whether the *Maya* before them reflects the image of a true Mahatma or not? And who will say that the physical is not a *Maya*? Higher things can be perceived only by a sense pertaining to those higher things; whoever, therefore, wants to see the real Mahatma, must use his *intellectual* sight. He must so elevate his *Manas* that its perception will be clear and all mists created by *Maya* be dispelled. His vision will then be bright and he will see the Mahatma wherever he may be, for, being merged with the sixth and seventh principles, which know no distance, the Mahatma may be said to be everywhere. But, at the same time, just as we may be standing on a mountain top and have within our sight the whole plain, and yet not be cognizant of any particular tree or spot, because from that elevated position all below is nearly identical, and our attention may be drawn to something which may be dissimilar to its surroundings, in the same manner, although the whole of humanity is within the mental vision of the Mahatma, he cannot be expected to take special note of every human being, unless that being by his special acts draw particular attention to himself. The highest interests of humanity, as a whole, is the Mahatma's especial concern, for he has identified himself with that Universal Soul which runs through Humanity; and to draw his attention one must do so through that Soul. This perception of the *Manas* may be called "faith," but it should not be confounded with "blind belief." "Blind faith" is an expression sometimes used to indicate belief without perception or understanding; while the true perception of the *Manas* is that enlightened belief which is the real meaning of the word "faith." This belief should at the same time be accompanied by *knowledge*, that is, experience, for "true *knowledge* brings with it faith." Faith is the perception of the *Manas*, the fifth principle, which knowledge, in the true sense of the term, is the capacity of the Intellect, that is, is spiritual perception. In short, the individuality of man, composed of his higher *Manas*, the sixth and the seventh principle, should work as a unity, and then only can it obtain "divine wisdom," for divine things can be sensed only by divine faculties. Thus a *chela* should be actuated solely by a desire to understand the operation of the Law of Cosmic Evolution, so as to be able to work in conscious and harmonious accord with Nature.—From "*Five Yars of Theosophy*."

"THE NEGRO: WHAT IS HIS ETHNOLOGICAL STATUS?" Can any readers of NOTES AND QUERIES inform me who "ARIEL" was, the author of this ethnological pamphlet quoted above? Was it ever answered by any one? LANGDON.

We cannot inform this correspondent as to whom the pseudonym belongs, but we have a copy of the pamphlet and the reply. We give the full title pages which may lead to the information as to authorship.

"THE NEGRO.

1. What is his ethnological status?
2. Is he the progeny of Ham?
3. Is he a descendant of Adam and Eve?
4. Has he a soul? or is he a beast in God's nomenclature?
5. What is his status as fixed by God in creation?
6. What is his relation to the white race?" By Ariel.

"Truth, though sometimes slow in its power, is like itself, always consistent; and like its AUTHOR, will always be triumphant. The Bible is true." Cincinnati, 1867. pp. 48. 12mo.

"Ariel" discusses these questions, and arrives at the conclusion that the negro is not a descendant of Ham, that he is not of the progeny of Adam and Eve, that he was created before Adam, consequently he is a beast; that he has no soul, that God will not accept religious worship from the negro because they have *flat noses*, citing Leviticus xxi, 18; that it was a negro, a talking beast, that tempted Mother Eve, "more subtle than any beast of the field which the Lord God had made (Genesis iii, 1). The text of the pamphlet is dated July, 1840.

"THE ADAMIC RACE.

Reply to 'Ariel,' Doctors Young and Blackie, on the Negro."

1. "The negro does *not* belong to the Adamic species."
2. "He is *not* a descendant of Adam and Eve."
3. "He is *not* the offspring of Ham."
4. "He is not a beast; he is a human being."
5. "He has an immortal soul; *but not after the image of God.*"
6. "And every attempt to civilize him, *after our form*, has resulted in his speedy and certain destruction."

By M. S. "The unity of the human race is unscriptural — contrary to the laws of science, and destructive to the welfare of every SPECIES of man." New York, 1868. pp. 70. 12mo.

"M. S." replies to "Ariel," and notices two other replies to the

same writer. This is illustrated with cuts of the Adamic Race, the Mongolian, the Malay, the American Indian, the Esquimau, the Ethiopian, and the Negro. "M. S." recapitulates his conclusions thusly :

That the negro is not a *beast*, but has a soul, but not created after the image of God ; that he was created *anterior* to Adam, together with all other inferior races, numerous in the valley of the Nile, who were also the mound-builders throughout Asia, and also in North and South America, and subsequently Adam and Eve were created, and then creation was complete. He believes in special creations ; that Ham was not the progenitor of the negro ; that a serpent in the form of a snake did not tempt Eve ; that the Ethiopian eunuch (Acts viii, 28) was not a negro.

There appeared during the war in the 60's another remarkable pamphlet with the following title-page :

" MISCEGENATION :

The Theory of the Blending of the Races, Applied to the American White Man and Negro."

"The Elements
So mixed in him that nature might stand up
And say to all the world, 'This was a man,'"
—Shakespeare.

This is an essay of twenty chapters in a 12mo pamphlet of 72 pages. The introduction begins, "The word is spoken at last. It is Miscegenation—the blending of the various races of men—the practical recognition of the brotherhood of all the children of a common father."

Webster says of this word : "Miscegenation, a mixing of the races, amalgamation ; a recent and ill-formed word ; it should be *miscegeneration*."—*Unabridged*, 1880.

If the pamphlet, "The Negro: What is his Ethnological Status ?" by "Ariel," was written as dated, in July, 1840, the word *miscegenation* was then in use or coined then. On page 45, "Ariel" says :

"That God destroyed the world by a flood, for the crime of amalgamation, or miscegenation of the white race. (whom he had endowed with souls and immortality) with negroes, mere beasts without souls and immortality, and producing thereby a *class* (not race), but a *class* of beings that were neither *human* nor *beasts*." (Genesis vi, 1-7.)

The following words are coined and used in this essay on "Miscegenation." Miscegenation, from *miscere*, to mix, and *genus*, race :

Miscegen, an offspring of persons of different races. Miscegenate,

the verbal form. Miscegenetic, the adjective form. The words are limited to the mixing of *two races*.

The following are the new words to express the idea of the union of the *white* and *black* races : *Melaleukation*, the abstract form ; from *melas*, black, and *leukos*, white. *Melaleukon*, the substantive form. *Melaleuketic*, the adjective form. The real word *Melamigleukation*, from *mignmi*, to mix, is ill adapted on account of the difficulty of pronunciation. The author claims the coming Type man will be a miscegen, and the extreme white and black are departures from the original type.

The same year of publication of " Miscegenation," 1864, appeared an answer to it, in 12mo size, of 72 pages, entitled,

"SUBGENATION :

The Theory of the Normal Relation of the Races ; an Answer to " Miscegenation." " I thank thee, Jew, for teaching me that word."—*Shakespeare*.

The author quotes from Scaliger, " that nothing will sell better than a scurrilous pamphlet," applying this to " Miscegenation." This author says he will only introduce two new words, namely, Subgenation, from *sub*, lower, and *generatus* and *genus*, a race born or created lower than another ; hence the natural or normal relation of an inferior race ; Subgen is the substantive form. He says the grand idea which is to be the Saviour of humanity in its *earthly* probation to the spiritual sphere, is summed up in one word—SUBGENATION. Suffice it to say that " Subgenation " required a second edition in 1868 to meet the demand. The author believed that the " millennial future " is to be ushered in through a complete understanding of the laws of Subgenation, by which an equality of condition is to become universal.

Who was " Ariel " ? Who was " M. S. " ? Who were the authors of the anonymous pamphlets, " Miscegenation," and " Subgenation " ?

" BRIGHT MASON." What is the masonic interpretation of *Bright Mason* ?

JOSEF.

From the earliest times the oral instructions of Masonry have been communicated in a catechetical form. Each degree has its peculiar catechism, the knowledge of which constitutes what is called a " bright mason." The catechism should be known to every Mason, and every applicant should be thoroughly informed in each degree before advancement. The rule is not as rigidly enforced as it ought to be.

Counting Out Rhymes.—Domestic and Foreign.

One of the most curious of childish practices is the method of determining who shall be "it" in out-of-door games like "I spy" or "hide and seek." This is called "chapping out" in Scotland, or "counting out" in England and America. Being "it" imposes the burdens of the games on the child selected by the counting-out process. A leader gathers the other children about him, arranges them in a row or in a circle, and recites a peculiar doggeral with light ningle-like rapidity. At each word he strikes lightly one of the children. The child who is struck at the last word is "out," and retires from the circle. The rhyme is then repeated, a second child falls "out," and the same thing is again repeated until only one child is left, who is proclaimed "it." The others scatter to seek hiding places, while "it" shuts his eyes for a time, usually until a certain number can be counted, when he begins the search.

The word "it" is always used in this technical sense. All the children accept it without inquiry and never question its meaning. When a little girl finds she is "it" she accepts the burden as a matter of course, and no more thinks of disputing the "count" than of disobeying a parent's command.

Few people can remember more than ten or a dozen such rhymes. As a rule only two or three prevail during the childhood of any one individual in his locality, but they are always undergoing changes and new ones are sometimes invented. Evidence collected from all parts of the world shows that the rhymes are probably many thousands in number. A pioneer inquiry recently made reveals the existence of about nine hundred, with the largest part of the world to hear from.

In the eastern part of New York state the boys gather about a cap and each puts an index finger upon it. The leader then says: "Rumble, rumble in the pot," which seems to be a sort of incantation. Then he recites in the usual way this doggerel:

One erzoll, two erzoll, zitkerzoll zan,
Bobtail, vinegar, little tall tan,
Harum squarum, virgin marum,
Zinctum, zanctum, duck!

In Indiana the preliminary formula runs as follows:

Rumble, rumble in the pot,
King's nail, horse top;
Take off lid.

Other similar practices connected with the use of the cap are reported from Maine, England and Scotland.

A CANADIAN RHYME.

Other ways of counting out, without the use of rhymes, prevail in New England. Sometimes the children stand in a group, twirling their fingers in silence. The first who speaks is "it." This seems to be a childish recognition of the fact that silence is golden. On the other hand, a rhyme reported from Canada puts a premium on quickness of speech :

Billy, Billy, burst,
Who speaks first ?

The child who speaks first is "out." The rhyme is continued until the slowest tongued little one is condemned to be "it." Iowa children have a peculiar method. They are arranged in a row and the leader, beginning with the first, recites the alphabet, giving each child a letter. When the letter happens to be the initial of the child's last name, that child is "out." The child remaining at the end of the recitation is "it."

Like these "it" rhymes are certain "pairing off rhymes" used for the purpose of pairing off children in games requiring two leaders. One of those in Massachusetts and Ohio is as follows :

Daisy Deborah Delflah Dean,
Fresh as a rose and proud a queen,
Daisy Deborah, drawn from the pool,
By Dick and Harry, came dripping from school ,
Daisy Deborah, wet as a fish,
Her mother says bed, while her father says pish.

The children on whom "Harry and Dick" fell paired off with those on whom "Daisy Deborah" fell, while those who received "bed" and "pish" were also paired. This rhyme is absurd enough, but it has a little story in with it, and it has more meaning than most of them. A word that rhymes will satisfy the children, whether it means any thing or not.

These doggerel verses have been collected from eleven European languages, counting the Romany as one, two African languages, six Asiatic, and one American—the Penobscot. Travelers also report that among the Polynesians similar rhymes are in use which seem to be considered of magical power. The counting-out sentences are in the languages so old that the meaning of the words are lost. Among Japanese each holds the sleeve of his coat in his hand, the leader strikes each sleeve at each word of the phrase used. The child upon whom the last word falls is out. The one who is left after all others are out is *oni* (oh-nee) meaning devil or evil spirit. This points to the origin of the rhymes to be mentioned hereafter. One of the Japanese phrase is a single line.

Chu, chu, ta, Ka, nochu.

DIVINATION RHYMES.

Allied to these counting-out rhymes and referred to the same origin are the rhymes used by children to divine the future fortunes of their playmates. In these, buttons on the coats or dresses are touched as each word of the doggerel is spoken, or apple seeds or cherry stones are counted. Cherry stones are arranged in a row convenient for counting and the child seeks to divine her own future with this rhyme :

Tinker, tailor,
Soldier, sailor,
Gentleman, apothecary,
Plowboy, thief.

Whatever word falls to the last cherry determines their lot. To ascertain the character of the garment worn by the girl at her wedding a second sentence was added :

Silk, satin, muslin, rags.

To ascertain how she will go to her wedding a third is added :

Coach, carriage, wheelbarrow, cart.

Then comes a fourth sentence, which indicates the sort of house the bride and groom are to occupy :

Palace, castle, cottage, barn,
(Or) Big house, little house, pig-sty, barn. .

This is an English form. In America the rhyme is :

Rich man, poor man, beggar man, thief,
Merchant, lawyer, doctor, chief.

The latter is probably familiar to every child in America.

There are certain features common to most of these rhymes. Passing over those whose meaning has not been ascertained, or which appear to be mere gibberish, we find frequent references to domestic scenes and habits. We hear of cattle, pigs, puddings and beer. Coffee, tea, cakes, apples and other eatables are found. The American rhyme, perhaps the most popular among children of the Northern and Western states,

Monkey, monkey, bottle of beer,
How many monkeys are there here ?

It, however, is said to refer to earthenware jars known in India as "monkeys." This explains the use of the word in connection with "beer." Comparatively few names of persons are found in these rhymes, the most frequent references being Abraham, Lot, "Nebuchadnezzar," Dr. Franklin and "Dr. Forster," the latter being the English or American child's way of saying Dr Faustus. Another fact which may or not appear remarkable is that in a collection of nearly nine hundred made by a Smithsonian Institute investigator, H. C. Bolton,

not one contained an objectionable word, the nearest approach to vulgarity being the following :

One, two, three, bumble bee,
Sting a man upon his knee,
Sting a pig upon his snout,
I'll be blamed if you ain't out.

The last line is sometimes changed to read :

Gracious Peter, you are out.

All these are forms of divination by lot. In old times most ventures were initiated by an appeal to chance, and the serious practice of children in their innocent games. King Saul, in a fit of bloodthirsty impatience, exclaimed, "Cursed be the man that eateth any food until it be evening and I be avenged of mine enemies." His son Jonathan knew nothing of the oath and, being hungry, ate his dinner before Saul's vengeance was complete. Perceiving signs of God's displeasure Saul cast lots to find out the offender. It finally fell upon Jonathan, who was saved from death only by the interference of the people. Ninety-five forms of divination by lot have been discovered. That by sticks, in use among the ancient Germans and Scythians, was a "counting out." The person seeking a sign measured a length, saying, "I will go, I will not go; I will act, I will not act," and the like, according to circumstances. The sentence which fell upon the last span was his destiny. Other forms prevailed with the stick, all being accompanied with "counting out" formulas. After the defection of Judas the 11 cast lots to see who should be his successor, "and the lot fell upon Matthias." The prayer which accompanied this serious ceremony has an echo in the meaningless "counting out" rhymes. The magicians of the middle ages were full of formulas and rhymes and even ecclesiastics used them to ascertain who was "it" in the fatal game of heresy and orthodoxy. The following doggerel used as a "counting-out" rhyme comes down from magic :

Ena, mena, bona, mi,
Kieca, lara, mora, di,
Eggs butter, cheese, bread,
Stick, stock, stone dead.

In this, eggs, butter and bread are laid under a ban and the last line foreshadows the death of the ex-communicant by beating with sticks. The first and second lines are said to be British words.

Among American children the following senseless rhyme is said to be the favorite :

Eny meeny, mlay, mo,
Catch a nigger by the toe,
If he bollars let him go,
Eny, meeny, miny, mo.

It is reported from 25 States of the Union and from Ontario, Can. There are groups of these rhymes distinguished by peculiar beginnings,

or references. Thus, there are '32 in the United States beginning with numbers, as :

One, two, three, four, five, six, seven,
All good children go to heaven;
One, two, three, four,
All bad children go next door.

A variation of this is the invention of an adult :

One, two, three, four, five, six,
All bad children cross the Styx.

To show how soon these words lose all meaning if they ever had any, it is related that the word Styx is spelled by the children s-t-i-c-k-s."

One, two,iky blue,
All out but you.

is used by very little children who cannot wait for the successive eliminations; "you" of the last line is "it." There is a Romany rhyme beginning

Ekkert, akai-ri you kair-an.

of which there are 28 variants, the group being known as the "Onery, twoery, eckery ann." "Twenty-one" is a feature in 35 American rhymes. The origin is unknown.

The Armenian children say :

Akt oodim,
Codaru, oodim,
Charghe traty peeshad.

The first two lines translated are, "Salt let me eat, cresses let me eat." The other words have no meaning. The rhyme is used by American children to detect one who is guilty of an offense. The last boy is believed to be guilty beyond a doubt. The rhyme familiar to all children in America,

One, two, buckle my shoe,
Three, four, shut the door.

has its analogies in Constantinople, Rome and other European and Oriental cities.

A LOCAL CHARACTER.

Many of these show local manipulation, the word "nigger" being found in a large number :

One, two, three, four, five, six, seven,
Five little niggers went to heaven.

Humor sparkles in some of these:

One, two, three, four, five, six, seven,
Eight, nine, ten, eleven.
First lieutenant, who is so neat,
He stopped in the battle to wash his feet.

It is difficult to believe that this was not the product of conscious

sarcasm. Some of these rhymes turn the thoughts of "older children" to their youthful days.

Watchman, watchman, don't watch me,
Watch that nigger behind the tree,
He stole whiskey and I stole none;
Put him in the calaboose for fun.

is a very late product of South Carolina.

Did you ever tell a lie?
No, I never told a lie,
But I ate an apple pie.

is a testimony to the veracity of Wisconsin and Virginia little ones.

The Connecticut child's big sister had a hand in the composition of this :

I know something I shall tell,
Three little niggers in a peanut shell,
One an sing and one can dance,
And one can make a pair of pants.
O U T spells out goes she.

And the big brother in this :

I was walking down the lake,
I met a little rattlesnake,
I gave him so much jelly cake,
It make his little bella ake.
One, two, three,
Out goes she.

One reported from Massachusetts is,

In hoc Domine quod,
Duck's foot plump in the mud.

Finally here is a most ingenious one from Maine :

Hono, ryfy,
Cabul, lyty,
Do not I
Tanti, busque,
Okor.

This is derived from the word "honorificabilitudinilatus," which word is found in Shakespeare's "Love's Labor Lost," Act V, Scene I.

MAGIC SQUARE AS TALISMANS. Among the ancients magic squares were held in great veneration, and were supposed to be endowed with occult virtues, and they are still so regarded in the East. A magic square of 16 cells stands over the door of a house in Bengal, and under it is the following prayer or supplication in the Persian language :

"O God, preserve the Doctor of the Faith, surnamed Karkhy, from the calamities of this world. May he be always a favorite of heaven, whilst Moses is selected as porter of Aly."

SERIES.

LIFE INSURANCE.

By B. F. Burleson, Onelda Castle, N. Y.

[THIRD PAPER.]

There is hardly a subject upon which the people are more interested than that of Life Insurance. Millions of dollars are annually expended, or rather invested, by people anxious to make provision for the future welfare of their families in case death overtakes them unexpectedly in the midst of their struggles to acquire a comfortable competency. The motive for doing so is undoubtedly commendable when exercised by due discretion and wisdom. There are so many incorporated companies soliciting the patronage of the public in their line of business, with so many different rates and rules of regulation, that it is confusing for insurers to choose from among them the safest and cheapest ones in which to invest their earnings.

Each one of the many insurance companies have oily-tongued agents who set forth in extravagant terms the many merits of the company they are working for, zealously hiding each defect, and not hesitating, if need be, to tell sometimes untruths, to draw in their victims. There are many old line and long established companies that are fairly honest in their dealings; but a great share of these later mushroom corporations that are springing up in our cities and towns by the hundreds are merely organizations to rob the poor man of his earnings, and give him nothing in return. They hold out such inducements in return for the premiums invested, in order to draw in their victims, that no company could long endure. After their net is sufficiently full to satisfy their avarice, the company disorganizes, not neglecting to pocket about all they have taken in from their dupes. It is not difficult by fraud, bribes, and other means to obtain charters from legislatures, and to hoodwink government inspectors by specious subterfuges. It therefore stands every person in hand who contemplates taking a life policy to inspect very minutely and carefully the terms and prospects of the companies that offer him rates. He should ask, and demand

an authenticated answer to such questions as these : How long has the company existed ? Is it earning money, and at what rate ? Is the rate of gain permanent or fluctuating ? How is the capital invested ? Does it pay its death losses promptly ? Who are its officers, and what salaries do they draw ?

After obtaining satisfactory answers to such questions as these, the would-be insurer should then carefully weigh these questions : Can the company fulfill its obligations without suffering loss, or are its profits too great ? These questions the applicant should solve for himself by doing his own figuring from the data given, making all due allowance for unforeseen accidents and casualties. The insurer should regard his premiums as regular deposits, and then from some good table of mortality, such as the Carlyle, for instance, ascertain how many years of life expectancy he has remaining at the age he insures. He then should find what his premiums, made at stated and regular periods, will amount to for that time, at not too high a rate of compound interest, say four or five per cent per annum. Should it fall greatly under or above the amount he is to receive at death, he should leave that company alone ; for, they either have it in mind to cheat him at death by disorganization, or to extort from him more than he will ever receive in return for his money. The nearer the amount of his deposits, by this figuring, agrees with the insurance he is to receive at death, the safer, in our estimation, is the company he insures with. The amount of these deposits should never fall under insurance ; for no company can long transact business on a losing basis. Quite a margin may be allowed for expenses and unforeseen contingencies.

To enlighten the reader still more on some of the features of life insurance, we will propose and solve by series a couple of problems.

PROBLEM 7.

A person whose age is 30 years wishes to insure his life for \$10,000, and to have a paid up policy at the age of 70 years. Money being worth five per cent per annum, compound interest, what sum must he pay annually to effect it, if he make the first payment at the time of insuring, and the last at his 69th birth day should he live so long ? Should he die at any time between whiles, the insurers are to pay his heirs on what would have been his next succeeding birthday the

whole amount of his insurance. In this problem the limit of life is supposed to be fixed at 70 years, and that death is equally liable to occur at any time previous to that period.

SOLUTION.

Put $A = \$10,000$, the amount insured, $r = 5\%$, and $T = 40$ years, the limit of life from the time of insuring. Let $S =$ the annual payment required in the problem. Suppose a and t are variables of A and T .

As $S(1+r)^t$, $S(1+r)^{t-1}$ $S(1+r)$ are the respective amounts of the several payments made during t years, we have by summing the series,

$$a = \frac{S(1+r)}{r} [(1+r)^t - 1] \quad . \quad . \quad . \quad (A).$$

Giving to t in equation (A) all integral values from 1 to T , summing the resulting series within the brackets, substituting $-T$ for -1 , and dividing the result by T to obtain the average amount A , we have,

$$A = \frac{S(1+r)}{Tr} \left\{ \frac{(1+r)^2}{r} [(1+r)^T - 1] - T \right\}$$

$$\therefore S = A \div \left\{ \frac{(1+r)^2}{Tr} [(1+r)^T - 1] - \frac{1+r}{r} \right\} = [\text{when } A = \$10,000, r = .05, \text{ and } T = 40] = \$219.34213+.$$

PROBLEM 8.

What would be the annual rate of mortality that an insurance company will neither gain nor lose if the average premium be \$12.30 per \$1,000 per annum payable in advance, money being worth 6% per annum?

SOLUTION.

Put $p = \$12.30$, the annual premium; $a =$ the amount of the policy; and $r = 6\%$, the rate of interest. Let $m =$ any number of persons insured, and suppose q persons die each year out of the number m . Suppose, also, that at the end of n years none of the m persons are living.

We shall then have $m = nq$ (1)

We may also easily trace the following yearly balances accruing to the insurance company :

$mp(1+r) - aq =$ balance on hand at the end of first year.

$mp(1+r)^2 - aq(1+r) + mp(1+r) - qp(1+r) - aq =$ second year's balance.

$mp(1+r)^3 - aq(1+r)^2 + mp(1+r)^2 - qp(1+r)^2 - aq(1+r) + mp(1+r) - 2qp(1+r) - aq =$ third year's balance.

Whence by induction, we may write the n th year's balance on hand as follows: $mp[(1+r)^n + (1+r)^{n-1} + \dots + (1+r)] - aq[(1+r)^{n-1} + (1+r)^{n-2} + \dots + 1] - qp[(1+r)^{n-1} + 2(1+r)^{n-2} + 3(1+r)^{n-3} + \dots + (n-1)(1+r)] =$ [by summing each series within the brackets, the last by decomposition,] $= \frac{mp}{r} [(1+r)^{n+1} - (1+r)] - \frac{aq}{r} [(1+r)^n - 1] - \frac{qp}{r} \left[\frac{(1+r)^{n+1} - (1+r)}{r} - (n-1)(1+r) \right]$

By putting this balance equal to 0, as the insurance company are neither to gain nor lose, and also by putting $m = nq$, then dividing the resulting equation by q , simplifying, etc., we obtain,

$$\left(p - prn + \frac{ar}{1+r} \right) (1+r)^n = p - pr + \frac{ar}{1+r} \quad (2).$$

Substituting the numerical value of p , r , and a , equation (2) becomes $(68.9037736 - .738n)(1+r)^n = 68.1657736$.

This transcendental equation is readily solved by Position from a table of logarithms. We find that $n = 92.9551$ years.

Now assume $m = 929551$; then by equation (1) will $q = 10,000$; that is, out of 929551 persons insured, 10,000 must die each year in order that the insurance company may neither make nor lose money.

Hence, the annual rate of mortality among the insured must be $\frac{10000}{929551} = 1\frac{70449}{929551}$ per cent. *Answer.*

ERRATUM. The sub-title of the first paper on "Series," in May No. of N. AND Q., 1892, page 109, should be

RATIONAL RECTANGULAR SOLIDS.

SUMMATION OF SERIES. (Vol. XI, p. 88.) Series of reciprocals of powers can be summed in terms of π when, and only when, the exponent of the power is *even*. (See "Vince's Fluxions," p. 215-216.

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ADDENDUM TO FIRST PAPER ON SERIES.

(MAY, 1892, VOL. IX, PAGE 109.)

It must not be understood that our answer to Problem 1, under the head of Rectangular Solids, or, as erroneously given, Rectangular Triangles, include the multiples of the solids obtained from our formulæ. With these included, the number would far exceed the answer, 246, assigned. We have only given those that are embraced in our serial forms. For instance, from the least of these solids by taking multiples we obtain the following :

$$\left\{ \begin{array}{cccccc} 1, & 2, & 3, & 4, & 5, & 7, & \text{etc.} \\ 2, & 4, & 6, & 8, & 10, & 14, & \text{etc.} \\ 2, & 4, & 6, & 8, & 10, & 14, & \text{etc.} \\ 3, & 6, & 9, & 12, & 15, & 21, & \text{etc.} \end{array} \right\}$$

In the same manner we may take the multiples of each solid obtained from any one of the formulæ. While Problem 3 correctly sums the volumes of the class of solids derived from our formulæ, we should perhaps more consistently have summed to r terms the volumes of the multiples of solids given in the series showed above, that is, of the series $1.2^2, 2.4^2, 3.6^2, 4.8^2, 5.10^2, 6.12^2$, etc., etc. We should obtain by the differential method, in doing this, $S_r = r^2(r+1)^2$.

When $r = 1$, $S_1 = 4$. When $r = 1000$, $S_{1000} = 1002001000000$.

" $r = 2$, $S_2 = 36$. Etc., etc.

" $r = 3$, $S_3 = 144$.

When S_r is given in this problem, we obtain, $r = \frac{1}{2}\sqrt{4\sqrt{S_r} + 1} - \frac{1}{2}$.

When $S_r = 4$, $r = 1$. When $S_r = 1002001000000$, $r = 1000$.

" $S_r = 36$, $r = 2$. Etc., etc.

" $S_r = 144$, $r = 3$.

B. F. BURLESON.

"PASSING THE RUBICON." On arriving at the banks of the River Rubicon, which the Romans had ever been taught to consider the sacred boundary of their domestic empire, Cæsar stopped short, as if impressed with the greatness of his enterprise. He said to one of his generals, "If I pass the river, what miseries shall I bring upon my country! and if I stop I am undone!" Then, after a pause, he exclaimed, "Let us go where the gods and the injustice of our enemies call us." Then with renewed energy he plunged into the river, crying out, "the die is cast," and there was for Cæsar no return.

A Chapter on the Digits.

The word digit comes from the Latin *digitus*, a finger. Hence the digits represent the ten fingers, or *phalanges*, a phalanx. It is well claimed that the octonary scale of 8 would be more simple, and much less complicated than the decimal scale of 10.

The word digit in the astronomical nomenclature means one-twelfth part. The surface of the sun or moon in the measurement of eclipses, is said to be 12 digits.

In botany the digitalis (*Scrophulariæ*) derives its name from *digitus*, a finger. The common name is "foxglove." The symbolical language is, "I am not ambitious for myself, but for you."

The nine digits are susceptible of many singular and peculiar evolutions, some of which it is the purpose of this paper to bring together as a sort of a digest. Many of the details, the whys, and wherefores, will be left to those interested to develop for themselves. Neither is it advisable here to enter into an historical account of their origin. The reader interested in the subject of their origin, and the various forms and changes they are claimed to have passed through, should read the very full account of them by the Rev. George Peacock, D. D, contained in the "Encyclopædia of Pure Mathematics," forming part of the "Encyclopædia Metropolitana," in an article entitled *Arithmetic*, pp. 368-523, London, 1847, quarto.

Those who are disposed to investigate the theoretical phase of numbers should examine the work, "Elementary Investigation in the Theory of Numbers," by Peter Barlow, London, 1811.

Many of the peculiar properties of numbers have been credited to various persons as discoveries, but nearly all such claimed discoveries and combination of figures are found to have been known previously.

Among some of the disputed discoveries and inventions are logarithms, fluxional or differential calculus, binomial theorem, rectification of the semicubical parabola, the formula for cubic equations, casting out the nines, and several others.

Some of the peculiar numbers, and coincidences in their evolutions will form the subject for a subsequent paper.

1. The digits 1, 2, 3, 5, and 7 are prime numbers, while 4, 6, 8, and 9 are composite. The digits 1, 4, and 9 are squares, while 1 and 8 are cubes. The digit 6 is a perfect number ($1+2+3=6$).

2. The sum of the nine digits is 45; and the sum is divisible by 9.

3. The continued product of the digits is 362880; which product is the number of ways they can be transposed by permutation.

4. The least whole number that can be divided by each of the digits without a remainder is 2520; and this number is the least common denominator of the digits as denominators of fractions; and with 1 for their numerators, the sum of the fractions is $2\frac{4}{5}$; This is also the sum of the reciprocals of the digits: $\frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6} + \frac{1}{7} + \frac{1}{8} + \frac{1}{9} = 2\frac{4}{5}$.

5. If 9 and its multiples, 18, 27, 36, 45, 54, 63, 72, be divided by 81, the decimals will each consist of all 1's, 2's, 3's, 4's, 5's, 6's, 7's, 8's, 9's, respectively.

6. The smallest four-figured number which will divide 2, 3, 4, 5, 6, 7, 8, and 9, and leave 1 for a remainder for each digits is 2521.

7. The smallest four-figured number which will divide 2, 3, 4, 5, 6, 7, 8, and 9, and leave for remainders successively 1, 2, 3, 4, 5, 6, 7, 8, is 2519.

8. The sum of the squares of the digits is 269; while the their cubes is 1925.

9. The pronixes of the digits are as follows: The pronix of 1 is 2; of 2, 6; of 3, 12; of 4, 20; of 5, 30; of 6, 42; of 7, 56; of 8, 72; of 9, 90. The sum of the pronixes, is 330.

10. If the fraction $\frac{45}{362880}$, composed of the digits (excepting the 1) be added to their sum, the sum will equal their continued product multiplied by the same fraction.

11. The digits can be placed so as to add 100 in the following fractional manner:

$$95\frac{1}{2} + 4\frac{2}{9} = 100.$$

12. If the digits in regular order be successively subtracted from the digits in reverse order, they reproduce the digits five times, and the last time in regular order, excepting the last two digits 8 and 9 which are transposed.

13. Fifty-four of the 80 common fractions from $\frac{1}{81}$ to $\frac{80}{81}$ (omitting all that are multiples of 3) will produce the cipher and the digits, excepting the digit 8, when such fractions are reduced to a circulate. (See N. AND Q., Vol V, p. 146.)

14. The arithmetical mean of the digits is $5 : (1+9) \div 2 = 5$. The geometrical mean of the same is $3 : \sqrt{(1 \times 9)} = 3$. The harmonical mean of the same is $1\frac{1}{2} : 2(1 \times 9) \div 8 + 2 = 1\frac{1}{2}$. The arithmetical mean is to the geometrical mean as the geometrical mean is to the harmonical mean: $5 : 3 :: 3 : 1\frac{1}{2}$.

15. The dual numbers of the digits in regular and reverse order, according to Oliver Byrne's "Dual Arithmetic," are as follows :

$$1234.56789 = 10^3 + 2,2,0,2,0,0,0,1,0,9.$$

$$987.654321 = '0'1'2'3'7'1'1'6'8'1'1'6 + 10^3.$$

16. The following are the roots of the digits in order taken as one number :

Square root : $\sqrt{123456789} = 11111.111.$

Cube root : $\sqrt[3]{123456789} = 497.8835.$

Biquadrate root : $\sqrt[4]{123456789} = 105.4092.$

Fifth root : $\sqrt[5]{123456789} = 41.5244.$

17. The powers of the digits are arranged in tables for many uses :

THE FIRST NINE POWERS OF THE NINE DIGITS.

1st	2d	3d	4th	5th	6th	7th	8th	9th
1	1	1	1	1	1	1	1	1
2	4	8	16	32	64	128	256	512
3	9	27	81	243	729	2187	6561	19683
4	16	64	256	1024	4096	16384	65536	262144
5	25	125	625	3125	15625	78125	390625	1953125
6	36	216	1296	7776	46656	279936	1679616	10077696
7	49	343	2401	16807	117649	823543	5764801	40353607
8	64	512	4096	32768	262144	2097152	16777216	134217728
9	81	729	6561	59049	531441	4782969	43046721	387420489

18. There are three kinds of logarithms of numbers calculated for the abbreviating of mathematical calculations. The logarithms of the digits and 10 are here given. It is only necessary to calculate the logarithms in one system for 2, 3, and 7, when the others can readily be found, in the same system, by addition, and in the other systems by the *moduli*.

NO.	NAPIERIAN.	NATURAL.	COMMON.
1	161180956.509		
2	154249484.703	0.6931472	0.3010299
3	150194833.622	1.0986123	0.4771212
4	147318012.551	1.3862944	0.6020599
5	145086378.135	1.6094379	0.6989700
6	143263361.701	1.7917595	0.7781512
7	141721856.726	1.9459101	0.8450980
8	140386543.936	2.0794415	0.9030899
9	139208711.043	2.1972246	0.9542425
10	138155105.579	2.3025851	1.0000000

19. The squares, cubes, reciprocals, square and cube roots of the digits are here given :

DIGITS.	SQRS.	CUBES.	RECIPROCAL.	SQR. ROOTS.	CUBE ROOTS.
1.	1	1	1.000000	1.0000000	1.000000
2.	4	8	.5000000	1.4142136	1.259924
3.	9	27	.3333333	1.7320508	1.442250
4.	16	64	.2500000	2.0000000	1.587401
5.	25	125	.2000000	2.2360680	1.709976
6.	36	216	.1666666	2.4494897	1.817121
7.	49	343	.1428571	2.6457513	1.912933
8.	64	512	.1250000	2.8284271	2.000000
9.	81	729	.1111111	3.0000000	2.080084
10.	100	1000	.1000000	3.1622777	2.154435

20. The minimum number made by the digits is 123,456,789 ; the maximum number is 987,654,321. Hence the arithmetical mean is 1,111,111,110 ; the geometrical mean is 349188582.832 ; the harmonical mean is 219487736.222.

21. If the digits (excepting the 8) be subtracted from one billion the remainder will be the nine digits reversed.

$$1000000000 - 12345679 = 987654321.$$

22. The number 37 has the peculiarity that if multiplied by the digit 3 and its multiples, the products will be successively the digits three times repeated, thus :

$$\begin{array}{lll} 37 \times 3 = 111. & 37 \times 12 = 444. & 37 \times 21 = 777. \\ 37 \times 6 = 222. & 37 \times 15 = 555. & 37 \times 24 = 888. \\ 37 \times 9 = 333. & 37 \times 18 = 666. & 37 \times 27 = 999. \end{array}$$

J. E. Clarke quotes from the author of the "Christian Code" and says that the following pyramidal arrangement of the arithmetical series from 1 to 6^2 contains mystery in that the sum of the series is $(36 \times 37 \div 2) 666 = (18 \times 37) 666$.



23. The arithmetical triangle said to have been invented by Pascal was made for quite another purpose, being a table for inspection to solve problems in combinations, etc. :

1																			
2.	1																		
3	3	1																	
4	6	4	1																
5	10	10	5	1															
6	15	20	15	6	1														
7	21	35	35	21	7	1													
8	28	56	70	56	28	8	1												
9	36	84	126	126	84	36	9	1											
10	45	120	210	262	210	120	45	10	1										
11	55	165	330	462	462	330	165	55	11	1									
12	66	220	495	792	934	792	495	220	66	12	1								

24. There is a Manuscript work "The Superdigit," written by Robert Flower, in the possession of J. O. Halliwell (MS. Bib. Hall. No. 25), which contains much curious information on the digits, scales, radixes, circulating decimals, etc. To illustrate here is one example :

To reduce $\frac{1}{19}$ to a decimal : $1 \div 19 = .05\frac{2}{19}$. Hence, .05 is the ratio. The work is as follows :

$$\begin{array}{r}
 .05 \\
 25 \\
 125 \\
 625 \\
 3125 \\
 15625 \\
 78125 \\
 390625 \\
 1953125 \\
 \text{etc., ad infinitum.} \\
 \hline
 .052631578947368421
 \end{array}$$

It is obvious that the computation need not be carried further than the correction column, immediately to the right of the vertical line ; since the other half of the entire period is complementary to that already found.

It will be observed that the circulate has the digits twice excepting the 9, which appears once.

25. The squares of numbers composed of all 1's are peculiar as to producing the digits similar to this last number. Put the number of 1's for the central figure, and then descend right and left, with the next lower digit and the number is squared, thus :

$$\begin{array}{ll}
 11^2=121. & 111111^2=12345654321. \\
 111^2=12321. & 1111111^2=1234567654321. \\
 1111^2=1234321. & 11111111^2=123456787654321. \\
 11111^2=123454321. & 111111111^2=12345678987654321. \\
 & 1111111111^2=12345679 \times 999999999. \\
 & 12345679 \times 999999999 = 12345678987654321. \\
 & 987654321 \times 5 = 10(123456789 \times 4) + 45
 \end{array}$$

26. The only right-angled triangle possible in integral numbers whose sides and area are in arithmetical progression is that composed of the digits 3, 4, 5, 6 : perpendicular 3, base 4, hypotenuse 5, area 6.

27. The greatest number of parts that a number composed of the digits can be separated into so that their product shall be a maximum, is

$$987654321 \div 2.718281828 = 363337719.741 \text{ parts.}$$

$$\text{Hence, } 363337719.741^{363337719.741} = \text{a maximum.}$$

28. The digits can be placed in the form of a common fraction four ways and their cube root extracted, as follows :

$$\sqrt[3]{\frac{22481759}{819}} = \frac{2}{819}; \quad \sqrt[3]{\frac{24187569}{289}} = \frac{2}{289}; \quad \sqrt[3]{\frac{12578}{488978}} = \frac{5}{78}; \quad \text{and} \\ \sqrt[3]{\frac{512}{488978}} = \frac{8}{78}.$$

29. The digits can be placed so to produce the cipher and each digit separately :

$$\frac{22}{31} - \frac{270}{485} = 0. \quad \frac{22}{31} - \frac{485}{970} = 1. \quad \frac{27082}{485828} = 2. \quad \frac{107469}{85828} = 3. \quad \frac{22184}{05706} = 4. \\ \frac{13485}{02697} = 5. \quad \frac{34182}{05697} = 6. \quad \frac{41832}{05978} = 7. \quad \frac{25499}{08187} = 8. \quad \frac{57429}{06381} = 9.$$

30. If the digits in regular order (omitting the 8) be multiplied by 9, and the multiples of 9, 18, 27, 36, 45, 54, 63, 72, 81, the results are successively all 1's, 2's, 3's, 4's, 5's, 6's, 7's, 8's, 9's, as follows :

$$\begin{array}{rclcl} 12345679 & \times & 9 & = & 111111111 \\ 12345679 & \times & 18 & = & 222222222 \\ 12345679 & \times & 27 & = & 333333333 \\ 12345679 & \times & 36 & = & 444444444 \\ 12345679 & \times & 45 & = & 555555555 \\ 12345679 & \times & 54 & = & 666666666 \\ 12345679 & \times & 63 & = & 777777777 \\ 12345679 & \times & 72 & = & 888888888 \\ 12345679 & \times & 81 & = & 999999999 \end{array}$$

31. The digits are represented in the value of π (as calculated by William Shanks to 707 decimal places), as follows :

Digit.	Number.	Multipled by.		Product.
1	79	1	=	79
2	73	2	=	146
3	74	3	=	222
4	72	4	=	288
5	63	5	=	315
6	68	6	=	408
7	53	7	=	371
8	73	8	=	584
9	79	9	=	711
0	73	0	=	000
Totals,	707			3124

32. The cipher and digits can be placed in the form of a fraction, so to equal the received value of π . $\frac{67888}{21466} = 3.1416 = \pi$.

33. The equation $x^5 + 2x^4 + 3x^3 + 4x^2 + 5x = 54321$. $x = 8.414455$.

34. The exponential equation for the number containing the digits in their regular order is,

$$x^x = 123456789. \quad x = 8.64006268; \text{ or, } 8.6400268^{8.6400268} = 123456789.$$

The exponential equation of the number containing the digits in their regular order for another x power is $x^{x^x} = 123456789$; therefore, $x = 2.806054$; or, $2.806054^{2.806054^{2.806054}} = 123456789$.

35. The expression $(112^2 - 1)^2 =$ the digits $= 157326849$.

36. The common logarithm of the number $123456789 = 8.09151499$. The natural logarithm of the number $123456789 = 18.63140171152549$.

37. The common logarithm of 12345679 (omitting the 8) when added to the logarithms of the multiples of 9, give the logarithms of the successive results of 1's, 2's, 3's, 4's, 5's, 6's, 7's, 8's, 9's, thus :

The common logarithm of 12345679 = 7.09151498.

Log. of 12345679 + log. of 9 = log. of 111111111	= 8.04575649011
Log. 12345679 + log. 18 = log. 222222222	= 8.34678748578
Log. 12345679 + log. 27 = log. 333333333	= 8.52287874483
Log. 12345679 + log. 36 = log. 444444444	= 8.64781748144
Log. 12345679 + log. 45 = log. 555555555	= 8.74472749445
Log. 12345679 + log. 54 = log. 666666666	= 8.82390874050
Log. 12345679 + log. 63 = log. 777777777	= 8.89085553013
Log. 12345679 + log. 72 = log. 888888888	= 8.94884747711
Log. 12345679 + log. 81 = log. 999999999	= 8.99999999999

38. The following numbers have the peculiar property in that their logarithms are found to be expressed by the same numbers :

10.1371288574238542 = log. of 1.371288574238542	= 0.1371288574238542
101.00000000000000 = log. 10.00000000000000	= 1.000000000000000
102.375812087593221 = log. 237.5812087593221	= 2.375812087593221
103.550260181586591 = log. 3550.260181586591	= 3.550260181586591
104.669246832877758 = log. 46692.46832877758	= 4.669246832877758
105.760456934135527 = log. 576045.6934135527	= 5.760456934135527
106.834720776754357 = log. 6834720.776754357	= 6.834720776754357
107.897489031398144 = log. 7897489031398144	= 7.897489031398144
108.951915998267839 = log. 8951915998267839	= 8.951915998267839
109.99999999999999 = log. 999999999.999999	= 9.999999999999999

39. The sum of the digits placed in a palindrome, using the 9 but once for a central digit, is equal to the square of the central digit :

$$1\ 2\ 3\ 4\ 5\ 6\ 7\ 8\ 9\ 8\ 7\ 6\ 5\ 4\ 3\ 2\ 1 = 81.$$

40. Oliver Byrne proposed the problem to make each of the three sides of a plane triangle to be composed of the nine digits, and then find the area of the triangle.

Let $(a) = 7891.23456$; $(b) = 8912.34567$; $(c) = 12345.6789$.

Hence, area = 35062539.6.

41. The reciprocals of the digits form an harmonic proportion and the musical scale ; and when reduced to a common denominator are :

$$2520\ 1269\ 840\ 630\ 504\ 420\ 360\ 315\ 280$$

42. The digits in the Roman method are expressed by I, V, X, L, C, D, M, and combinations. These letters added represent a total of 1666.

43. The digits, 1, 2, 3, 4, 5, are arranged in a magic square so to = 15 ; and also the nine digits so to = 15, thus :

1	4	2	5	3	= 15
2	5	3	1	4	= 15
3	1	4	2	5	= 15
4	2	5	3	1	= 15
5	3	1	4	2	= 15
					Also,
15	15	15	15	15	diagonals = 15

8	8	4	= 15
1	5	9	= 15
6	7	2	= 15
15	15	15	Also,
			diagonals = 15

44. The magic sum of the digits when arranged in a magic square is 15 ; while the magic sums produced from magic squares of compartments equal to the squares of the digits, are for 1, 1 ; for 4, 3 ; for 9, 15 ; for 16, 34 ; for 25, 65 ; for 36, 111 ; for 49, 175 ; for 64, 260 ; for 81, 369.

45. The common fraction $\frac{187174210}{111111111}$ reduced to a decimal, will circulate, and produce regularly the cipher and nine digits.

46. The center of gravity, so to speak, is in the 7, ($\frac{3}{4}$ of 7) as seen here : $1+2+3+4+5+6+1\frac{1}{2} = 22\frac{1}{2}$; $5\frac{1}{2}+8+9 = 22\frac{1}{2}$. That is, $[(1+9)\times 9]\div 2 = 45$, the sum of the digits. Therefore,

$987654321 \times 11\frac{1}{2} = 111111111\frac{1}{2}$, $987655321 \times 56\frac{1}{2} = 555555555\frac{1}{2}$,
 $987654321 \times 22\frac{1}{2} = 222222222\frac{1}{2}$, $987654321 \times 67\frac{1}{2} = 666666666\frac{1}{2}$,
 $987654321 \times 33\frac{1}{2} = 333333333\frac{1}{2}$, $987654321 \times 77\frac{1}{2} = 777777777\frac{1}{2}$,
 $987654321 \times 45 = 444444445$, $987654321 \times 90 = 8888888890$.

47. The digits as they would appear in different scales will be seen by the following table. The number of places for each scale is inversely as the logarithm of the radix.

SCALE.	UNITS.	10'S.	100'S.	1000'S.	RADIX.	LOGS.	PLACES.
Binary	1	2—	4—	8—	2	0.301029	1.0
Ternary	1—2	3—	9—	27—	3	0.477121	2.5
Quaternary	1—3	4—	16—	64—	4	0.602059	4.0
Quinary	1—4	5—	25—	125—	5	0.698970	5.0
Senary	1—5	6—	36—	216—	6	0.778151	6.8
Septenary	1—6	7—	49—	343—	7	0.845098	8.0
Octonary	1—7	8—	64—	512—	8	0.903089	10.0
Novenary	1—8	9—	81—	729—	9	0.954242	10.0
Denary	1—9	10—	100—	1000—	10	1.000000	1.0
Duodenary	1—11	12—	144—	1728—	12	1.079181	2.5
Quaterdenary	1—13	14—	196—	2744—	14	1.146128	3.0
Senidenary	1—15	16—	256—	4096—	16	1.204120	4.0
Octonidenary	1—17	18—	324—	5832—	18	1.255272	5.0
Vicenary	1—19	20—	400—	8000—	20	1.301029	10.0
Tricenary	1—29	30—	900—	27000—	30	1.477121	2.5
Quadragenary	1—39	40—	1600—	64000—	40	1.602059	4.0
Quinquagenary	1—49	50—	2500—	125000—	50	1.698970	10.0
Sexagenary	1—59	60—	3600—	216000—	60	1.778151	10.0

The invention of the Binary System has been attributed to Leibnitz, and a medal was struck to his memory bearing on it the inscription, *Omnibus ex nihilo ducendis sufficit Unum*. This system served Bouvet a key to unlock the "Cova of Fohi," used 4,000 years ago in China. The first fifteen numbers would be expressed after the Hindoo method, 1, 10, 11, 100, 101, 110, 111, 1000, 1001, 1010, 1011, 1100, 1101, 1110, 1111.

The Octonary System has been developed and favored as an ideal system in a pamphlet entitled "Octonary Numeration," by Alfred B. Taylor, Philadelphia, Pa., 1887. Also a very concise article and exposition of "Octonary Numeration," by W. Woolsey Johnson, is published in the "Bulletin of the New York Mathematical Society" for October, 1891. The "octonary multiplication table" stands thus :

1	2	3	4	5	6	7
2	4	6	10	12	14	16
3	6	11	14	17	22	25
4	10	14	20	24	30	34
5	12	17	24	31	36	43
6	14	22	30	36	44	52
7	16	25	34	43	52	61

The Duodenary System has been developed into an arithmetic and metrology and entitled, "Duodenal System of Arithmetic, Measures, Weights, and Coins," by John W. Nystrom, Philadelphia, Pa., 1875. The base is 12. Two new characters are required for the scale, thus :

An.	Do.	Tre.	For.	Pat.	Sex.	Ben.	Ott.	Nev.	Dis.	Elv.	Ton.
1	2	3	4	5	6	7	8	9	°°	∞	10
1	2	3	4	5	6	7	8	9	10	11	12

The Tonal System was developed and published in a book entitled, "The Tonal system, with Sixteen to the Base," by John W. Nystrom, Philadelphia, Pa., 1862. The system presents 16 characters. Representing the new characters by turned figures the tonal system stands thus, with the names of each :

An.	De.	Ti.	Go.	Su.	By.	Ra.	Me.	Ni.	Ko.	Hu.	Vy.	La.	Po.	Fy.	Ton.
1	2	3	4	5	6	7	8	*	9	ℓ	g	ε	ε	7	10

48. The square root of the number with the digits in reverse order $\sqrt{987654321}=31427$. The square root of the number containing the digits in regular order, $\sqrt{123456789}=11111$. The difference of these roots, discarding the decimals of each, is 20316. Now this difference squared again produces the digits, $20316^2=412739856$.

49. Equations like the following produce singular digital results :
Given $3x + 5y + 7z = 100$, to find all the different values of x, y, z , in whole numbers. The solution of this equation results that 8 values of each letter will satisfy the equation, as follows :

$x =$	31	27	23	19	15	11	7	3
$y =$	0	1	2	3	4	5	6	7
$z =$	1	2	3	4	5	6	7	8

50. The sum of the fractions having the triangular numbers for the denominators to infinity and unity for the numerators can be summed, $1 + \frac{1}{3} + \frac{1}{6} + \frac{1}{10} + \frac{1}{15} + \frac{1}{21} + \text{etc.} = 2$. In like manner the pyramidal numbers as denominators and unity as numerators $= 1\frac{1}{2}$.

51. The sum of the squares as denominators to infinity and unity as numerators, $= \pi^2 \div 6$, or $3.141592 + \frac{2}{3} \div 6 = .1644934 +$.

52. The progression of the cubes 1, 8, 27, 64, 125, etc., of the natural numbers 1, 2, 3, 4, 5, etc., possess the remarkable property, that if any number of the terms whatever, from the beginning, be added together, their sum will always be a square. $1 + 8 = 3^2$. $1 + 8 + 27 = 6^2$. $1 + 8 + 27 + 64 = 100$, and so on.

53. The problem of the alphabet being invited to dine with Z.

Z being rich, in his mansion fine,
The rest of the letters invited to dine,
For every day
Of merry May,
Whenever they choose ; but begs to fix
Conditions two that never twain
Who met at his board shall meet again,
And that never the guests be more than six,

They go in sixes, they go in fives,
Feeding as never they fed in their lives;
Then four and four,
Till the month was o'er,
And so that none
Got dinners more
Than other one.
Now show what your art is,
In naming the parties.—*T. P. Kirkham.*

Solution. The arrangement of the parties would be as follows :

FOURS.

ABKL
AFOP
AIRS
BCUV
BGXY

FOURS.

FEWY
FHTV
IDWX
IJTU
CDNP

FOURS.

CEQS
GJNO
GHQR
EJML
HDMK

FIVES.

MPRUY
MOSVX
KOQUW
KNSTY
LPQTX
LNRVW

SIXES.

BFIQMN
ACGWMT
AEHUNX
AJDQVY
BDERTG

SIXES.

BJHSWP
FJCXRK
ICHLYO
FGDLUS
IGEKVY

54. The digits can be transposed exactly *thirty* ways so that their integral square root can be extracted, as follows :

	Digits.	Roots.		Digits.	Roots.
1	139854276	= 11826 ²	17	587432169	= 24237 ²
2	152843769	= 12363 ²	18	589324176	= 24276 ²
3	157326849	= 12543 ²	19	597362481	= 24441 ²
4	215384976	= 14676 ²	20	615387249	= 24807 ²
5	245893761	= 15681 ²	21	627953481	= 25059 ²
6	254817369	= 15963 ²	22	653927184	= 25572 ²
7	326597184	= 18072 ²	23	672935481	= 25941 ²
8	361874529	= 19023 ²	24	697435281	= 26409 ²
9	375468129	= 19377 ²	25	714653289	= 26733 ²
10	382945761	= 19569 ²	26	735982641	= 27129 ²
11	385297641	= 19629 ²	27	743816529	= 27273 ²
12	412739856	= 20316 ²	28	842973156	= 29034 ²
13	523814769	= 22887 ²	29	847159236	= 29106 ²
14	529874361	= 23019 ²	30	923187456	= 30384 ²
15	537219684	= 23178 ²			
16	549386721	= 23439 ²		15400869444	661962

The formula for finding these digital squares is as follows :

$$10^8a + 10^7b + 10^6c + 10^5d + 10^4e + 10^3f + 10^2g + 10h + i \\ = (10^4p + 10^3q + 10^2r + 10s + t)^2$$

55. Rev. W. Allen Whitworth, England, proposed a problem in 1880, as follows :

Find a fraction with a prime denominator, which when expressed decimally has a recurring period consisting of the ten digits. Show that there is only *one* possible denominator, and *two hundred and forty* different numerators.

Two gentlemen, Heppel and Turriff, sent in a solution showing that the only possible denominator is 9091; that one form of decimals is 4139258607; that there is only 43280 possible combinations; that the sums of the odd and even places of digits are 17 and 28 (there being 120 each) and therefore the decimals are divisible by 11; that the first and sixth, second and seventh digits are severally equal to 9 and therefore the decimals are divisible by 99999.

With this data, it required but little calculation to find the least of the 240 numerators; and then to revolve the decimal of digits, and that developed the numerator and thus the following table was formed

TABLE OF 240 NUMBERS $\div$ 9091 GIVING THE DIGITS.

NUM.	DEC. DIGITS.	NUM.	DEC. DIGITS.	NUM.	DEC. DIGITS.
114	0125398746	1266	1392586074	3201	3521064789
115	0126498735	1268	1394786052	3209	3529864701
123	0135298647	1328	1460785392	3261	3587064129
125	0137498625	1330	1462985370	3263	3589264107
133	0146298537	1337	1470685293	3365	3701462985
134	0147398526	1340	1473985260	3369	3705862941
474	0521394786	1357	1492685073	3401	3741062589
479	0526894731	1358	1493785062	3409	3749862501
483	0531294687	1914	2105378946	3441	3785062149
489	0537894621	1915	2106478935	3445	3789462105
533	0586294137	1941	2135078649	3565	3921460785
534	0587394126	1945	2139478605	3569	3925860741
565	0621493785	1951	2146078539	3583	3941260587
569	0625893741	1954	2149378506	3589	3947860521
583	0641293587	2274	2501374986	3623	3985260147
589	0647893521	2279	2506874931	3625	3987460125
623	0685293147	2301	2531074689	3733	4106258937
625	0687493125	2309	2539874601	3734	4107358926
665	0731492685	2351	2586074139	3751	4126058739
669	0735892641	2354	2589374106	3754	4129358706
674	0741392586	2365	2601473985	3761	4137058629
679	0746892531	2369	2605873941	3763	4139258607
714	0785392146	2401	2641073589	4183	4601253987
715	0786492135	2409	2649873501	4189	4607853921
957	1052689473	2441	2685073149	4201	4621053789
958	1053789462	2445	2689473105	4209	4629853701
966	1062589374	2665	2931470685	4261	4687053129
968	1064789352	2669	2935870641	4263	4689253107
976	1073589264	2674	2941370586	4274	4701352986
977	1074689253	2679	2946870531	4279	4706852931
1137	1250687493	2714	2985370146	4301	4731052689
1140	1253987460	2715	2986470135	4309	4739852601
1146	1260587394	2823	3105268947	4351	4786052139
1150	1264987350	2825	3107468925	4354	4789352106
1176	1293357064	2841	3125068749	4474	4921350786
1177	1294687053	2845	3129468705	4479	4926850731
1228	1350786492	2861	3147068529	4483	4931250687
1230	1352986470	2863	3149268507	4489	4937850621
1246	1370586294	3183	3501264987	4533	4986250137
1250	1374986250	3189	3507864921	4534	4987350126

NUM.	DEC. DIGITS.	NUM.	DEC. DIGITS.	NUM.	DEC. DIGITS.
4557	5012649873	5902	6492135078	7841	8625013749
4558	5013749862	5908	6498735012	7845	8629413705
4602	5062149378	6228	6850731492	7861	8647013529
4608	5068749312	6230	6852931470	7863	8649213507
4612	5073149268	6246	6870531294	7914	8705312946
4617	5078649213	6250	6874931250	7915	8706412935
4737	5210647893	6266	6892531074	7941	8735012649
4740	5213947860	6268	6894731052	7945	8739412605
4782	5260147398	6376	7013529864	7951	8746012539
4790	5268947310	6377	7014629853	7954	8749312506
4812	5293147068	6412	7053129468	8114	8925310746
4817	3298647013	6417	7058629413	8115	8926410735
4828	5310746892	6422	7064129358	8123	8935210647
4830	5312946870	6426	7068529314	8125	8937410625
4882	5370146298	6646	7310526894	8133	8946210537
4890	5378946210	6650	7314926850	8134	8947310526
4902	5392146078	6682	7350126498	8376	9213507864
4908	5398746012	6690	7358926410	8377	9214607853
5328	5860741392	6722	7394126058	8412	9253107468
5330	5862941370	6726	7398526014	8417	9258607413
5337	5870641293	6737	7410625893	8422	9264107358
5340	5873941260	6740	7413925860	8426	9268507314
5357	5892641073	6782	7460125398	8466	9312506874
5358	5893741062	6790	7468925310	8468	9314706852
5466	6012539874	6812	7493125068	8502	9352106478
5468	6014739852	6817	7498625013	8508	9358706412
5502	6052139478	7137	7850621493	8522	9374106258
5508	6058739412	7140	7853921460	8526	9378506214
5522	6074139258	7146	7860521394	8557	9412605873
5526	6078539214	7150	7864921350	8558	9413705762
5646	6210537894	7176	7893521064	8602	9462105378
5650	6214937850	7177	7894621053	8608	9468705312
5682	6250137498	7733	8506214937	8612	9473105268
5690	6258937410	7734	8507314926	8617	9478605213
5722	6294137058	7751	8526014739	8957	9852601473
5726	6298537014	7754	8529314706	8958	9853701462
5828	6410735892	7761	8537014629	8966	9862501374
5830	6412935870	7763	8539214607	8968	9864701352
5882	6470135298	7823	8605213947	8976	9873501264
5890	6478935210	7825	8607413625	8977	9874601253

Sum of the 240 numerators = $9091 \times \frac{1}{2}(240) = 1090920$.

Sum of the decimal digits = $(45 \times 240) + (1234567890 \times 972) = 1,199,999,999,880$.

56. The digits have been arranged into common fractions so as to be reduced to $\frac{1}{2}$, nine ways ; $\frac{1}{3}$, two ways ; $\frac{1}{4}$, four ways ; $\frac{1}{5}$, ten ways ; $\frac{1}{6}$, three ways ; $\frac{1}{7}$, six ways ; $\frac{1}{8}$, twenty-eight ways ; $\frac{1}{9}$, four ways, as follows :

$$\begin{array}{cccccccc} \hline 6729 & 7293 & 7329 & 6792 & 9273 & 6927 & 9267 & 7932 & 9327 \\ \hline 13458 & 14586 & 14658 & 13584 & 18546 & 13854 & 18534 & 15864 & 18654 \\ \hline \end{array} = \frac{1}{2}$$

$$\begin{array}{cc} \hline 5832 & 5823 \\ \hline 17496 & 17469 \\ \hline \end{array} = \frac{1}{3}$$

$$\begin{array}{cccc} \hline 4392 & 5796 & 7956 & 3942 \\ \hline 17568 & 23184 & 31824 & 15768 \\ \hline \end{array} = \frac{1}{4}$$

$$\begin{array}{cccccccccc} \hline 2769 & 3297 & 2697 & 2973 & 6297 & 3729 & 2967 & 9627 & 9237 & 9723 \\ \hline 13845 & 16485 & 13485 & 14865 & 31485 & 18645 & 14845 & 48135 & 46185 & 48615 \\ \hline \end{array} = \frac{1}{5}$$

$$\begin{array}{ccc} \hline 2943 & 5697 & 4653 \\ \hline 17658 & 34182 & 27918 \\ \hline \end{array} = \frac{1}{6}$$

$$\begin{array}{cccccc} \hline 2394 & 2637 & 4527 & 5274 & 5976 & 7614 \\ \hline 16758 & 18459 & 31689 & 36918 & 41832 & 53298 \\ \hline \end{array} = \frac{1}{7}$$

$$\begin{array}{cccccccccc} \hline 3187 & 4589 & 4591 & 4691 & 4769 & 5237 & 5371 & 5839 & 5916 & 7123 \\ \hline 25496 & 36712 & 36728 & 37528 & 38152 & 41896 & 42968 & 46712 & 47328 & 56984 \\ \hline 7312 & 7421 & 7416 & 7941 & 8419 & 8932 & 8954 & 8174 & 9156 & 9158 \\ \hline 58496 & 59368 & 59328 & 63528 & 67352 & 71456 & 71632 & 65392 & 73248 & 73264 \\ \hline 9182 & 9316 & 9321 & 9352 & 9421 & 9531 & 9541 & 9523 & & \\ \hline 73456 & 74528 & 74568 & 74816 & 75368 & 76248 & 76328 & 76184 & & \\ \hline \end{array} = \frac{1}{8}$$

$$\begin{array}{cccc} \hline 6331 & 6471 & 7243 & 8361 \\ \hline 57429 & 58239 & 65187 & 75249 \\ \hline \end{array} = \frac{1}{9}$$

MISCELLANEOUS

NOTES AND QUERIES,

WITH ANSWERS.

"Listen to him who shows himself ready to be instructed by others."
—ZENODOTUS.

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No. 2.

A New Chapter in Theosophy.

The papers published in NOTES AND QUERIES on the *Wisdom-Religion* are interesting reading, and lead me to make a few remarks on that branch of the science which covers the reincarnation problem, or rather, I should say, on a yet unwritten chapter in Theosophy to account for the law of sex.

In Genesis we read (Gen. 1, 27) : "In the image of (like unto) God, male and female created (formed) He them" ; and this distinctly intimates that both the man and the wo(mb)man were formed in the likeness of God, or similar to Him in Being, and that what are called the Fatherhood and Motherhood of God being oneness in the divine nature, were for purposes of increase and reproduction, divided between two Representatives. Such division implies also the assignment of the distinct attributes of the All-Father to the man as an Earth Father, and the distinct attributes of the All-Mother to the woman as the Earth Mother.

Note the expression (Gen. 1, 26), "Let *us* make man." In God the twain are one Spirit ; in man the twain are one flesh.

Man is what woman is not, and woman is what man is not. That which is *one* in the divine, has to *become* one in the natural, sometime in the future, and so thoroughly does this sex impression pervade nature that even every curve is a *duo in uno* (concavo convex in form)

having one leading feature of sex, in common with all animated life. A common saucer will illustrate the fact. Pour water into it, and it shows the female nature in its receptivity. Turn it over and pour water on the convex side, and it shows the male nature by dispersion.

Now if we allow our minds to take a step further we shall perceive a logical reason for what the Theosophist claims, viz. : that reincarnation is the great necessity of the soul's progress, and that the grand design is, ultimately to reunite these "halves of God" through knowledge gathered by a long series of experiences. Refer to Genesis II, 9.

If we take another step forward, we realize that this divine and ultimate union, *must*, since man's mission (Pet. I 1 18) is to grow in favor with the "us" of God, and into a (perfect) knowledge of the Lord, be subject to alternate (male and female) incarnation.

Man must experience what woman is, and woman must experience what man is by exchangeable incarnations, before either can present worthily at the court of Heaven (Heb. VII, 26) holy, harmless and undefiled. Reference might be made here to Matthew XXII, 30, to Mark XII, 25, and to Luke XX, 35, where it is stated that in Heaven there is no marrying nor giving in marriage, because the condition of perfected spirit, is, as is, "the angels of God;" that is, of neither sex separately, but in true likeness to, and at-one-ment with, the Great All-Father and Mother. We cannot reason however that mere alternations of sex in the reincarnating process, would make the true advances required to become perfect, for man (to be up to the full stature of man) may require to be made over and over many times before he is worthy to put on the "wedding garment," and woman in like manner may have to reach a far higher standard of womanhood before she attains to womanly perfection, or completes *her* moiety of development, but there is endless duration to accomplish all that man is destined to become, and all time to reveal the true and glorious image and likeness of the One Father God.

Man is God's idea, and as such cannot return to Him void (imperfect) but must accomplish that whereunto it was sent forth, however long it may take, or whatever difficulties may bar its progress.

If we have to gain knowledge by experience and put it to good use, we have hold of the lever of an advancement to perfection, and how much wiser it would be to divinely regulate our present incarnation

for the sake of its improvement, than as Gray expresses it, "waste Life's sweetness on the desert air."

What Paul taught the Philippians (*cir.* A. M. 4066) holds good today as a grand lesson in ethics, and if the road to perfection is through the green fields cropped by Theosophy, and the law of progress is read in advancing reincarnations, then let us seek with Paul (Phil. iv, 8), whatsoever is true, whatsoever is venerable, whatsoever is in accord with Justice, whatsoever is pure, whatsoever is Love-lit, whatsoever is by true report good, and obey these precepts all our life, and let us heed the Pauline recommendation to "think on these things," for our stature can thus be built up and our future desires made to accord with our final destiny, which is to worthily range ourselves in the line of the full alphabet of Love and Truth somewhere according to our letter on the roll-call between the Alpha and Omega (Rev. i, 8) of Eternal Life, without beginning or ending, and find rest in the arms of Him which was and which is, and which ever will be, The Almighty.

C. B. B, Vineland, N. J.

NEPHELOCOCCYGIA. (Vol. IX, p. 120.) *Nephelococcygia* is a word found in "The Birds" of Aristophanes, a comedy intended as a satire on Athenian frivolity and credulity, or building castles in the air, and that dreaming expectation of a life of luxury and ease, in which the great mass of the Athenians of that day indulged. The word means "cloud-cuckoo-town," and was imagined to have been built in the clouds by cuckoos. It occupied the whole horizon, and was designed to cut off the gods from all connection with mankind. The word occurs in the *Veræ Historæ* of Lucian, a romance written probably in the age of M. Aurelius Antoninus. Macaulay and Mrs. E. B. Browning also use the word.

NEPHELOCOCCYGIA. (Vol. IX, pp. 120.) A medical or surgical term, from *Nephelo*, from *Nepheloid*, from two Greek words meaning a cloud-and-a-resemblance. *Coccygia*—referring to *Coccyx*—the assembly of small bones (generally consisting of four) attached to the lower part of the sacrum; or, to *coccygeus*, a muscle, arising from the spinous process of the ischium and inserted into the extremity and lateral border of the *coccyx*. (See *Dunglison's Medical Dictionary*.)

H. G. GOODALE, Jamaica, N. Y.

MASTERS ELECT OF NINE—ILLUSTRIOUS ELECT OF FIFTEEN. (Vol. IX, p. 120.) Masters Elect of Nine; also called Elected Knights; Elect of Nine; Elected Knights of Nine (Elu- in French Rite), was created by King Solomon, as a reward to the nine Fellow Crafts, for their services in rewarding and bringing to justice the first of the three assassins of Hiram. The meetings (called Chapters) were held in the audience chamber, composed of nine members, has nine lights, battery nine, and age nine years.

Illustrious Elect of Fifteen; also called Elected Knights of Fifteen, is a continuation and conclusion of the previous degree; the Chapter has fifteen lights; only fifteen are allowed present at a reception; fifteen are sent to arrest the two remaining assassins and commence their journey on the fifteenth of the month. H. G. GOODALE.

SEXAGESIMA SUNDAY. Why are the Latin numeral words applied certain Sundays in each year? LILLIAN.

Sexagesima Sunday is 60 days before Easter. In all such ecclesiastical terms as Quadra-, Quinqua-, Sex-, Septuagesima (Sunday), the week is reckoned as a ten-day week, because the octave and the two eves equal 10. Thus,

1 eve of Sunday, 2 Sunday, 3 Monday, 4 Tuesday, 5 Wednesday, 6 Thursday, 7 Friday, 8 Saturday, 9 Octave, Eve, and 10 Octave.

So in music, 7 notes with the octave of the first note we call an octave, and the 3 days of the entombment were one eve of Saturday, 2 Saturday, 3 eve or Sunday.

THE CHINESE BIBLE. What is the real Chinese Bible? OLAF.

The Chinese Scriptures were compiled and partly composed by Confucius, divided into five books, namely :

1. The Yi-King, a treatise on cosmogony.
2. Shu-King, the acts and maxims of Yao, Shun, and other ancient kings held in religious veneration.
3. Shi-King, which contains 311 sacred poems.
4. Ee-King, the book of rites, containing maxims and directions for everyday life and all conditions of men.
6. Chun-Tsien, a history of Confucius's own time.

CHILDERMAS. We have Christmas (December 25), and Michealmas (September 29); but what and when is Childermas? OLAF.

Childermas is the same as the Holy Innocents, and is commemorated on December 28. The coronation of Edward IV was put until Monday because the preceding day was Childermas.

DEO JUVANTE. The expression Deo Juvante implies, *Help from God*. The Encyclopædia Britannica states the word "God" was originally (in pre-historic times) = Helper. Can you trace it to this meaning? In II Kings xiv, 26, Israel was without a *helper*, that is, God-forsaken. In Psalm lrv, 4, there is what seems to be an incorporated note of explanation, *God* is (or means) my helper, and in Hebrews xiii, 6, are the words, "The Lord is my helper." C. B. B.

SISTREN. Chaucer has the plural word *sistren* as the companion word to brethren. For what reason, do you suppose, is it obsoleted (expunged from the language) in Webster's International Dictionary? The Episcopal service begins with: Dearly beloved *Brethren*, the Scriptures moveth *us* in sundry places etc. Now since Scripture moves the devotional Sistren as certainly as the habitual Brethren, why are they left out of the admonition and thus ignored by the Prayer Book?

The sistren of the woman's rights movement should ventilate the man-monopoly of Scripture influence and threaten Webster with Topheth. C. B. B.

THE SHAKESPEARE CIPHER. In 1886 Ignatius Donnelly, of Hastings, Minn., gave out that he had discovered by ciphers that Lord Francis Bacon was the author of the plays attributed to Shakespeare. The cipher he referred to consisted of the blunders in pagination, hyphenation, bracketing of the great folio edition of 1623, to which must be added capitalising words without any ostensible reason (thus the word Bacon is capitalized even in such compounds as "Bacon-fed"), and in the use of Italics. In regard to italic words, Mr. Donnelly says:

"In I Henry IV, there are 7 italic words in the first column, p. 53; by multiplying these to ciphers we get $53 \times 7 = 371$, and the 371st word is Bacon. Again. On p. 67 of the same play the first column contains 6 words in italics, and $67 \times 6 = 402$, which word is St. Albans."

In this sort of way Mr. Donnelly reads a minute history of Lord Bacon in cipher, and affirms that all the blunders and irregularities of the printed plays were designed. The secret writing was adopted out of fear of the jealousy of Queen Elizabeth, who looked upon some of the plays as no less than treason, for example, Richard II.

Has Mr. Donnelly's work on the Shakespearean cipher been suppressed or called in? or is the volume high priced? A. O.

THE CAXTON SOCIETY. It is stated that the Caxton Society was formed in 1845 and existed till 1854, and published sixteen volumes of literature of the middle ages. This society was named in honor of William Caxton (1412-1491), the first English printer. What were the titles of these 16 volumes? TYRO.

CARY (ALICE AND PHEBE). — ORTHOGRAPHY. (Vol. IX, pp. 118.)

CARY.

Allibone, supplement, 1891.
 Appleton's Cyclopædia, biography.
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 Adams, Oscar F., Am. Authors.
 Derby & Jackson, publishers, N.Y.
 Hurd & Houghton, pubs., N. Y.
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 1861, probably taken from Allibone, 1859.

DEXTER.

We are here reminded as well as
 in the article following this para-
 graph, of the errors in many of
 the dictionaries, cyclopædies, etc.

HANNAH F. GOULD'S BIRTHPLACE. (Vol. IX, p. 97.) Allibone's Dictionary of Authors, 1859, Vol. I, p. 712, gives the birthplace of Miss Gould as "Lancaster, Vermont," as stated in NOTES AND QUERIES. Her birthplace is claimed to have been Lancaster, Mass.; born September 3, 1789; died September 5, 1865; being one of ten children of Benjamin and Grizzel Apthorp (Flagg) Gould. She was named Hannah Flagg from her grandmother Hannah (Pitson) Flagg. Four of the ten children received the name Flagg for a middle name, John, Grizzel, Hannah, and Gershom. The other six were Esther, Benjamin Apthorp, Rebecca, Sarah, Mary, and Elizabeth.

Lippincott's Gazetteer and Thompson's History of Vermont give no town in Vermont by the name of Lancaster.

"THE RECUELL OF THE HISTORY OF TROYE." (Vol. IX, p. 23.) According to John Munsell's "Every Day Book of History and Chronology," p. 368, this book was printed at Cologne, and published September 19, 1471, being the first known book printed in the English language.

"THE GAME AND PLAYE OF CHESSE, 1474." It is claimed that this book was the first book printed in England, the year of William Caxton's return from France. Other authorities give as the first book certainly printed in England, "Dictes and Notable Wise Sayings of the Philosophers, 1477."

Letter from the Editor of "The Coming Man."

I am sorry that you advocate a delusion of the devil called Theosophy, a big word from the Greek to cover a lie, an idle supposition, a mere dogma, destitute of all proof. It is a system of belief involving no moral obligation, requiring the keeping of no commandment, and therefore mere lawlessness. There is no possibility of classing the religion of Christ with any other, seeing it is *opposed* to all others and claims to be the only *true* religion. It has an irresistible evidence of truth, righteousness, godliness, prophecy, which no reasonable man can reject, appealing to our reason and understanding making, us perfectly pure in heart and life, as I have experienced (once an infidel). Please send no more of your magazines. I do not read it; but only glance at its headings. O turn to the living God from these delusions that entrap men thinking themselves wise and learned, puffed up with pride and conceit, with the cunning puzzles of mathematicians, and the lies in big words of man's science. God calls man in his fallen state a fool and wicked. I will give you a proof of the truth of our religion. On May 15, next, a bloody war will break out here; for so the Lord has revealed it to me. Lawlessness will triumph, but the Lord's people will escape to a place of refuge and be fed and guarded by angels. I am a man of revelations and visions, living near to God for especially the last 25 years. Seek repentance and the hatred of sin, and the pure heart from God through Christ Jesus, that you may lead the similar perfect life and so enter the Lord's kingdom. Put away all vain knowledge called philosophy and science. Be humble as a little child, and flee to Christ from refuge, for the storms of anarchy that will desolate this our land.

A. M'INNES.

204 Dumbarton Road, Glasgow. Scot, April 19, 1892.

This message comes to us all on a postal card of the ordinary size, and in a remarkably fine and close hand of leaning chirography.

We shall be charitable and say but a few words in reply to our brother editor. We publish this journal to give information, not to advocate pet doctrines or dogmas. The word *Theosophy* is from *Theos*, God, and *Sophiia*, Wisdom; two Greek words. Theosophy is not a "big word," as he says, but a smooth euphonious word, found throughout the Bible; often used by St. Paul and the apostles, *Theou sophian* (I Cor. i, 24). (See also Luke ii, 49; Eph. iii, 10; I Cor. i, 21, etc.) The articles on Theosophy are from the pens of several writers giving their views on the wisdom-religions each from his own standpoint.

Brother M'Innes told us April 19, 1892, that a bloody war was to

break out on May 15, 1892, but our foreign advices at that time did not announce such news to substantiate that he had such a revelation.

We never experienced his infidelity, but have been a seeker and for truth wherever found, which is mighty and will prevail.

We have exchanged our brother editor's organ, "The Coming Man," from his first number, and have perused his doctrines, and have been amused at his explanation of physical phenonema. Any of our readers can have a package of his papers by forwarding their address and some stamps for the prepayment of postage.

THE THORN OF WINEER. (Vol. IX, 120.) A reference to Wm. D. Whitney's works, in the chapter on "Cox's Aryan Mythology," p. 161, he says of Mr. Cox's inconsistency in the interpretation he gives to mythic elements :

"The poisoned robe of Dejanira, in which Hercules expires, is sometimes the mantle of the cloud in which the sun sinks to rest at the close of the day ; at another time, it is the representative of ' the piercing rays which burn in the tropical noon-day ' ; and yet again, the boar's tusk, which cuts short the life of Adonis, and ' reappears in the myth of Odysseus, is but the *thorn of winter*, and the poisoned robe of Herakles.' (?) The 'thorn of winter,' namely, because the death of summer, under the baleful influence of winter, is not only inseparably connected with the overwhelming of day by night, so that either can be substituted for the other to help out an interpretation, strangely enough, the destroying power is most fitly represented by the fatal weapon which wounds the hero in one invulnerable spot."

Abou Ben Adhem.

Abou Ben Adhem, (may his tribe increase !)
Awoke one night from a deep dream of peace,
And saw within the moonlight in his room,
Making it light and like a lily in bloom,
An angel writing in a book of gold ;
Exceeding peace had made Ben Adhem bold,
And to the Presence in the room he said,
"What writest thou ?"—The vision raised its head,
And, with a look made of all sweet accord,
Answered—"The names of those who love the Lord."
"And is mine one ?" said Abou ; "Nay, not so,"
Replied the angel.—Abou spoke more slow,
But cheerly still ; and said, "I pray thee, then,
Write me as one who loves his fellow-men."
The angel wrote, and vanished. The next night
It came again, and a great wakening light,
And showed the names whom love of God had blest—
And, lo ! Ben Adhem's name led all the rest !—*Leigh Hunt.*

SERIES.—BONDS.

By B. F. Burleson, Onelda Castle, N. Y.

[FOURTH PAPER.]

A nation, state, county, township, or incorporated town, having an assessed valuation of property within its boundaries, and subject to taxation, may, by the consent of its taxable inhabitants, or their delegated representatives, borrow money to defray expenses incurred for the public welfare of the people embraced within its limits, and issue bonds or promises to pay at some future time, the same as individuals who give their note of hand for sums they wish to borrow.

This privilege, however, has been so often used to the detriment of localities that it is now subject to the sanction and consent of the higher legislative bodies of the state before it can be resorted to.

The nation in our civil war was forced to borrow many millions of dollars to defray its expenses, and to issue its notes or bonds in promise of future payment. So states, cities, and towns find it a very convenient way to obtain ready money for doing the same thing. Hence capitalists find a very safe and easy way of investing their money by purchasing such bonds. As a general rule the more people one can render liable for the repayment of money loaned, the safer is the transaction. For this reason United States bonds are the safest security that capitalists can obtain, for over 60,000,000 of people are pledged to their payment from money arising from revenues or direct taxation. As a rule the safer the paper a person receives for his money, the less will be the rate of interest he is willing to accept for its use. For this reason the rate of interest on our national bonds is very low, and has gradually been growing less and less since the dangerous period of our civil war. Starting out by paying six per cent. annual interest when we hardly knew how the conflict would end, and even bought at that rate many times with a large discount, the nation had hard work to find purchasers. But as we grew stronger and more united the rate has gradually fallen lower and lower, until now these bonds have been refunded or replaced by others that bear no higher rate than from $2\frac{1}{2}$ to $3\frac{1}{2}$ per cent. per annum interest, and many times, even at these low rates, sell at a premium. The interest on bonds is payable semi-annually. A \$1,000 five per cent. bond, due in ten years, has twenty coupons attached, of the value of \$25 dollars each, the interest for each six months of the principal from the date of issue to maturity. These are severally detached and paid as they fall due in regular order. Hence the rate of interest specified in bonds is in reality a semi-annual one of half that which is specified in it.

Government and other bonds have been issued in such vast amounts, and have become such a safe medium for securities in our banking and other systems of trust, that it is the great problem of the day to know how we can do business in our advanced stage of wealth without them; that is, when they have all fallen due, and been paid, how shall we do business with safety and confidence? But it is our task to deal with problems of another class than this, which we will now proceed to.

It has been one of the hardest problems relating to bonds, and one which has lately been very much discussed, to know what per cent. a person will really receive for the use of his money when he purchases bonds at a premium, or a discount, that bear a certain rate per cent. on their faces. Bankers and brokers have tables showing this. Their results are based on the assumption that the income or interest money arising from bonds is not to be reinvested in determining the rate per cent. that will be realized on their purchase, which is probably the correct view to be taken.

We will solve a set of problems in the different cases according to the view and rules established by bankers.

PROBLEM 9.

What should I pay for a \$1,000 bond due in ten years, with interest at five per cent., payable semi-annually, to make it a ten per cent. investment?

SOLUTION.

Put $a = \$1,000$, the face of the bond; $r = 2\frac{1}{2}\%$, the rate of semi-annual interest on it; $R = 10\%$ the annual rate of interest desired to be realized on its purchase; and $t = 20$, the number of six months coupons attached to it. Let S = the purchase price of the bond. It is very obvious that the semi annual rate $R_1 = \sqrt[2]{1+R} - 1 = .048809$ is the same as the annual rate of $R = 10\%$, for if any sum of money be placed at this semi-annual rate of R_1 , and compounded for one year, the interest will be the same as though it bore the annual rate R .

At the end of the first six months the purchaser will have due him, $S(1+R_1) - ar$; at the end of the next, $S(1+R_1)^2 - ar(1+R_1) - ar$; and at the end of t such periods,

$$\begin{aligned} S(1+R_1)^t - ar[(1+R_1)^{t-1} + (1+R_1)^{t-2} + \dots + 1] \\ = [\text{by summing the series within the brackets, etc.,}] \\ = S(1+R_1)^t - ar[(1+R_1)^t - 1] \div R_1. \end{aligned}$$

This sum due the purchaser at the maturity of the bond must be equal to its face value, that is, a . Resolving the equation thus obtained for S , we have,

$$S = \frac{aR_1 + ar(1+R_1)^t - ar}{R_1(1+R_1)^t} \quad (a)$$

Substituting numerical values in equation (a), and solving by the aid of logarithms, we find that $S = \$700.2775$. *Answer.*

PROBLEM 10.

What annual rate of interest will the purchaser receive on his investment if the bond in Problem 9 be bought for \$800?

SOLUTION.

Resolving formula (a) for R_1 , we get by taking logarithms,

$$\log(SR_1 - ar) + t \log(1 + R_1) = \log a + \log(R_1 - r) \quad (b)$$

Substituting numerical values in (b), it becomes,

$$\log(800R_1 - 25) + 20 \log(1 + R_1) = \log 1000 + \log(R_1 - .025) \quad (c)$$

Solving equation (c) by Double Position with the aid of a table of logarithms, we find very accurately that $R_1 = .0396734$, the semi-annual rate received. But $R = R_1^2 + 2R_1$. $\therefore R = .0809208$, the annual rate. *Answer.*

PROBLEM 11.

What annual rate of interest will the purchaser receive if the bond in Problem 9 be bought for \$1200?

SOLUTION.

Changing the signs of the first and last terms in equation (b) to adapt it to positive results, and for bonds bought at a premium, we have,

$$\log(ar - SR_1) + t \log(1 + R_1) = \log a + \log(r - R_1) \quad (d)$$

Substituting numerical values in (d), we have,

$$\log(25 - 1200R_1) + 20 \log(1 + R_1) = \log 1000 + \log(.025 - R_1) \quad (e)$$

Resolving equation (e) as in Problem 10, we obtain very accurately $R_1 = .013523$, the semi-annual rate. $\therefore R = R_1^2 + 2R_1 = .0272296$, the annual rate required.

PROBLEM 12.

Required the face of a 5 % bond, having ten years to run, which being bought for \$500 shall yield the purchaser an annual income of 7 %?

SOLUTION.

Resolving equation (a) for a , we obtain,

$$a = \frac{SR_1(1+R_1)^t}{R_1 - r + r(1+R_1)^t} \quad (f)$$

Substituting in equation (f) $S = 500$, $r = .025$, $t = 20$, and $R_1 = \sqrt{(1.07) - 1} = .034408$, we obtain $a = \$577.6466$. *Answer.*

PROBLEM 13.

What per cent. of interest must a \$1000 bond bear having ten years to run, which upon being bought for \$900, shall yield the purchaser an annual income of 6 %?

SOLUTION.

Resolving equation (a) for $2r$, we obtain,

$$2r = \frac{2R_1[S(1+R_1)^t - a]}{a[(1+R_1)^t - 1]} \quad (g)$$

Substituting in equation (g), $S = 900$, $a = 1000$, $t = 20$, and $R_1 = \sqrt[20]{(1.06) - 1} = .029563$, we obtain $2r = .045737$. *Answer.*

PROBLEM 14.

How many years must a \$1000 5 % bond run, in order that if it be purchased for \$700, it shall yield the purchaser an annual income of 8 %?

SOLUTION.

Resolving equation (b) for $\frac{1}{2}t$, we obtain,

$$\frac{1}{2}t = \frac{\log a + \log(R_1 - r) - \log(SR_1 - ar)}{2\log(1 + R_1)} \quad (h)$$

Substituting in equation (h), $S = 700$, $a = 1000$, $r = .025$, and $R_1 = \sqrt[20]{(1.08) - 1} = .0392305$, we obtain $\frac{1}{2}t = 22.81253$ years. *Answer.*

When bonds are bought at a premium observe to solve formula (d) for $\frac{1}{2}t$.

There is another method of solving this class of problems, which, it is thought by many, should be adopted. It is claimed that a certain and uniform portion of each coupon, when bonds are bought at a premium for instance, should be set aside as a sinking fund for the reimbursement of the premium paid when the bond matures. The balance of the coupon only must be considered as the semi-annual interest received on the investment. This net interest divided by the investment will give the rate per cent. of semi-annual interest received by the purchaser. This method is indisputably correct. We will give the solution of Problem 11 by this process, as it is interesting, and we wish to show that both methods are co-identical.

SECOND SOLUTION OF PROBLEM 11.

The sinking fund deposits may draw interest either simple or compound, or they may lie idle just as the depositor can arrange it. Hence there are three cases in this method of solution which may be condensed into two, namely; (1), when the sinking fund deposits are

invested at a certain rate R_s of simple interest ; and (2), when they are invested at a certain rate R_c of compound semi-annual interest.

Case I. Put $B = \$1000$, the face value of the bond ; $P = \$200$, the premium paid on it ; $R = .05$, the rate of interest ; and $t = 20$, the number of coupons attached to it. Let $A =$ that portion of each coupon that is set aside as a sinking fund ; and $r =$ the required rate per cent. received semi-annually on the investment.

We have, by adding the amounts of the sinking fund deposits from the time they are made to the maturity of the bond,

$$[(t-1)AR_s + (t-2)AR_s + \dots + AR_s] + tA = [\text{by summation}] \\ = t^2 AR_s - \frac{1}{2}t + tA = P. \therefore A = \frac{P}{t[(t-1)R_s + 1]}.$$

Hence the required rate per cent received semi-annually on the investment becomes, $r = \left[\frac{BR}{2} - \frac{P}{t[(t-1)R_s + 1]} \right] \div (B+P) \dots (A)$

When $R_s = 0$, the sinking fund deposits draw no interest, and formula (A) reduces to $2r = 2 \left[\frac{BR}{2} - \frac{P}{t} \right] \div (B+P) = 2\frac{1}{2} \% \text{ Ans. } \dots (B)$

When $R_s = 5 \%$, we obtain $2r = 3\frac{3}{4} \% \text{, etc., etc.}$

Case II. By adding the amounts of the sinking fund deposits, when they draw compound interest, we have the geometrical series,

$$A[(1+R_c)^{-t} + (1+R_c)^{-t+2} + \dots + (1+R_c)^{-1}] = [\text{by summation}] \\ = \frac{A[(1+R_c)^t - 1]}{R_c} = P. \therefore A = \frac{PR_c}{(1+R_c)^t - 1}.$$

Hence the required rate of compound semi-annual interest received on the investment becomes $r = \left[\frac{BR}{2} - \frac{PR_c}{(1+R_c)^t - 1} \right] \div (B+P) \dots (C)$

When $R = 0$, that is, when the sinking fund deposits draw no rate of compound interest, formulæ (A) and (C) ought to reduce to identical results. When $R_c = 0$, we have for the value of the second term within the brackets of formula (C) $\frac{0}{0}$, an illusory value. Hence by the calculus the term may be evaluated by dividing the differential of its numerator by the differential of its denominator, and repeating the process until it gives a definite value. Doing this we obtain by one

$$\text{differentiation : } \frac{P}{t(1+R_c)} = [\text{when } R_c = 0] = \frac{P}{t}.$$

$\therefore$ When $R_c = 0$, $2r = 2 \left[\frac{BR}{2} - \frac{P}{t} \right] \div (B+P) = 2\frac{1}{2} \% \text{, the same as in Case I as it ought to be.}$

When $R_c = r$, that is, when the purchaser of the bond realizes the

same interest on his sinking fund deposits that he realizes on the purchase of his bond, formula (C) will reduce to

$$r(B+P) = \frac{BR}{2} - \frac{Pr}{(1+r) - 1} \quad (D)$$

Substituting in (D), $B = \$1000$, $P = 200$, $R = .05$, and $t = 20$, clearing of fractions, and taking logarithms, we readily obtain the equation,

$$\log(25 - 1200r) + 20\log(1+r) = \log 1000 + \log(.025 - r) \quad (E)$$

Comparing (E) with formula (e) in the first solution of this problem observing in our different notation that r is co-identical with R_1 in (e), it will be seen that both solutions give the same result, and the much disputed question of which is correct is settled, as both methods give the same answer.

WANTED. For several years, about 1820 to 1830, there existed an organization known as the "Mathematical Club of the City of New York," holding regular meeting, and discussing mathematical subjects. The papers read and problems discussed were published and entitled "The Exercises of the Mathematical Club of the City of New York." Where can a copy of these "Exercises" be obtained?

The following question was proposed at one of the meetings of the Club, by James Ryan :

"Required to know if the cube root of $2\sqrt{7} + 3\sqrt{3}$ can be found by the rule given by Newton, 'Universal Arithmetic,' page 139, for extracting any root of a binomial surd; and if not, to show where that rule fails, and what change is to be made in it, so as to obtain the root."

Robert Adrain LL.D, ably investigated the subject, and he found the rule not only to fail in this, and in a variety of other examples, and also discovered the defect in the rule.

AMERICAN POSTAGE STAMPS.—THE GEORGE WASHINGTON HEAD TRANSFER. (Vol. VIII, pp. 407.) In enumerating the twelve American postage stamps, you omitted to note the changes made in the 2's and 3's. Did George Washington change places with Andrew Jackson, or has the 3-cent some other worthy's head upon it? Give the time of this change and the reason for it.

C. B. BAGSTER.

The denominations and heads on the American postage stamps as published in Vol. VIII, p. 407, were taken from E. Cobham Brewer's "Historic Note-Book," p. 24. Who can give the information desired by this correspondent?

Death of Prof. Fernando C. Hathaway.

Prof. F. C. Hathaway died at his father's residence in Hardwick on July 6, 1873.

He was the son of Loam Hathaway and was born in Calais, Aug. 29, 1844, and was therefore only 29 years of age. His father was a thrifty farmer who, while bringing up quite a family, planted a farm in the wilderness and made himself independent by industry, frugality, and strong native sense. His son Fernando Cortez worked on his father's acres, attended district school and early exhibited a strong love for books. Having completed his preparatory course at the Hardwick Academy, he entered Dartmouth College in 1864, and graduated among the first of his class in 1868. He was a born instructor and wisely chose teaching his appropriate work. His first year of teaching was spent in his old academy in Hardwick, where in February, 1869, he married Hattie J. Woodbury, and leaves as the seal of this marriage one little daughter, only a few months old.

In the fall of 1869 he became permanently connected with the People's Academy at Morrisville and continued this connection to the end of his life.

This institution has steadily increased in patronage under his faithful labors and wise management.

A thorough scholar, devoted to his work, he was, as might be expected, the master of his art. Modest and unassuming, he won the esteem and respect of his pupils and the good will and affection of all. His appointment last fall as member of the State Board of Education was an honor justly bestowed upon one of her most promising sons.

The key note of his success was his thoroughness, applied first to himself and then to his scholars. He hated caste, pretense and shams. Solid merit alone could stand before his faithful examinations. Everybody came to believe that what he called "wheat" was the pure article, and that what he called "chaff" might as well be tumbled into the yard. Every teacher knows that thoroughness and fidelity in his calling are one and inseparable. So it was with the deceased. With a large and active brain resting like a luminous dome upon a slight frame, he has thus early died—a martyr to his thoroughness and fidelity as a teacher. What wonder then that so many of his pupils, neighbors, and acquaintances mourn his loss as one of their own household. A light has gone out of this world to shine with greater brilliancy in a better. He has gone—a beloved son and brother—a devoted husband and father—a faithful teacher and worker—in whom the elements were so mixed that all the world might say, "Here was a *man*!"

Sermon Preached at "Ammuskeeg-Falls." 1739.

The first printed sermon preached within the limits of what is now Manchester, N. H., was at "Ammuskeeg-Falls, in the Fishing Season, 1739," by Rev. Joseph Secombe, of Kingston, N. H., a gentleman of good attainments, eccentric habits, and extremely fond of fishing. It was his custom annually, with other gentlemen, to visit the Falls for recreation and diversion. At such times he preached on Sunday to the natives and others settlers and visitors. One of his sermons was printed in Boston in 1743, and dedicated to the "Honorable Theodore Atkinson, Esq.," of Portsmouth, N. H., who was one of his hearers. Copies of the printed discourse have become very scarce, only five perfect ones being known to exist. It has been thought advisable to reprint the same as an appendix to this number of NOTES AND QUERIES, and preserve it from oblivion. With the exception of the modern s for the former long f, the same appears *verbatim, literatim, et punctatim*. The quotation on its title-page contains the name "Moniack," of which Potter's "History of Manchester," says:

"Moniack, one of the names applied to the Merrimack by the Indians, from the fact that it contained a great many islands. The literal meaning of Moniack is 'Island-place' — it being a compound word from the Indian nouns *Mona* (island) and *Auke* (place)," (p. 721).

"*Namaoskeag*," or as called by the English, and now written, *Amoskeag*, has been a noted place for centuries. The terminals *oog*, *ook*, and *uk*, written by the English *auke*, or *ook*, were used by the Indians to represent a *place* or *spot* of land or water; and *eag*, *ee*, and *ek*, written by the English *eag*, *ek*, and *ic*, were the terminals used by the Indians, to represent *long* or *extended* places of water. Thus *Namaos* means a *fish*, and compounded with *eag*, with the *k* thrown in for the sake of sound, becomes the Indian derivative noun, *Namaoskeag*, a *long and continued place of water for fish*, and was doubtless applied by the Indians to that part of the Merrimack river consisting of *falls*, *rapids*, and *ripples*, extending from the Skowhegan in Merrimack, to Turkey Falls in Concord. . . . But as the country became settled, and fish scarce, the '*Namaoskeag*' became limited to the rapids in the immediate vicinity of '*Namoaskeag falls*, (pp. 638-639."

The word has many variations in orthography, among them being, *Namoaskhag*, *Naamkeake*, *Namaske*, *Naumkeag*, *Naimkeak*, and several others. (See Potter's "*Farmers' Monthly Visitor*, 1852-1853.)

Business and Diversion

*inoffensive to God, and necessary for the Comfort and Support of
human Society.*

A

DISCOURSE

utter'd in Part

A T

Ammauskeeg-Falls,

IN THE

Fishing-Season.

1739.

Deep in the Vale old Moniack rolls his Tides,
Romantick Prospects crown his reverend Sides;
And thro' wild Grotts, and pendent Woods he strays,
And ravish'd at the Sight, his Course delays.
Silent and calm—now with impetuous shock
Pours his swift Torrent down upon the steepy Rock;
The tumbling Waves thro airy Channels flow,
And loudly roaring, smoke and foam below. *I. W.*

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

BOSTON, Printed for S. KNEELAND and T. GREEN in Queen-Street.
MDCCLIII.

To the Honorable
Theodore Atkinson, Esq;

AND OTHERS

The Worthy Patrons of the Fishing

AT

AMMAUSKEEG.

Gentlemen,

It's not to signify to others that I pretend to an Intimacy with you or that I ever had a Share in those pleasant Diversions, which you have innocently indulged yourselves in, at the Place where I have taken an annual Tour for some Years past. Yet I doubt not that you'll Patronize my Intention, which is to sence against Bigottry and Superstition. All Excess I disclaim, but pretend to be a Favourer of Religion, and of Labour as an Ingredient, and of Recreation as a necessary Attendant.

I believe the *Gentlemen* who moved me to preach there in some odd Circumstances, and those at whose Desire and Charge this Discourse is Printed, (asking their Pardon if my Suggestion appear to them ungrounded) were moved more from the uncommonness of the Thing, than any Thing singular in it. I have put off the Importunity for near these three years; but least it should be, that I fear, it's being seen by the World, I submit it to sight and Censure.

So little as I know you, *Gentlemen*, I heartily present it to you; tho' all the Reason that I intend to offer is, we have fished upon the same Banks: And tho' I know this will be no Bait, I am fond of being esteemed, in the Affairs of Fishing,

Gentlemen,

your most Obedient

and very humble Servant.

Fluviatulis Piscator.

[Reprinted May, 1882, at Manchester, N. H., verbatim, literatim, et punctatim.]



Business and Diversion

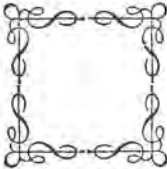
inoffensive to G O D.



J O H N XXI. iii.

" Simon Peter saith unto them, I go a Fishing."



 'Tis an odd and vicious Conceit of the Superstitious, who in Popish Countries are called the Religious; that a solitary Sequestration from the social Affairs and Duties of Life, afford a mighty Advantage to Religion; For this is contrary to the Design of the Creator in the Make and Constitution of Man; opposite to the Providence and Precepts of God and the Examples of holy Men recorded in sacred History. The Instance in our Text shows that *Business*, * or I think Diversion in proper Portions of Time, and other suitable Circumstances, are not hurtful, but very friendly to Religion.

The Apostles were constituted Fishers of Men, to allure and draw Souls to Christ, from a Pit of Sin and Misery, to an Ocean of Piety

* *For their stated Business, was to preach the Gospel; tho' Fishing had been their Employment.*

and Pleasure. . . . An high and really religious Employment ! And our Lord gave them a *Vacancy*, with Restriction, *but tarry ye at Jerusalem*. They had been commissioned long before, [*Matth. x. 17 and Luke ix.*] but before they were to enter upon their Enterprize, in which he should be coporally absent, they have a Leisure refreshing Season. To what should they in Reason have devoted this Intermission, but Fasting and Mourning, for now the Bridegroom was not always with them ? Why, *Obedience is better than Sacrifice, and to hearken, than the Fat of Rams*, 1 Sam. xv. 22. He who best knew the Nature of Man, before he was to send Men upon extraordinary Business, would give them Leisure ; nor was this Space confined wholly to Devotion. Some of it, we find, was spent in Business or Diversion. Certainly these Saints were as sincerely and piously affected to God, as the superstitious Biggots to Popery can, with any Shew of Modesty, pretend to be ; yet they divert themselves in so suitable a Season, and our Lord not only appoints the Leisure, but supports them in it ; by giving them a lucky Draught of Fishes. This sacred Story leads me to think,

I. In the general, that the common Enterprizes of Life are not inconsistent with Piety towards God : But that infinite Holiness may be pleased with them. And in particular, that

II. Fishing is innocent as Business or Diversion.

Some think it strange that I give myself the Trouble to illustrate these Things, which, to them appear level to the lowest Capacity.

But all Men are not of the same Cast or constitution. A Proposition which is easy and evident to one, may be as doubtful and difficult to another ; and its no uncommon Case, for Men who have no higher End in their Employments, and have been unseasonable, unguarded and irregular in their Diversions, and have no higher End than Self, if they are convinced of their Idolatry and Carnality, to exclaim against the world ! Then, when they most of all need to be diligent in some good Employment, Diligence is termed Worldly-mindedness ; seasonably and temperately to recreate themselves, is carnal Pleasure. These Difficulties require no great depth of Tho't, nor a Multitude of Words for their Solution.

We may in an easy and natural Manner, consider that Religion is all of a Piece, and one Duty does not destroy another. That Business and Diversion, in their proper Place and Time, determined from a good Principle, and performed piously and prudently ; are so far from being offensive, that they are a necessary Branch of our holy Religion.

Let us then in the general consider, *Whether the common Enterprizes of human Life, be consistent with practical Piety.*

Here we must tell what we mean, by the common Enterprizes of

Life. And we renounce all unjust and dishonest Methods of obtaining the Riches, Honours, and Pleasures of the World : And all unlawful Games, and those which are lawful, when they are unsuitably and irregularly managed.

We consider Business or Diversions, as human Understandings. By Business, we mean our stated Exercises, or that which we ought to employ most of our Time in, and most of our Thoughts about. Diversion is the turning aside from Business, in some proper Period, to refresh ourselves, and fit us for a more cheerful and lively Discharge of Duty. Now, if it should be made evident, that these are Parts of our Duty to God, I suppose they must be consistent with real Religion. And this will appear, if we consider, That God is an active Being, and proposes himself as our Pattern. It's not only contrary to Scripture, and deep thinking, but common Sense, to suppose the great Creator and Governour of all Worlds, idle and inactive. Every one conceives something of his Operation, as the Over-ruler of Human Affairs, or Author of all Things. And if God be Agent, he expects those to be such who are capable of acting : And as he is perfect, and must act in a most excellent Manner, according to his own Nature, he must expect and require his Creatures to act according to the Power with which he has endowed them. And as he has endowed Man with a Capacity of knowing something of him, he must design his imitating of him in his Measure and Degree. In this the Image of God in Man consists. And we are to imitate him in Labour and Rest, as well as in other Respects. This will be clear to you, if you recollect the Fourth Commandment : *Six Days shalt thou Labour*, for in six *the Lord made and rested on the seventh*, &c.

Indeed, no Man was made for Time, but Time for him : And as God uses Eternity for his own Glory, according to his infinite Wisdom and Power ; so he expects Man should spend his Time, according to his Capacity

Man's Capacity is the Measure of his Duty, and the Nature of Man requires Rest and Labour, and a prudent Interchange and Succession of each. We were not obliged to do, in our Original, those Things which our Species were not capable of performing : But the Limitation of Nature was a Bound by the Deity, *So far shalt thou come, and no farther*. The Stretch of a human Mind, and the Strength of Man's Body, is limited by the supream Disposer of all Things. And the same Being, in limiting our Capacity, makes out our Duty, by our Make and Frame, and casual Circumstances in the Course of his Divine Providence, he shews a wise Man what he ought to do, and what to avoid, and how he should direct, guide, and govern himself or others, No mere Man ever could, nor will any Man that has the Government of himself, pretend to keep up an uninterrupted Series of idleness and

Indolence, of Labour or Devotion ; for Experience must soon convince them that Man's Nature is formed for Variety : He is a changeable Creature, and is supported by Change. So Man at first was put into the Garden of Pleasure, not only to serve his Maker, in his Devotions, and delight himself by his Sensations, but *to dress it and to keep it* : For in his primitive *Make* he needed those Changes. And we need them much more in our lapsed State : As all the Works of God, in Nature and Revelation, manifestly declare. Let those who would form to their Imagination, a beautiful Description of the Original of the World, read Dr. *Burnet* : But I must confine myself to Scripture, and the common Current of our Experience, in the present State of Things ; and as to that original State of the World, you will excuse me if I say little about it, because we have little to do with it. But if we gaze upon Nature, in it's present Situation, we shall find, that every Thing calls for a prudent Alloy of Labour and Diversion : [Tho' I must rejoin, because I would not be wanting in Caution, by Labour, I would be understood to mean, our Actions in our particular Callings ; and by our Diversions, our turning aside from them, whether in the prescribed scriptural or rational Acknowledgements of the Deity, or our innocent unbending the Bow in those lawful Amusements, which are more commonly called Diversions. The Reason of my thus speaking is on the Account of the *divine Diversion*. *Six Days shalt thou Labour. But on the Seventh* God who best knew our Capacities, has delineated our Business [or that which we are Statedly to employ most of our Time in, for that I call, must call so]. *God* confirms the Division both by Precept and Example : And if we throw off Superstition and allow ourselves to think freely we shall be confirmed that Business is Part of our Religion.] To return then : Let us consider the Universe in its present State and Situation. All the heavenly Bodies keep their Course, [but their Orbits are more or less Excentric]. The rising Sun calls Man forth to his Business. The Sun withdraws, and lengthning Shades forewarn us of the rising Damp, and unhealthy Vapour ; and bid us retire for Rest and Shelter. Yet if something uncommon calls us longer abroad, the *Moon* and *Stars* will lend a little of their *borrowed Light* ; but amphibious Creatures, Birds and Beasts of Prey, oft check our Improvidence or Negligence. The Sun gives us our longest Days when the Earth requires most of our Labour, and when she refuses Produce, he shortens our Hours of Business.

So the vast Collection of Waters sometimes heaves in its briny Billow, swells every Bay, and rushes with Joy tho' every Channel ; as from an Engine played by the Almighty Arm ; then sinks into her deep Caverns, leaves Room for the Return of the rapid Rivers ; with vast Additions from in-land Oceans.

The Winds also take their turns for Labour and Rest. The labori-

ous East sends gently in the vast Magazines of floating Wealth, to the favorite Sons of Fortune ; while he is gathering up the scattering Clouds, which he shoves in upon the craving Land, and generously pours down a more universal Blessing : and retires, when the brisk West opens a Glene, scatters the broken Cloud, and sweeps up the redundant Moisture. * * *

So the Earth *here* raises a rocky Mountain with a frowning Front ; and levels *there* a pleasant Plain ; *here* sinks a rushy Fen, *there* raises a fertile Field : *Here* the struggling Streams rush down a rapid River, *there* the easy Waters lye still and move not But what in Nature does not ? Every Thing calls for Labour, and Labour requires rest.

These uncultivated Lauds call for hard Labour, but some other Circumstances admit of Diversion ; for this the half-tam'd *Deer* graze your Plains, and the rough *Bear* infest domestick Folds. The ingenious *Dr. Woodward* has shown what convulsions there were at the Time of the Deluge, and how Sterile the Earth is made by that awful Event ; and this to make us Labour, because our sinful Propensity required it.*

But we are social Creatures ; and the Cord of Society is strengthened by Industry. In this defective State, great Diligence is necessary in Education, in Purging out Prejudices, Infusing Principles and Maxims of Wisdom ; and acquiring Habits of just Reasoning, and Prudent Determining in every Occurrence. It's needful that some should make a business of Teaching ; and the Labour of others must support such in their Labour.

Government is necessary to our good Order ; to secure our Lives, Property and Peace : And those who are by divine Providence, set in Authority over us, should be esteemed and honoured ; that they may be so, they should be set above Contempt, by a generous Sup-

* Speaking of the old World, he says that after the Fall of Man, " These exuberant Productions of the Earth became a continual Decay and Snare to him, they only excited and fomented his Lusts, and ministered Fuel to his Vices and Luxury, and the Earth requiring little or no Tillage, there was little Occasion for Labour, so that almost the whole Time lay upon his hand, and gave him Leisure to contrive ; and full Swing to pursue his Follies ; and the Pravity of humane Nature was The Pravity of humane Nature is not, I fear, less yet than it was then And to remove the Temptation and Cause of the Sin, he brought this Change, by mingling and confounding its first constituent Principles That by this Means a great Part of their Time might be taken up, &c.

See his natural History, Ed. 1st. Pag. 89, to 114

port from the Society whom they serve : which it never can do unless Industrious.

Seeing we are to consider God, not only as Creator of Man, but as the Founder of Society, and it must follow that a social Homage is his Due ; and this Homage must be paid in the best, the most regular and rational manner : It appears by the Light of Nature, and Suffrage of all Nations, that there should be some Persons stated and appointed to lead Societies in their Devotions ; to keep the Knowledge of God, and our Duty to him, clear from all Confusions and unworthy Conceptions, and to excite religious Sentiments, &c. This requires the Labour and Study of such Persons, and the Labour of others to support them. So that unless we would have Ignorance and Irreligion, and all Manner of Miseries and Mischiefs infest Mankind, we must labour : and as God is the Author of the Species, and Founder of our State, this Industry should be practised with a View to his Glory, as Part of our holy Religion.

This Thought includes Piety, Justice and Charity. We must be diligent in some lawful Calling, because God requires it, as mere Reason shews, so doth the Scriptures.

Those who will take no Method for their own Support, rob Society, or murder themselves. If a Man provide not for himself he either starves or pillages his Neighbour : I can call it nothing less than Robbery, if he could by any lawful Business, have supported himself ; for he is as really a Villain, who, without my knowing it, picks my Pocket, as he who says, *Stand and Deliver!* And whatever I am obliged by Authority to pay towards the Support of Religion, Government, and the Poor, more than I should or ought to have done, if my Neighbour had been industrious, they really rob me of ; for I have so much less of Estate thro' their Negligence The Equity of that Precept is clear, *He that will not work, neither let him eat.* And it's as evidently just, he that will not labour to support Government, forfeits it's Protection and Favour.

The Man who will not labour, often thinks himself forced to lie long in this Neighbor's Debt ; which is a great Piece of Injustice to his Neighbour and to Society : Seeing if his industrious Neighbour had his Money in his Hand, he would have turn'd it to the Increase of his Estate, and Emolument of the Community. It's thro' Idleness that Men have little to dispose of, and are tempted to ask such exorbitant Prices for their Wares.

The Original of Communities, are Families. In these are weak and feeble Members, who need Labour for their Support : And that Man

is not only unjust, but barbarous and cruel, who neglects them.*
He that provideth not for his own, especially for those of his own House, hath denied the Faith, and is worse than an Infidel.

We ought to labour from a Principle of Charity, *That we may have to give to him that needeth.*† *The Poor ye have with you always.*‡
 If the Poor perish thro' your Want, when you might have had it to give ; it's as much thro' your Neglect, as if you had it, and refused to help and relieve them.

Indeed the most kind and prudent Way of relieving the Poor, is by setting them to work, if they are able. For hereby you give them Courage, cause them to be prudent and frugal ; and prevent much Sin. It does not put them to so much Pain, to ask for that for which they have laboured : And what they earn hardly, they will not be so likely to spend idly. While they have Employ, they may be kept from making Mischief among Neighbors, from wandering about from House to House as *Busy-Bodies*.§

If ye shall fulfill the royal Law, according to the Scriptures thou shalt love thy Neighbour as thy self, ye shall do well. If a Brother or a Sister be naked, or destitute of daily Food, and one of you say to them, Depart in Peace, be you warmed and filled, notwithstanding you give them not of those things that are needful to the Body. What doth it ? But can common Christians feed their Neighbours with anything better than fair Words unless they be diligent in their Business.

* There has been long and tedious Disputes about a Medium of Trade, and a sad Complaint about the constant Falling of Money : While the Prices of the Produce of the Country are under no Regulation by Law : Every one almost will make it a Rule, *to sell as dear as he can* : And if they ask an *Angel* this Year, for that which might have been purchased with a *Crown* last, an *Angel* is worth no more now than a *Crown* was then ; and Money must continue Falling. It's worthy the Tho't of considerate Man, whether a want of Labourers be not at the Bottom of all this. If Men don't labour, they vainly complain of hard Times, and Scarcity of Money ; for they have nothing to procure it.

† Eph. iv. 28. ‡ Matth. xxvi. 11.

§ In the best regulated Communities, they keep all employ'd young and old, strong and weak ; those who are strong to more onerous Service, and the more feeble to that which is less burthensome, &c. See Sir WILL. TEMPLE of Holland and BUSBEG ; *Faci Epist.* RICHELIEU'S *Pol. Will.* Chap. IX. Sect. vi.

Quest. *These are evident, you may say, but how do they reach the Rich ?*

The Rich are of the same Nature as the Poor, and stand in as near Relation to God and Society as they : And in these Respects, have as much need of Business. Tho' Men have ever so much Wealth, they should consider that Idleness and Inactivity rusts and depraves the Mind, and renders it unfit for the Service of God or Men. It either distempers the Brain with Melancholly, or fills the Body with ill Humours, and the Mind with vicious Inclinations ; and either of them give Satan great advantage against us. Besides we are to consider Wealth as a Talent given us by God to improve, therefore the more any Man has, the more he has to turn to advantage, which must proportionably encrease Care and enlarge the Sphere of Action. He that sinks his Estate thro' Indolence robs the Publick, for he cant do so much for the Commonwealth. And if he only keeps the Principal, and endeavours to make no Interest, he is an *unprofitable Servant* to God who intrusts him, and to the Society who protects him.

If we are to be Followers of God as dear Children ;
Reflection. if God is an Agent ; if we are to imitate him in labouring six Parts in seven of our Time ; if the human Constitution in its Original requires Change of Labour and Rest ; if this is the State of all Nature ; if Piety to God, and Justice and Charity to Men require Labour ; and Business cannot be perform'd to Advantage without some seasonable prudent and regular Diversion : How wild and superstitious are those who would drive Persons into Monasteries and Nunneries, under the Notion of their spending their whole Time in Devotion ? And how much better is it for Persons who are deeply in Debt, or dependent on Charity for their daily Support, to run about under the Notion of dealing with their Neighbours in some pretended Case of Conscience, prating about Things *which they understand not* ; then study to be quiet and *do their own Business !*

Extraordinary Religion is the most exact Transcript of the communicable Attributes of God ; and the nearest Imitation of the divine Being, as far as the Dictates and Limits of Nature, and the Rules of his holy Word. They who are wise above what is written, will soon discover their Folly : For when Superstition has overwhelmed a Man's Brain, like a Child with the Rickets, his Head grows too big for his Body, and the distempered Creature soon dwindles away to nothing. For men in vain plead for such Devotion as robs Society, such as defrauds Mankind. *He that loves not his Brother whom he hath seen, how shall he love God whom he hath not seen.*

Weak Persons are apt to say, Can we do too much for God ? Can we spend too much Time in Religion ? No, you cannot. But you may disobey God, when you think you obey him. You may do what

he forbids, when you think you do what he requires. You may be idolatrous, when you think you are mighty devout. Why, your Ancestors tho't this might be ; Why else did they reject the exorbitant Number of popish Fast and Festivals, &c. ? In one Century you seem to have forgot your Errand to *America*. And what do you think of those *Israelites*, who sacrificed their Children, &c. Do you think that they could do too much for God ? Could they do any more than to give their First-born of their Bodies for the Sin of their Souls ? Who could blame them, if none can do too much [in the common Sense] ? If a Man were to murder his Father or Mother, his Wife or Children, or himself, under the Notion of being extraordinary religious, and should say, who can do too much for God, would you not think the poor Creature were delirious ? Why, *He that loves not his brother is a Murderer* ! Many make a great Talk of Matters of Faith, or rather of Opinion, and will go prating from Place to Place,* and take little or no Care of their Families ; they are mighty religious, but if it were possible they would not pay a Farthing for the Support of the Government, (by which our Lives are preserved) or of Religion, or for the Education of their Children. They like Holidays extreamly, and might be glad if every Day were such ; but can, with a good Conscience, lie in Debt from Year to Year. It's an easy Matter to pray, and read, and talk devoutly ; but to work is hard, 'tis tedious to the poor Carcass, a Weariness to the Flesh ! It's an easy Matter to run down your industrious Neighbour as a worldly Man, but have you paid him that which you owed him ? Is not he forced, in great Part, to support your Family ?

I wish Men would know what Religion is in the Whole, and not set the several Parts of it at Variance, and make one Branch militate with another. *Let us love God with all our Hearts*, and at the same Time remember that we are to *love our Neighbour as ourselves*.

Let us meditate on and long after Heaven ; but know at the same Time, that our Way thither is thro' the Earth : That the Soul is infinitely the superior Part, but if we murder the Body, the Soul must eternally be damned. Let us be frequent at Church, yet not forget that we have something to do at Home. Let's be serious and steady

* I wish there were not too much Reason for Complaint in this Regard, at this Day. I have often been surprized, not only at the prophane Railing against Lectures, but at the Absurdity and Folly of many, who had hardly a Morsel of Meat to put into their Mouths, and their Children near famishing, and all their Business ruining, on Account of their violent and furious rambling here and there, on the Notion of some religious Errand ; as if God would call them to a Fraud and Barbarity, which, the Apostle tells us, is worse than Infidelity, *1 Tim. 5, 8*.

in our Devotions, and likewise diligently follow our Business. In short, Let every Command have its proper Weight with us, every Duty it's Proportion of our Time and Tho'ts.

Business and Diversion, in the general, may be allowed as innocent and necessary. But some Enterprizes which wear that Name may be scrupled. We may therefore enquire in particular,

II. *Whether Fishing is lawful as Business or Diversion.*

Not only those called Religious, among the *Turks* and *Persians*, and the *Benjans*, &c. have scrupled eating of Flesh or Fish, but some among ourselves, fear whether we ought to take away the Lives of Creatures for our own Support ; and are positive that we should not for Diversion. Many have a great Aversion to those whose Trade it is to take away the Lives of the lower Species of Creatures. A Butcher is (in their Apprehension) a mere Monster, and a Fisherman, a filthy Wretch.

It's an ancient Observation, that a *merciful Man is merciful to his Beast*. *The righteous Man regards the Life of his Beast*, Prov. xii. 10. Where any have long used any Creature, the Tho't of it's Service, and some sort of Regard contracted to it thereby, is not easily conquered. But a noble generous Soul hates Barbarity to foreign as well as domestick Creatures.

"It's not certain [says my Lord BEACON] that the worthier any Soul is, the larger is it's Compassion. For contracted degenerate Minds "imagine that those Things belong not to them : But the Mind that "looks upon itself as a nobler Portion of the Universe, is kindly affected towards inferiour Creatures"

He that takes Pleasure in the Pains and dying Agonies of the lower Species of Creatures, is either a stupid sordid Soul, or a Murderer in Heart. He that delighteth to see a Brute die, would soon take great Pleasure in the Death of a Man.

But here, *in Fishing*, we are so far from delighting to see our Fellow-Creature die, that we hardly think whether they live. We have no more of a murderous Tho't in taking them, than in cutting up a Mess of Herbage. We are taking something, which God, the Creator and Proprietor of all, has given us to use for Food, as freely as the *green Herb*. Gen. ix. 2, 3.

He allows the eating them, therefore the mere catching them is no Barbarity. Besides God seems to have carv'd out the Globe on purpose for a universal Supply : In Seas, near Shores, are Banks and Beds made for them ; to furnish the Lands adjacent and Lands which lye remote, are more divided into Lakes and Ponds, Brooks and Rivers ; and he has implanted in several Sorts of Fish, a strong Instinct [or Inclination] to swim up these Rivers a vast Distance from the Sea. And is it not remarkable, that Rivers most in-

cumbered with Falls, are ever more full of Fish than others. Why are they directed here? Why retarded by these difficult Passages? But to supply the Islands? Does forming and disposing of these Things argue nothing?

Since the Flood the Earth is more Barren, and Vegetables afford not a sufficient Support for Mankind. . . . So that if the Lives of all these are of less Consequence, nay, are freely given by him whose they are, they may be taken and used as Food: If they *may* be taken, any may make a Business of taking them for the Supply of others.

But if this be innocent as Business, some may still scruple it as Diversion.

And why not all Diversion with as good Reason? The grave and judicious Mr. *Perkins* says,* "We are allowed to use the Creatures of God, not only for our Necessity, but for meet and convenient Delight. This is a confessed Truth. And therefore to them who shall condemn fit and convenient Recreation (as some of the ancient Fathers have done, by name *Chrysostom* and *Ambrose*) it may be said, "be not too righteous, be not too wise, *Ecc. vii, 16.*" But if we consider, that the End of Business and Diversion are the same, we shall clearly conceive the Truth. The End of both are Refreshment and Support of Man in the Service of God. If I may eat them for Refreshment, I may as well catch them, if this recreate and refresh me. It's as lawful to delight the Eye, as the Palate. All Pleasure arises from the Suitableness and Agreeableness between the perceptive Faculties, and the objects that affect them: And our bountiful Maker, as he has given the animal Life many perceptive Faculties, the Senses of Seeing, Hearing, Tasting, &c., so he has provided suitable Objects for all these Faculties, and does allow us to gratify ourselves therewith.

When the Body has been long wearied with Labour, or the Mind weakened with Devotion, it's requisite to give them Ease; then the use of innocent and moderate Pleasures and Recreations is both useful and necessary, to Soul and Body; it enlivens Nature, recruits our Spirits, and renders us more able to fet about serious Business and Employment. For to intermix no Gratifications, nor Diversions with our more serious affairs, makes the Mind unactive, dull and useless.†

* See his *Works*, Vol. 2, p. 140.

† *Cito rumpes arcum si tensum habueris.*

At si laxaris, cum voles, eris utilis,
Sic lusus Animo debet aliquando dari,
Ad cogitandum melior, ut redeat tibi.

..... Study and ease
Together mixt; Sweet Recreation,
And Innocence, which most does please,
with Meditation.

* " It proceeds either from Pride, ill Nature or Hypocrisy, when " People censure and are offended at the Liberties which others " use in thus relaxing their Minds. Sloth and Idleness we have already inveigh'd against, and condemn'd, but those who give seasonable Hours for their Devotions and know how to dispatch the proper Business of Life well and seasonably enough, and still aim chiefly at the Glory of God, need be under no Apprehensions of the divine Wrath and Displeasure on the Score of their Diversions. For this is *good and comely*, Eccl. v. 18. And indeed, the Comforts and Enjoyments of this Life, which we receive from the bountiful Hand of God, is a great Subject of our Praise and Thanksgiving to God, *that the lines are fallen to us in pleasant Places, our heads anointed, our Cup running over.* The Streams lead us up to the Fountain and Spring-Head. Our Diversion, if rightly used, not only fits us for, but leads us to Devotion; and the Creature brings us to Christ. Thus in the Context, the Disciples go a Fishing, and Christ manifests himself to them. Not only countenances them, by succeeding their Design; but excites and draws out their Affections to him, so much that *Simon* could not wait till the Vessel came to Shore, but leapt into the Lake, and swam swift ashore, to greet and converse with his dearest Lord.

. That I may not be tedious, I will only lead in your Reflections a Word or two.

Religion is the highest reason, and Christianity perfectly suited to Man in his present State. And as the venerable Judge *Hale* says,† " Religion is best in its *Simplicity* and *Purity*, but difficult to be re-
" tain'd so, without Superstitions and Accessions; and those do com-
" monly in Time *stifle* and *choak* the *Simplicity* of Religion, unless
" much Care and Circumspection be used: The Contemporations
" are so many and so cumbersome, that Religion looseth its *Nature*,
" or is strangled by them: Just like a Man that hath some excellent
" simple Cordial or Spirit, and puts Musk in it to make it smell
" sweet, and Honey to make it taste pleasant, and it may be *Can-*
" *tharides* to make it look glorious. Indeed by the Infusions he hath
" given it a very fine *Taste, Smell, and Colour*, but yet he hath so

* The Pharisees were of this Temper and frequently censure and condemn CHRIST for his Recreations, both for the Matter and Manner. *The Son of Man came eating and drinking, and they say, behold a man gluttonous and a wine-bibber, a Friend of Publicans and Sinners.* Math. 11, 19. Luke 7, 34, &c. and Chap. 15. 2. But all extreams are bad, one leads to another; those who in this Case *Strain at a Gnat*, in another will generally *Swallow a Camel*.

† Contemplations, last Part, p. 254.

"clogg'd it, and *sophisticated* it with *Superaddition*, that it may be it "hath altered the Nature, and destroy'd the Vertue of it." Some so muffle up Christianity, and make it look so melancholy, sickly and sower, that inconsiderate People are apt to dread its Command, as they would the Tyranny of *Sallee-Men*. But

What prodigious Injustice is hereby done to the most sacred and excellent Cause in the World?

Such zealous, weak, mistaken Men can't easily be perswaded of the Dissimilitude there is between *their* Opinion and Practice, and the Doctrine and Behaviour of *Christ* and *his Apostles*. It were worthy of their diligent Application, to make a critical Attempt of running the Parralel. And they would certainly find their own Lives awkward and disjointed ; and their Notions, in this Part, maim'd and defective, and bloated and swell'd in that. They would find likewise, that they have given themselves and others a great deal of unnecessary Fatigue and Perplexity : Wearying themselves and tormenting others, by making those Things Duties which God never requir'd, and forbidding those Things which God never prohibited : Perplexing themselves and all around them with infinite Doubts and Fears, without any Foundation : Leading Men into the most loosing Labyrinths, for which there can be no Clue found, but in the Tracts of their own maz'd Brain.

Therefore, How needful is it that we be well acquainted with the Scriptures, inform'd in the Religion of Jesus, conform'd to the Example of Christ and his Apostles ? There we shall see the Nature and Design of Christianity. To bring *Glory to God in the highest, Peace and Good-will to Men*. That God's Glory and his Good his Duty and Interest . . . Piety and Pleasure, can never be sundered.

He will find that in order to an Action's being term'd really religious, the Principle from which, and the End for which it was done, are much more to be considered, than whether it commonly fall under the Denomination of Devotion, Business, or Diversion ; for they are all at one Time or other our Duty : And the doing our Duty from a good Principle and for a right End, must be term'd religious acting. Eating and Drinking are natural and sensible Actions, but when *we eat and drink* to the *Glory of God*, they are to be considered religious, *I Cor. v. 31.* and that not only when Men eat and drink the meanest for Quality, and the least for Quantity that can support them in the service of God and Society ; and when they have a rich and plentiful collation : As at *Cana of Galilee*, they had a Plenty of rich Wines miraculously provided by Christ himself, who made one of the Company at this cheerful Entertainment. This was at a Wedding, which is not every Day. "No Man should make Sports his Business, nor "Pastimes his Employment, no more than Cordials his Drink, or "Sauces his Meat." This destroys the very Notion of Diversion.

Says Mr. *Lock*, "Some may be said never to divert themselves, they can't *turn aside from Business*, for they never do any," *To every Thing there is a Season*, Eccl. iii. 1 . . . 4.

Should we not always in every Enterprize wish for the Preference and Blessing of Christ? Methinks those who love and adore the blessed Jesus, should desire to see him every where, and in every Thing! who calls for our Devotion and allows our Diversion! who procured Peace and Pleasure for wretched sinful Men! Don't I owe a *grateful Sense* of the Grace and Favor of my Benefactor, in the Enjoyment of every Blessing? This gives a Gust to every Enjoyment, our tasting the Sweetness of Christ in them. We consider him as Mediator of the Covenant of Grace, and when we see every Thing convey'd from God to us by him, then we have a real Relish for them. There is no suitable solid Satisfaction in any temporal Good, but as the Gift of God thro' Christ. This every good Man, in a good Frame finds and feels. "Business and Diversions, "Cities and Palaces, with their various Ornaments; Fields and "Groves; Spring, Summer, and Autumn, with all their flowery "Beauties and tasteful Blessings, are some of the Delights of the "Sons of Men. Books and Learning, and polite Company, and refin'd Science, are the more elegant Joys of ingenious Spirits: These "are enticing Gratifications of the Senses or the Mind of Man; they "are innocent in themselves, they may be sanctified to divine "Purposes, and afford double Satisfaction if God be among them: But "if God be absent, if he hide his Face or frown upon the Soul, not "Palaces, nor Groves, nor Fields, nor Business, nor Diversion, nor "all the flowery or tasteful Blessings of Spring or Summer, nor the "more refin'd Joys of Books and Learning, and elegant Company; "not all the rich Provision of Nature and Art, can entertain and refresh, can satisfy or please the Soul of a Christian. "when smitten with the Love of God.

To conclude, Let us ever remember that *we and all we have*, is God's, and that we are accountable to him for our Improvement of all, and depend on Christ for our Acceptance with him in all.

A M E N .

Ye happy Fields, unknown to Noise and Strife,
The kind Rewarders of Industrious Life;
Ye shady Wood where once I us'd to rove,
To think for Men, and praise the God above;
Ye murmuring Streams that in Meanders roll,
The sweet Composers of the pensive Soul,
Farewell. . . The City calls me from your Bowers;
Farewell amusing Tho'ts and peaceful Hours.

MISCELLANEOUS

NOTES AND QUERIES,

WITH ANSWERS.

" *Science may become divine by admitting Him who is the light of the world.*"
—JOHN JAMES GARTH WILKINSON.

VOL. X.

SEPTEMBER, 1892.

No. 3.

"The Veil of Isis."

BY WM. EMMETTE COLEMAN, SAN FRANCISCO, CAL.

It was a common custom of the Greeks and Romans to identify with their own gods the deities of other nations, often in an arbitrary and misleading manner. The gods of Egypt, and even those of India and of the Gauls, were thus erroneously assimilated to those of Greece and Rome. This fact is well known to every classical and mythological scholar; and, consequent upon an extended study of the best authorities in Egyptology, comparative mythology, and all branches of Orientalism, I am justified in saying that there is no competent scholar or writer of the present day who does not fully recognize the unreliability, in most cases, of the asserted identification of foreign divinities with those of Rome and Greece. For my own part, I have never paid any attention to those so-called identifications, knowing as I do their worthlessness.

There is nothing in my remarks on "The Veil of Isis," in March (1892) NOTES AND QUERIES, indicative of my acceptance of any Greco-Roman assimilation of Egyptian deities. On the contrary, the whole of that article was devoted to the correction of a popular error, due primarily to the improper identification of variant deities by a Greek writer. Judge of my surprise, then, to see it stated in the May NOTES AND QUERIES that my article seems to fall into an error, com-

mon to many students of Egyptology, etc. ; namely, the identification of Egyptian deities with those of Greece and Rome. This was followed by a long explanation, by my pseudonymous critic, in refutation of that which I had never hinted at,—said explanation consisting of facts known to the veriest tyro in Egyptology, and which in no manner affect what I did say. I did not state that Neith was, according to Herodotus, *et al.*, of the first *rank*, while Osiris and Isis were of the third. I used the exact language of Herodotus, Bunsen, and Wilkinson, and said Neith was said, by them, to be of the first *order* (not rank), and the Osirian divinities of the third order. Having substituted “rank” for “order,” my critic then stated what everybody knows, that the worship of Osiris was one of the most universal in Egypt, and that he and Isis were in the first class of deities. The three orders of gods, in Herodotus, appear to refer to their chronological order, rather than to their relative rank at the date of Herodotus’s writing. The gods of the third order, so called, were not necessarily of inferior rank to those of the other two orders. Those of different comparative rank were included in the same order. Wilkinson says (“Rawlinson’s Herodotus,” ii, 245) that though Re (Ra) is not in the first order, that does not necessarily place him in an inferior position, since Osiris, the greatest of all, who with Isis was worshiped over all Egypt, as Herodotus distinctly asserts, was of the third order. Bunsen tells us (“Egypt,” i, 363) “the *monuments* also really describe the Osiris order as the third.” When I quoted the three authors in regard to the three orders of gods, I had no reference to the relative rank of the deities. I mentioned the facts in sustentation of the statement that Neith and Isis were distinct divinities. The remarks of Herodotus showed that in his time the Egyptians with whom he came in contact regarded Neith and Isis as belonging to different orders of deities ; and this has been confirmed by the monuments, as shown by Bunsen and others, and as universally recognized by Egyptologist. I demur to the statement that Tiele does not rank high as an Egyptologist. Dr. C. P. Tiele, Professor of the History of Religions in the University of Leiden, the colleague of Dr. Abraham Kuenen, stands second to none in his special field, the history of ancient religions ; and his “History of the Egyptian Religion” is the best work published on that subject. Dr. Tiele is an untrammelled scholar, un-

hampered by theological prepossessions, like Brugsch Bey, Le Page Renouf, and others who have dealt with Egyptian religion ; hence one reason for the superiority of his work in that direction.

In answer to my affirmation that the inscription on her temple at Sais referred to the virginity of Neith, not to her inscrutability, my critic quotes a passage from a papyrus in which the hidden knowledge of Neith is mentioned. I am familiar with this passage ; it is found on page 206 of Tiele's " Egyptian Religion." But it is irrelevant as regards the meaning of the Saitic inscription ; and that it is so in the view of Tiele is evident, since on page 204 of his work, two pages prior to his quotation of the passage regarding the concealed knowledge of Neith, he plainly tells us that the virginity of Neith " is expressed in the words inscribed on the temple, ' My garment no one has lifted up.' " I stated in my article, that Neith was " the eternal deepest ground of all things symbolized as the divine mother-maid " (Tiele, p. 205) ; the fact that she was a representative of hidden wisdom was not denied ; so my critic in this instance again quotes texts to prove that which has not been questioned, and which is without relevancy to the points in question. The point is solely this : Does the expression, " lifting the garment " (falsely rendered " veil ") of Neith refer to her perpetual virginity or to her inscrutability ? There is not a shadow of doubt that it refers to the former, and I am confident that every Egyptologist in the world will so decide. Then what justice is there in endeavoring to muddle this plain statement of fact, by lugging in irrelevant matter about Neith, in *other* inscriptions, being credited with hidden wisdom ? It is not what other monuments tell us of Neith, but what this famous Saitic inscription says of her.

Certain texts are quoted by my critic to prove the identity of Neith and Isis. It is well known that during the thousands of years over which variant phases of the Egyptian religion extended, with its multifarious gods and goddesses, many modifications, transformations, and amalgamations took place, often caused by changes in dynasties and other local considerations. Taking the monuments as a whole, great confusion exists in the names, characteristics, and identifications of the members of the Egyptian pantheon. Local and improper identifications of variant gods and goddesses are not infrequently met with. The special votaries of a particular god or goddess, in order to

magnify its importance, did not scruple to transfer to it the specific features of other gods or goddesses, and to identify it with those other deities. Now, these alleged identifications were often as arbitrary and unwarranted as were those of the Greeks and Romans in the matter of the unity of their gods with those of foreign *cultes*.

It is noteworthy that my critic, while rightly rejecting the improper Greco-Roman identifications of the gods, accepts as true, and quotes against me, the similarly improper identifications of variant Egyptian deities made in certain parts of Egypt and at certain periods. I have paid no attention to either. One is as unscientific and misleading in many cases as the other.

Isis was the most popular goddess in Egypt. She was undoubtedly a distinct deity from Neith. But, in later degenerate times, some of the uncritical Isis-worshippers attributed to Isis the attributes of various other goddesses, including Neith, and improperly identified Isis with them. This was merely sectarian glorification of their favorite goddess, regardless of truth or right. Some of the attributes of Neith were parallel to those of Isis; and, so far as they were concerned, the two divinities might be in a measure identified. But the one specially distinctive characteristic of Neith, her perpetual virginity combined with her motherhood, was altogether foreign to the true Isis; and in this respect the two goddesses could never be properly identified. And it is exclusively to this characteristic of Neith—foreign to Isis—that the inscription relative to the misnamed “Veil of Isis” pertains. So far as the meaning involved in the clause concerning this “veil” is concerned, any reference to Isis is entirely out of the question. “There is no one of the Egyptian goddesses quite like her [Neith],” says Tiele. “Her attributes are transferred to other goddesses [including Isis], but they all reproduce only one side of the double being that we find in Neith.” That is, her double attribute of virginity united to maternity pertains, as a whole, to no other goddess in Egypt. Isis may embody her universal motherhood, but never her universal virginity.

In view of these facts it is evident that nothing published in the May NOTES AND QUERIES affects in any manner the truths contained in my article in the March number. Every statement stands unshaken, and I unqualifiedly reaffirm everything therein asserted.

The Atlantis.

In your June number (1892), of NOTES AND QUERIES, you interested me by publishing the thirteen propositions which Ignatius Donnelly formulated as reasons for the antediluvian existence of an *Atlantis*, the supposed sunken land or continent now beneath the highway of our grey-hound steamers as they rush between what are now known as the new and the old (ocean-divided) worlds ; and it may add some interest to the marvel to repeat what the Encyclopædia Britannica (9th edition) says on the subject. It says :

" Atlantis, or Atalantis, or Atlantica, is an island mentioned by Plato and other classical writers, concerning the real existence of which many disputes have been raised.

" In the *Timæus*, Critias relates how his grandfather Critias had been told by Solon some remarkable events in early Athenian history which he had learned from the Egyptian priest at Sais, whose records went much further back than the native accounts.

" The most famous of all the Athenian exploits (Solon had been told) was the overthrow of the island of Atlantis. This was a continent lying over against the pillars of Hercules, in extent greater than Libya and Asia put together, and was the passage to other islands and to another continent, of which the Mediterranean Sea was the only harbor ; and within the pillars the empire of Atlantis reached to Egypt and Tyrrhenia.

" This mighty power was arrayed against Egypt and Hellas and all the countries bordering on the Mediterranean.

" Then did your city bravely, and won renown over the whole earth, for at the peril of her own existence and when the other Hellenes had deserted her, she repelled the invader, and of her own accord gave liberty to all the nations within the pillars.

" A little while afterward there was a great earthquake, and your warrior race all sank into the earth, and the great Island of Atlantis also disappeared in the sea. This is the explanation of the shallows which are found in that part of the Atlantic ocean." (Jowett's Introduction to the *Timæus*.)

Such is the main substance of the principal account of the island furnished by the ancients, which if not entirely fastidious, belongs to the most nebulous region of history. The story may embody some popular legend and the legend may have rested on certain historical circumstances, but what those were, it is (as the numerous theories advanced on the subject may be held as proving) impossible now to determine.

(Vol. III, p. 27, Allen's Reprint.) Dates : Plato, B. C. 429-347. Solon, B. C. 638? - 558? The Flood (Gen. vii, 19), [A. M. 1656; B. C. 2348. Critias (*Kritias*), one of the thirty tyrants of Athens.

C. B. B.

"COBWEBS, OR A NEW BROOM; WHICH?" Mrs. A. B. Trumper writes me from England, May 10, last : "I am deeply interested in Theosophy and I ask my God to keep me on my watch-tower against its antichrist wickedness. I have mailed to you a book by G. H. Pember, M. A., published by Hodder & Stoughton, London, that I have been reading, on Theosophy. It is the fashionable creed of the Athenian mind that looks for some new thing, though in reality it is a revival of an old form of denying the *Only One* who reveals the wisdom of God to us." (Yes, an older form than the "Only One" himself). That is the opinion of a representative lady.

Mine in reply will be to define Theosophy as *The Wisdom of God, speaking universal nature that all who have ears to hear may hear Him*. As we cannot limit the illimitable, so the "Only One" that illumines Mrs. Trumper's understanding, though a Koh-i-noor or mountain of (religious) light to her can be but an "Only One" of *that particular lustre* (other sheep I have which are not of this fold. John x, 16); but no matter how highly estimated, there are others that outshine it, as *The Orloff* diamond in the sceptre of the Emperor of Russia, and *The Regent* brilliant of the French sword of state (Napoleon I), and these may justly symbolize Theosophy to Theosophists as the Koh-i-noor Christianity to Christians.

C. B. B.

THE HARPIES. (Vol. IX, p. 136.) Harpies are of Greek mythology. Fabulous monsters, said to have been the daughters of Neptune and Earth; or, according to Hesiod, of Thamus and Electra. In Homer they are merely personified storm winds, who were believed to have carried off any person that had suddenly disappeared. In Hesiod they are fair-haired and winged maidens who surpass the winds in swiftness, and are called Aëlo, *storm*, and Ocypete, *rapid*; later writers have added a third, Celeno, *blackness*, and represent them as disgusting monsters, with heads and breasts like maidens, faces pale with hunger, bodies like vultures, and hands armed with claws; they were very fierce and loathsome, living in an atmosphere

of filth and stench, and contaminating everything they came near. The harpies ministered to the gods as the executors of vengeance, and dwelt in the Strophadæan isles, in the Ionian sea. The most celebrated myth in which the harpies figure is that of the blind Phineus, whose food they had been commissioned to snatch away as often as it was placed before him. The Argonauts arrived at his residence while he was tormented, and freed him from the persecution. In the famous harpy monument discovered in Lycia by Sir C. Fellows, and now in the British Museum, the harpies are represented in the act of carrying off the daughters of Pandærus. "He is a regular harpy": one who wants to appropriate everything, one who sponges on another without mercy.

Mrs. A. RANSOM, Chicago, Ill.

Coös. (Vol. IX, p. 136.) Coös County, N. H. Its name is an Indian word signifying *pinus*, with which a large part is covered. There is also a county in Oregon bearing the same name and watered by the Coös Coquilla rivers.

Mrs. A. RANSOM.

BERTRAM AND RINALDO. Bertram, Old German, means "bright raven. Rinaldo is from Riginald, Old German, and means "strong ruler." In Shakespeare's play, "All's Well that Ends Well," the hero is Bertram, Count of Rousillon, who marries Helen.

Rinaldo is the name of the steward to Countess of Rousillon in the same play. Rinaldo, a famous warrior in Tasso's "Gierusalemme Liberata"; in Pulci's "Morgante Maggiore"; in Bojardo's "Orlando Innamorato"; in Oristo's "Orlando Furioso"; and in other romantic tales of Italy and France. He was one of Charlemagne's Paladius, and cousin to Orlando. Having, in a rage, killed Charlemagne's nephew Barthelot with a blow of a chess-board, he was, with all his family except his father, banished and outlawed. After various adventures and disasters, he went to the Holy Land, and, on his return, succeeding in making peace with the Emperor. "We stare at a dragon who has killed three French cuirassiers as a proidgy; yet we read without the least disgust, how Godfrey slew his thousands, and Rinaldo his ten thousands." "Bertram has been taught the arts of courts, to gild a face with smiles, and leer a man to ruin."—*Dryden*.

LINE OF A COUPLET WANTED. What is the preceding line of this couplet?

P. P.

"Some daring rebel *sins* up to my song."

Books.

The following, while not brand new, are good selections on books :

" Let us consider how great a commodity of doctrine exists in books".—R. DEBURY, 1344.

" Books are friends whose society is extremely agreeable to me ; they are of all ages and every country."—FRANCESCO PETRARCA.

" Books are the Glasse of Counsell to dress ourselves by."—A writer in the sixteenth century.

" How can I live without my book."—B. BONIFACIUS RHODIGINUS.

" For books are not absolutely dead things."—JOHN MILTON.

" Books are a guide in youth, and an entertainment for age."—JEREMY COLLIER.

" God be thanked for books."—WM. ELLERY CHANNING.

" In a corner of my house I have books."—DR. ARNOTT.

" Wondrous indeed is the virtue of a true book."—THOMAS CARLYLE.

" Good books, like good friends, are few and chosen." — A. BRONSON ALCOTT.

" A great book that comes from a great thinker — it is a ship of thought, deep freighted with truth, with beauty too." — THEODORE PARKER.

" What is a great love of books ? It is something like a personal introduction to the great and good men of all past time." — JOHN BRIGHT.

" I love my books as drinkers love their wine."—FRANCIS BENNOCH.

" Books are the windows through which the soul looks out."—HENRY WARD BEECHER.

" Books are our household gods."—JANUARY SEARLE.

" The only true equalizers in the world are books." — DR. J. A. LANGFORD.

" Let us thank God for books."—J. FREEMAN CLARKE.

" My latest passion shall be for books." — FREDRICH II OF PRUSSIA.

DAVID M. DRURY.

LARGE TREES. (Vol. IX, p. 128.) One of the largest trees in New England, and probably *the* largest, was injured by fire a few years ago, from the effects of which it has recently died. It was a witch elm of perfect proportions, 33 feet in circumference, and when looked at from Mt. Holyoke, has frequently put a hack and horses in eclipse.

BARBARA STANWIX.

QUOTATION IN LONGFELLOW'S "EVANGELINE." Who can give any information of, or references to, where Longfellow got the following quotation found in his "Evangeline" ?

A. L. G.

"Once in an ancient city, whose name I no longer remember,
 Raised aloft on a column, a brazen statue of Justice
 Stood in the public square, upholding the scales in its left hand,
 And in its right a sword, as an emblem that Justice presided
 Over the laws of the land, and the hearts and homes of the people,
 Even the birds had built their nests in the scales of the balance,
 Having no fear of the sword that flashed in the sunshine above them.
 But in the course of time the laws of the land were corrupted :
 Might took the place of right and the weak were oppressed, and the mighty
 Ruled with an iron rod. Then it chanced in a nobleman's palace
 That a necklace of pearls was lost, and ere long a suspicion
 Fell on an orphan girl who lived as maid in the household.
 She, after form of trial and condemned to die on the scaffold,
 Patiently met her doom at the foot of the statue of Justice.
 As to her father in Heaven her innocent spirit ascended,
 Lo, o'er the city a tempest rose : and the bolts of the thunder
 Smote the statue of bronze, and hurled in wrath from its hand
 Down on the pavement below the clattering scales of the balance,
 And in the hollow thereof was found the nest of a magpie
 Into whose clay-built walls the necklace of pearls was inwoven."

DESIGNS OF PORTRAITS ON U. S. POSTAGE STAMPS. The designs on the 1870 issue of the U. S. postage stamps were designed as follows :

1-cent, blue,	. . .	Franklin after Rubucht.
2-cent, brown,	. . .	Sackson after Powers.
3-cent, green,	. . .	Washington after Houdon.
6-cent, pink,	. . .	Lincoln after Volk.
7-cent, vermilion,	. . .	Stanton after a photograph.
10-cent, brown,	. . .	Jefferson after Powers.
12-cent, purple,	. . .	Clay after Hart.
15-cent, orange,	. . .	Webster after Clavenger.
14-cent, purple,	. . .	Scott after Coffee.
30-cent, black,	. . .	Hamilton after Carrachi.
90-cent, carmine,	. . .	Perry after Wolcott's Statue.

WILLIS D. KING, Philatelist.

"ET VOCEM AUDIVI CITHARCEORUM CITHARIZANUM IN CITHARIS SUIS." (Vol. IX, p. 136.) The English of the Latin given by "JOSEF" is :

"And I heard the sound of those who were skilled in striking the cithara, playing upon their stringed instruments."

BARBARA STANWIX.

LATIN QUOTATION. (Vol. IX, p. 136.) The quotation of "JOSEF" is from the Apocalypse xiv, 2. Latin (*sicut* omitted). It is translated as follows : "And I heard the voice of harpers harping with their harps."

A. WILDER, M. D.

NEMESIS. (Vol. IX, p. 120.) Nemesis or Retribution is described by Hesiod as the daughter of Night ; but according to Pausanias, she was worshipped by the Rasusanians as the daughter of Okeanos—the Ancient One. She had a temple at Petrai. The Attic tragedians represent her as punishing those who are presumptuous from good fortune, as well as those guilty of crime. Modern writers use the term as personified retribution.

A. WILDER, M. D.

ESCRIBED CIRCLE. (Vol. VI, p. 236). An *escribed* circle is one whose circumference touches exterior side of a given triangle and also the other two sides produced.

HARRISON.

CASTING OUT THE 9's. (Vol. IX, p. 136.) "Daboll's Arithmetic," in which I first learned to 'cipher," had this method of "proving" the work by "casting out the 9's." My teacher, Mr. G. Thomson Gridley, showed me how to do it. I never saw the method in any other work, and so must refer "ALPHEUS" to the quaint home, spun treatise of Nathan Daboll, who was, I believe, a Yankee of Connecticut.

A. WILDER, M. D.

CASTING OUT THE 9's. (Vol. IX, p. 136.) The method of "casting out the 9's" for proof of correctness in the performance of the examples in the fundamentals of arithmetic, is given in Daniel Adams' "Scholar's Arithmetic or Federal Accountant," published as early as 1799. The method of casting out the 9's succeeds on a principle :

"That every figure, in rising from the place of units to that of tens, takes to itself the addition of 9 times its value. The sums from tens to hundreds, etc.

"Consequently, if any figure, for instance 4, be removed from units place and divided by 9, it will leave a remainder of 4 ; the same of any other figure removed and divided by 9, it will leave a remainder of itself, and that only.

"Therefore, if any number be divided by 9 ; or, the figures which express that number be added together and the sum of them be divided by 9, the remainder will be equal.

"These properties of the figure 9 belong to none other of the digits, excepting to the figure 3, and the figure 3 possesses them in consequence only of being an even part of 9."

The manner of casting out the 9's, being familiar to our readers, need not be given here. It is also given in "Daboll's Arithmetic," p. 35, 1816.

HARPIES. (Vol. IX, p. 136.) Hesiod gives the Harpies a very respectable origin. Thaumás (wonder) wedded Elektra, daughter of deep-flowing Okeanos; she bore rapid Iris, and the fair-haired harpies Aello and Okypete. These names signify *whirlwind* and the *swift-flying*. Evidently, therefore, the primitive concept of harpies was that of swift winds, such as mariners encounter at sea, personified.

In the *Odyssey*, the harpies are mentioned by Telemachus as snatching away his father, and by Penelope as tempests that had snatched away the daughters of Pandarus, which is in keeping with the concept.

The tragedians set them forth as monsters, abhorrent and execrable. They pursue Orestes; and rot the tables of Phineus. Virgil also represents them as half women, and half bird, rapacious and foul. They are evidently personifications of wanton rapacity, as well as of sudden death.

A. WILDER, M. D.

SATAN is the apotheosis of self; a supreme personality. The personal is the animal; hence Satan is painted with ears, hoofs, and tail of the animal.

CHRISTOS is the apotheosis of humanity: a divine individuality. The Individual is the Eternal, the Divine: hence Christos is crowned with the thorns of suffering, and with the halo of Divinity.—*The Path*.

Ask not about a person's descent, but ask about his conduct.

—*Sundarikabharadvajasutta* v, 9.

First of all honor the immortal gods as by law enjoined.

—*Pythagoras*.

We must look to the mind and not to the outward appearance.

—*Æsop*.

Hateful to me as the gates of hell is he who conceals one thing in his mind, and utters another.—*Homer*.

To serve God is better, not only than liberty, but even than a kingdom.—*Philo*.

We must so exert ourselves that each may consider himself as the chief contributor to the victory.—*Xenophon*.

To die Fate has appointed to all; but to die honorably is peculiar to the good.—*Isocrates*.

Where the cause is just even the small conquers the great.

—*Sophocles*.

QUESTIONS.

The following first eleven questions are sent to us by a reader of the *St. Louis Republican*, taken from that paper. Why is it that

- 1 Bees never store honey where it is light ?
 - 2 The moth hath a fur jacket and the butterfly none ?
 - 3 Leaves will attract dew when boards, sticks, and stones will not ?
 - 4 A horse always gets up foreparts first and a cow hindparts first ?
 - 5 Corn on the ear is never found with an uneven number of rows ?
 - 6 Fish, flies, and caterpillars may be frozen solid and still retain life ?
 - 7 A squirrel comes down a tree head first and a cat tail first ?
 - 8 Electricity is never visible except when it comes in the form of zigzag lightning ?
 - 9 A horsefly will live for hours after the head has been pinched off ?
 - 10 The dragon-fly can devour its own body and the dead still live ?
 - 11 Some flies thrust their eggs into the bodies of caterpillars, but always in such parts of the body that when the larvæ are feeding on the flesh of the foster parent they will not eat into the vital part ? Can this be explained ? Can the fly reason ?
-

12. Prof. G. M. Minchin, of Cooper's Hill College, England, says that many results in the solution of certain problems of statics "are obtained by *Quaternions* in a much more simple and ready manner for the purpose than by *Cartesian Crutches*." What are mathematical "*Cartesian Crutches*."

13. Give a list of some of the flowers that have been proposed for a "National Flower" for the United States. JUNO.

14. H. T. Riley's "Dictionary of Quotations" (Bohn's edition), p. 543, credits to Homer the quotation — "The generations of men are as leaves." Where does Homer say this ? LEON.

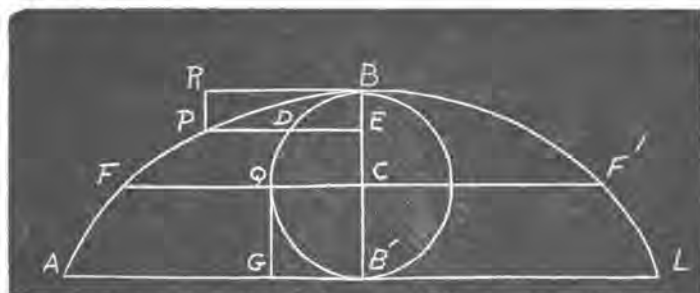
15. The author of "History of Ilium or Troy," published in London, 1802, says on page 15, that a work is extant in Greek entitled "The Sequel to the Iliad." Has this work ever been translated into English, and if so give translator's name and date. LEON.

16. Give an account how the epithets "Black Republican" and "Red Republican" came to be so applied. ALEXANDER.

*Correction of an Error in Davies and Peck's
Mathematical Dictionary.*

The accompanying figure and lettering are reproduced from Davies and Peck's Mathematical Dictionary, Art. *Cycloid*.

They say, "If a line CF is drawn through the center of the generating circle parallel to the base, the area $BCFPB$ is equal to the area of the triangle $B'QC$, or half the square described upon the radius of the generating circle."



That the above quotation contains an error is obvious from inspection; for the semi-cycloidal segment $BCFPB$, instead of being equal to half the square $B'Q$, is equal to the *sum* of the square $B'Q$ and the quadrant CBQ .

If x, y are rectangular coördinates, origin at B , the area A , of the semi-cycloidal segment BPE , $= \int y dx = xy - \int x dy$. Substituting for dy from the differential equation to the curve we get

$$A = xy - \int \sqrt{2rx - x^2} dx.$$

Substituting for y its value from the equation to the curve, and putting $x = r$, we get

$$A = BCFPB = r^2 + \frac{1}{4}\pi r^2 = BECB'GQDB.$$

J. E. HENDRICKS, Des Moines, Iowa.

CANDLE AND KINDLE. (Vol. IX, p. 136.) The rule of English pronunciation, "c soft before e, i, and y," would necessitate the change to *k* in order to form the word *kindle*. BARBARA STANWIX.

SERIES. — ANNUITIES.

[FIFTH PAPER.]

By B. F. Burleson, Oneida Castle, N. Y.

An annuity is a sum of money payable yearly, or at any regular stated periods of time. They are limited or perpetual, certain or contingent, immediate or deferred. A limited annuity ceases at a certain time; a perpetual one continues forever. Certain annuities begin and end at fixed times; contingent ones with the happening of certain events, as the birth or death of a person. Immediate annuities begin at once; deferred ones at a certain or contingent time in the future. An annuity, if not paid when due, is said to be forborne, or in arrears. The present worth of an annuity is that sum which put at interest for the given time and rate will equal the sum of the amounts of the several payments from the time they are made to the last payment. Rules for finding the present worth of immediate, deferred, or forborne annuities are given in nearly all our text books on algebra and arithmetic. It is our design in this paper to give a few problems with their solutions, showing the present worth or purchase value of certain limited and perpetual annuities in which the payments are not uniformly the same.

In our notation a is the first payment of an annuity, R is the amount of one dollar for one year at the given rate of compound interest, n is the number of years the annuity is to continue, and P is its present value.

PROBLEM 15.

What is the present value of an annuity for n years, and forever, if the use of money be worth $r = 5\%$ per annum compound interest, and if the first payment be \$100, and the succeeding payments rise in geometrical progression whose ratio is e ?

SOLUTION.

We have by adding the present worth of the yearly annuities,

$$P = \frac{a}{R} + \frac{ae}{R^2} + \frac{ae^2}{R^3} + \dots + \frac{ae^{n-1}}{R^n}$$

$$= [\text{by summing the geometrical series}] = \frac{a(e^n - R^n)}{R^n - (eR)} \quad (a)$$

When $a = \$100$, $e = 2$, $R = 1.05$, $n = 1$, we find from (a) that $P = \$95.23809$.

When $a = \$100$, $e = 2$, $R = 1.05$, $n = 2$, we find from (a) that $P = \$276.644$.

When $a = \$100$, $e = 2$, $R = 1.05$, $n = 12$, we find from (a) that $P = \$239979.5892$. Etc., etc., etc.

When $n = \infty$, the annuity becomes perpetual and formula (a) becomes by factoring,

$$P = \frac{a}{e-R} \left[\frac{e^n}{R^n} - 1 \right] = \infty \text{ when } e > R, \text{ and } \frac{a}{e-R} \times -1 = \frac{a}{R-e}$$

when $e < R$. Hence, if the ratio by which the successive payments rise be greater than R , or 1.05, the present value of the perpetuity will be an infinite sum; but if it be less it will be

$$P = \frac{a}{R-e} \quad \text{. (b)}$$

When $a = \$100$, $e = 1.04$, $R = 1.05$, we find from (b) that $P = \$10,000$. Etc., etc., etc.

PROBLEM 16.

What is the present value of an annuity for n years, and forever, if the use of the money be worth $r = 5\%$ per annum compound interest, and if the first payment be \$100, and the succeeding payments rise in arithmetical progression whose common difference is d ?

SOLUTION.

We have by putting the amount of P for n years equal to the sum of the amounts of the several payments as they fall due in reverse order.

$$PR^n = a + (n-1)d + [a + (n-2)d]R + [a + (n-3)d]R^2 + \dots + (a+d)R^{n-2} + aR^{n-1} \quad \text{. (1)}$$

By $R(1) - (1)$, etc., we obtain,

$$PrR^n = aR^n - a - nd + d(1+R+R^2 + \dots + R^{n-1})$$

= [by summing the series within the parentheses]

$$= \frac{d(R^n - 1)}{r} - (a + nd - aR^n) \quad \text{. (2)}$$

$$\therefore P = \frac{(ar + d)(R^n - 1) - ndr}{r^2 R^n} \quad \text{. (c)}$$

From formula (c) we obtain,

When $a = \$100$, $d = \$50$, $R = 1.05$, $r = .05$, and $n = 1$; $P = \$95,238.09$.

When $a = \$100$, $d = \$50$, $R = 1.05$, $r = .05$, and $n = 2$; $P = \$231,292.5$.

When $a = \$100$, $d = \$50$, $R = 1.05$, $r = .05$, and $n = 50$; $P = \$15721,331.39$. Etc., etc., etc.

When $n = \infty$, we obtain from formula (c) by evaluation after one differentiation,

$$\frac{(ar+d) \times d R^n - dr}{r^2 \times d R^n}; \text{ after two, } \frac{(ar+d) d_2 R^n}{r^2 d_2 R^n} = \frac{ar+d}{r^2}$$

∴ When the annuity becomes perpetual, $P = \frac{ar+d}{r^2}$. . . (d)

From formula (d) we obtain,

When $a = \$100$, $d = \$50$, $R = 1.05$, and $r = .05$, $P = \$22000$.
Etc., etc., etc.

PROBLEM 17.

What is the present value of an annuity for n years, and forever, if the use of money be worth $r = 5\%$ per annum compound interest, and if the first payment be \$100, the second $3a = \$300$, the third $6a = \$600$, etc., etc., the n th payment being $\frac{1}{2} na (n+1)$?

SOLUTION.

We have by putting the amount of P for n years equal to the sum of the amounts of the several payments as they fall due in regular order.

$$PK^n = aR^{n-1} + 3aR^{n-2} + 6aR^{n-3} + \dots + \frac{1}{2}a(n-1)(n-1)R^2 + \frac{1}{2}na(n-1)R + \frac{1}{2}na(n+1) \quad (1)$$

By (1) $\times \frac{(R-1)^2}{R^2}$ it becomes by uniting similar terms, factoring, etc.,

$$PR^{n-2}(R-1)^2 = a(R^{n-1} + R^{n-2} + R^{n-3} + \dots + R + 1) - \frac{an}{2R}(n+3) + \frac{na}{2R^2}(n-1) \quad (2)$$

Hence, by summing the geometrical series within the parenthesis and dividing the equation by $R^{n-2}(R-1)^2$, we obtain,

$$P = \frac{a(R^n - 1)}{R^{n-2}(R-1)^3} - \frac{na(n+3)}{2R^{n-2}(R-1)^2} + \frac{na(n+1)}{2R^n(R-1)} \quad (e)$$

From formula (e) we obtain,

When $a = \$100$, $R = 1.05$, and $n = 1$; $P = \$95.23809$.

When $a = \$100$, $R = 1.05$, and $n = 2$; $P = \$367.347$.

When $a = \$100$, $R = 1.05$, and $n = 50$; $P = \$399588.9608$.

Etc., etc., etc.

When $n = \infty$ we find by evaluating each term separately of formula (e) by the calculus that the first $= \frac{aR^2}{(R-1)^3}$, and the second and third each zero.

∴ When the annuity becomes perpetual

$$P = \frac{aR^2}{(R-1)^3} = \frac{aR^2}{r^3} \quad (f)$$

From formula (f) we obtain,

When $a = \$100$, $R = 1.05$, $r = .05$; $P = \$882000$.

A Chapter on the Property of Numbers.

CURIOS IN MATHEMATICS.

57. Wm. Allen Whitworth, of Hammersmith, England, has shown that 40 different right-angled triangles can be constructed having the common hypotenuse 32045, and all their sides integers, as follows :

PERPS.	BASES.	PERPS.	BASES.	PERPS.	BASES.	PERPS.	BASES.
716	32037	7259	31212	12325	29580	18291	26312
1363	32016	7656	31117	12920	29325	19227	25636
2277	31964	7888	31059	13572	29029	19552	25389
2400	31955	8283	30956	15080	28275	19795	25200
3045	31900	8580	30875	15708	27931	20300	24795
3757	31824	8772	30821	15916	27813	21000	24205
3955	31800	10075	30420	16269	27608	21093	24124
4901	31668	10192	30381	16704	27347	21576	23693
5304	31603	11475	29920	17051	27132	22100	23205
6764	31323	11661	29848	17253	27004	22244	23067

58. John Leslie says numeration is the mode of classing numbers by successive braces, leshes, warps, etc. He thus refers to the manner of the converting a number from one scale to another. Hence, let it be required to reduce the number 430685 to the several scales as here exemplified :

Binary,	11010010010011101	Octary, . . .	1511135
Ternary, . . .	210212210022	Nonary, . . .	725708
Quaternary, . . .	1221021131	Denary, . . .	430685
Quinary, . . .	102240220	Undenary, . . .	274642
Senary, . . .	13121525	Duodenary, . . .	189205
Septenary, . . .	3442433		

59. It has been proposed by W. Allen Whitworth, and shown (*Times* Reprint Vol. XXXII, p. 69) that 9091 is the *only prime* number which, as a denominator to a fraction with 240 numerators, will, when each is reduced, produce the digits in recurring decimals ; hence the number 9091 is the sum of each of two of the 240 numerators taken 120 times ; and the decimal digits of these 120 pairs will always sum 9's, as seen by the following table :

TABLE OF 240 NUMBERS $\div$ 9091 GIVING THE DIGITS.

NUM.	DEC. DIGITS.	NUM.	DEC. DIGITS.	NUM.	DEC. DIGITS.
114	0125398746	674	0741392586	1266	1392586074
8977	9874601253	8417	9258607413	7825	8607413625
115	0126498735	679	0746892531	1268	1394786052
8976	9873501264	8412	9253107468	7823	8605213947
123	0135298647	714	0785392146	1328	1460785392
8968	9864701352	8377	9214607853	7763	8539214607
125	0137498625	715	0786492135	1330	1462985370
8966	9862501374	8376	9213507864	7761	8537014629
133	0146298537	957	1052689473	1337	1470685293
8958	9853701462	8134	8947310526	7754	8529314706
134	0147398526	958	1053789462	1340	1473985260
8957	9852601473	8133	8946210537	7751	8526014739
474	0521394786	966	1062589374	1357	1492685073
8617	9478605213	8125	8937410625	7734	8507314926
479	0526894731	968	1064789352	1358	1493785062
8612	9473105268	8123	8935210647	7733	8506214937
483	0531294687	976	1073589264	1914	2105378946
8608	9468705312	8115	8926410735	7177	7894621053
489	0537894621	977	1074689253	1915	2106478935
8602	9462105378	8114	8925310746	7176	7893521064
533	0586294137	1137	1250687493	1941	2135078649
8558	9413705762	7954	8749312506	7150	7864921350
534	0587394126	1140	1253987460	1945	2139478605
8557	9412605873	7951	8746012539	7146	7860521394
565	0621493785	1146	1260587394	1951	2146078539
8526	9378506214	7945	8739412605	7140	7853921460
569	0625893741	1150	1264987350	1954	2149378506
8522	9374106258	7941	8735012649	7137	7850621493
583	0641293587	1176	1293587064	2274	2501374986
8508	9358706412	7915	8706412935	6817	7498625013
589	0647893521	1177	1294687053	2279	2506874931
8502	9352106478	7914	8705312946	6812	7493125068
623	0685293147	1228	1350786492	2301	2531074689
8468	9314706852	7863	8649213507	6790	7468925310
625	0687493125	1230	1352986470	2309	2539874601
8466	9312506874	7861	8647013529	6782	7460125398
665	0731492685	1246	1370586294	2351	2586074139
8426	9268507314	7845	8629413705	6740	7413925860
669	0735892641	1250	1374986250	2354	2589374106
8422	9264107358	7841	8625013749	6737	7410625893

NUM.	DEC. DIGITS.	NUM.	DEC. DIGITS.	NUM.	DEC. DIGITS.
2365	2601473985	3201	3521064789	3761	4137058629
6726	7398526014	5890	6478935210	5330	5862941370
2369	2605873941	3209	3529864701	3763	4139258607
6722	7394126058	5882	6470135298	5328	5860741392
2401	2641073589	3261	3587064129	4183	4601253987
6690	7358926410	5830	6412935870	4908	5398746012
2409	2649873501	3263	3589264107	4189	4607853921
6682	7350126498	5828	6410735892	4902	5392146078
2441	2685073149	3365	3701462985	4201	4621053789
6650	7314926850	5726	6298537014	4890	5378946210
2445	2689473105	3369	3705862941	4209	462853701
6646	7310526894	5722	6294137058	4882	5370146298
2665	2931470685	3401	3741062589	4261	4687053129
6426	7068529314	5690	6258937410	4830	5312946870
2669	2935870641	3409	3749862501	4263	4689253107
6422	7064129358	5682	6250137498	4828	5310746892
2674	2941370586	3441	3785062149	4274	4701352986
6417	7058629413	5650	6214937850	4817	3298647013
2679	2946870531	3445	3789462105	4279	4706852931
6412	7053129468	5646	6210537894	4812	5293147068
2714	2985370146	3565	3921460785	4301	4731052689
6377	7014629853	5526	6078539214	4790	5268947310
2715	2986470135	3569	3925860741	4309	4739852601
6376	7013529864	5522	6074139258	4782	5260147398
2823	3105268947	3583	3941260587	4351	4786052139
6268	6894731052	5508	6058739412	4740	5213947860
2825	3107468925	3589	3947860521	4354	4789352106
6266	6892531074	5502	6052139478	4737	5210647893
2841	3125068749	3623	3985260147	4474	4921350786
6250	6874931250	5468	6014739852	4617	5078649213
2845	3129468705	3625	3987460125	4479	4926850731
6246	6870531294	5466	6012539874	4612	5073149268
2861	3147068529	3733	4106258937	4483	4931250687
6230	6852931470	5358	5893741062	4608	5068749312
2863	3149268507	3734	4107358926	4489	4937850621
6228	6850731492	5357	5892641073	4602	5062149378
3183	3501264987	3751	4126058739	4533	4986250137
5908	6498735012	5340	5873941260	4558	5013749862
3189	3507864921	3754	4129358706	4534	4987350126
5902	6492135078	5337	5870641293	4557	5012649873

The foregoing two-page table is the same as paragraph No. 55, except the numerators are combined in twos so the sum of each two is equal to the constant denominator 9091.

60. The following are some very singular results of two numbers contributed to NOTES AND QUERIES (Vol. VIII, No. 6; 1891), by Thos. S. Barrett, London, England :

$$2.5061843881 + .3990129572 +$$

The reciprocal of 2.5061843881 is .3990129572

The logarithm of 2.5061843881 is .3990129572

The logarithm of .3990129572 + .3990129572 = 0.

The logarithm of 3.990129572 + .3990129572 = 1.

The logarithm of 39.90129572 + .3990129572 = 2.

The logarithm of 399.0129572 + .3990129572 = 10.

.3990129572 — the logarithm of .3990129572 = 2 × .3990129572

The number 2.5061743881 × 3.990129572 = 10.

$$.3990129572 \sqrt{3990129572} = 10.$$

$$.3990129572^{2.5061843881} = .3990129572 \times .25061843881$$

$$2.5061843881 \sqrt{10} = 2.5061843881$$

$$\frac{2.5061843881}{.3990129572} = \text{the square of } 2.5061843881$$

The logarithm of .3990129572 = — .3990129572 which is generally written $\frac{1}{1.6009870428}$

61. The base of the natural system of logarithms, 2.718281828 + and the logarithm of 10 in that system, 2.302585092 +, also have some remarkable results :

The reciprocal of 2.718281828 is .3678794418

The logarithm of 2.718281828 is .4342944819

The reciprocal of 2.302585092 is .4342944819

The logarithm of 2.302585092 is .3678794418

62. John D. Williams, in his "Elementary Algebra of Theory and Practice," pp. 350-351, says that the equation " $5x+7y+9z=93256$ " will admit of 18801148 integral answers.

63. Fermat, in his "Diophantus," Bk., VI, p. 181, proposed a problem to the English mathematicians, to show that there was only one integral solution of the equation $x^2+2=y^3$; the solution evidently being $x=2$, and $y=3$. On this he has a note to the effect that he had no difficulty in finding a solution in rational fractions, but that he had discovered an entirely new method, *sane pulcherrima et subtilissima*, which enabled him to solve such questions in integers.

64. The following table of polygons of less than 100 sides, admitting of a geometrical construction, is found in Barlow's "Theory of Numbers," p. 505 :

3 = trigon.	16 = 2^4	48 = $3 \cdot 2^4$
4 = 2^2	17 = $2^4 + 1$	51 = $17 \cdot 3$
5 = $2^2 + 1$	20 = $5 \cdot 2^2$	60 = $15 \cdot 2^3$
6 = $2 \cdot 3$	24 = $3 \cdot 2^3$	64 = 2^6
8 = 2^3	30 = $15 \cdot 2$	66 = $17 \cdot 2^2$
10 = $2 \cdot 5$	32 = 2^5	80 = $5 \cdot 2^4$
12 = $3 \cdot 2^2$	34 = $17 \cdot 2$	85 = $17 \cdot 5$
15 = $5 \cdot 3$	40 = $5 \cdot 2^3$	96 = $3 \cdot 2^5$

After the above table is added, the following three consecutive polygons each of which is inscribable in a circle :

$$255 = 3 \cdot 5 \cdot 17. \quad | \quad 256 = 2^8 \quad | \quad 257 = 2^8 + 1$$

Then Barlow says the next three consecutive digits that admit of a geometrical construction are the following :

$$65535 = 265 \cdot 257 \quad | \quad 65536 = 2^{16} \quad | \quad 65537 = 2^{16} + 1$$

Now the product of the extremes of first three consecutive polygons, 3 and 5, give the first of the next three consecutive polygons, and the product of the extremes of the second three give the first polygon of the third three, etc., and thererore can there be any limit to the geometrical construction of such polygons ?

$3 \times 5 = 15$	3, 4, 5
$15 \times 17 = 255$	15, 16, 17
$255 \times 257 = 65535$	255, 256, 257
$65535 \times 65537 = 4294967295$	65535, 65536, 65537
	4294967295, 4294967296, 9294967297

65. Davies and Peck, in their "Mathematical Dictionary," say that only four pairs of *amicable numbers* were known at that time (1862), which are as follows :

220 and	284
6232 "	6368
17296 "	18416
9363584 "	9337056

In the Appendix to the *Ladies' Diary*, Vol. IV, p. 342, there is a table of *sixty-three pairs* of amicable numbers which were computed by Euler and published in a tract in 1750. These were communicated to NOTES AND QUERIES, Vol. III, pp. 150-151, 1886, by Prof. H. A. Wood, now of Stevens High School, Hoboken, N. J. The 62d pair in Euler's table is 2620 and 2924, and would fall in as second above.

66. W. Allen Whitworth proposed the following problem (*Times* Reprint, Vol. XXXIX, p. 37) in 1883 :

Show that there are 220 triangles whose sides are integers not exceeding 100, and whose areas are also integral.

The list of the 220 triangles is as here set forth :

1. Right-angled ; in number, including multiples, 52.

3 4 5	20 21 29	11 60 61	36 77 85
5 12 13	12 35 37	16 63 65	13 84 85
8 15 17	9 40 41	33 56 65	29 80 89
7 24 25	28 45 53	48 55 73	65 72 97

2. Isosceles ; in number, including multiples, 72.

5 5 6	25 25 14	41 41 18	65 65 66
5 5 8	25 25 48	41 41 80	73 73 96
13 13 10	29 29 40	53 53 56	85 85 72
13 13 24	29 29 42	53 53 90	85 85 26
17 17 16	37 37 24	61 61 22	89 89 78
17 17 30	37 37 70	65 65 32	

3. Scalene ; in number, including multiples, 96.

4 13 15	25 29 36	34 65 93	53 75 88
13 14 15	25 39 40	35 53 66	57 82 89
7 15 20	29 35 48	36 61 65	56 61 75
11 13 20	39 41 50	37 91 96	57 65 68
10 17 21	13 68 75	39 41 50	60 73 91
12 17 25	15 41 52	39 85 92	61 74 87
13 20 21	17 55 60	40 51 77	61 91 100
17 25 26	20 37 51	41 51 58	65 76 87
17 25 28	25 39 56	41 84 85	65 87 88
13 37 40	25 52 63	43 61 68	68 75 77
13 40 45	25 51 52	48 85 91	68 87 95
15 34 35	25 74 77	50 69 73	75 86 97
15 37 44	26 51 55	51 52 53	78 95 97
17 39 44	29 52 69	52 73 75	89 99 100

67. Prof. Augustus DeMorgan mentions in his "Algebra," p. 87, the prolixity of the roots of the number 4096.

$$4096 = 64^2 = 16^3 = 8^4 = 4^5 = 2^{12}$$

68. A number composed of two cubes being given, it is possible to find two other cubes, the sum of which shall be equal to the former two. Vieta was of contra opinion ; but M. de Fermat, in his " Observations on the Arithmetical Questions of Diophantus," (with a Commentary by Bachet de Meziriac), has pointed out a method by which such cubes can be found. The calculations indeed extend to numbers which are exceedingly complex, and sufficient to frighten the ordinary arithmetician, but the acute analyst can solve such problems.

It was proposed to divide the sum of the two cubes 8 and 1 into two other cubes.

Father de Billy undertook the solution of the problem and gave for the two other cubes the two following fraction as found in Hutton's " Recreations in Mathematics and Natural Philosophy," (Edward Biddle's edition), London, 1840, p. 30 :

$$\frac{12436177733990097836481_3}{60962383566137297449} + \frac{487267171714352336560_3}{60962383566137297449} = 1^3 + 2^3 = 9$$

Hutton remarks that we must take these number on Father de Billy's word, for he does not know whether any one will ever venture to examine whether he is correct or not.

Abijah McLean, of New Lisbon, Ohio, some forty years ago, thoroughly examined this problem, solving the same, and says these numbers, as published by Hutton are wrong ; he says the true answer is :

$$\frac{12436177733990094836481_3}{609623835676137297449} + \frac{487267171714352336560_3}{609623835676137297449} = 1^3 + 2^3 = 9$$

69. Artemas Martin, in 1873, proposed the following problem which appears in the " Times Reprint," Vol. XX, p. 42, the answers to which are sides of the largest right-angled triangle known to have been calculated :

There is an integer series of right-angled triangles whose legs differ by unity only, that whose sides are 3, 4, 5 being the first triangle ; show that the sides of the 80th triangle are,

$$\begin{array}{l} 10588278309438211127768625972711138460195892610538807320361440 \\ 10588278309438211127768625972711138460195892610538807320361441 \\ 14974086787388384990495417211933241811765094618559069827415009 \end{array}$$

70. The number 120 has the property of being equal to half the sum of its aliquot parts, or divisors :

$$1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, \text{ added } = 240$$

The number 672 is also equal to half the sum of its aliquot parts.

71. The occult properties of some numbers are thus illustrated by William G. Leonard, of Cincinnati, Ohio, in the *Scientific American*. He says of the number 27648, that it is exactly equal to the series, $1^3 \times 2^3 \times 3^3 \times 4^3 = 27648$, and that such a remarkable coincidence can not be merely accidental; it must have some deeper foundation in the mysteries of astronomy, such for example, as the number in which the vast cycle of the precession of the equinoxes is completed. He continues his speculations, and observes that the first two digits 27 is a cube $= 3^3$, and the last digit 8 is also a cube $= 2^3$, that the middle digit 6 is twice the cube root of 27, and the other digit 4 is twice the cube root of 8, and that the sum of all the digits is exactly equal to the first cube 27, whose cube root is 3, and the sum of these digits 9 the square of 3. The number 27648 reversed becomes 84672 which contains the original number exactly $\frac{4}{3}$ times; both terms of the fraction expressing the ratio are perfect squares which are contained a whole number of times in the reversed number, and the square roots of the terms of the ratio 7 and 4 differ by the constantly recurring digit 3; the terms of the fraction $\frac{4}{3}$ also differ by 38; again, 84672 is divisible by the square of the digits (excepting 5 and 9), without a remainder: that is, by $1^2, 2^2, 3^2, 4^2, 6^2, 7^2, 8^2$, and also by the cubes $1^3, 2^3, 3^3, 4^3$. The sum of the digits 2, 4, 6, 7, 8 $= 27$ the cube of 3. The first two digits 84 minus the last two 72 is twice the middle digit 6, which is the difference between the first and last digit 8 and 2. The sum and difference of 27648 and 84672 is 57024 and 112320 which numbers, he says, have similar remarkable properties.

72. William Lenhart, of York, Pa., proposed in the "Mathematical Miscellany," No III, 1836, the following problem, and solved the same.

It is required to find four integers such that the sum of every two of them may be a cube.

- | | |
|-----------------------------|-------------------------------|
| I. 2080913082956455142636. | III. 7262810476410016163052. |
| II. 4937801347510680732948. | IV. 214972108693241589340948. |
| I. + II. $= (19146344)^3$ | I. + III. $= (21062342)^3$ |
| I. + IV. $= (60097344)^3$ | II. + III. $= (23021160)^3$ |
| II. + IV. $= (60359866)^3$ | III. + IV. $= (60571840)^3$ |

Thus we have in the table four pairs of cubes that are equal to each other, and the lesser cubes in any three pairs of the four are such that the sum of every two of them is greater than the third, which are the proper requisites; consequently, as four things can be combined four different ways three at a time, we shall be able from these pairs of cubes to find four different sets of integers to answer the question; but neither set will be of a denomination as low as the set given above.

73. If a series of fractions, says Thos. S. Barrett, of London, be made thus : $\frac{2}{3}, \frac{3}{5}, \frac{5}{8}, \frac{8}{13}, \frac{13}{21}, \frac{21}{34}, \frac{34}{55}, \frac{55}{89}$, &c., in which every numerator is the preceding denominator, and each denominator is the sum of the preceding numerator and denominator, then the farther we proceed with the series the nearer the fraction becomes = $.618034+$. They are alternately a little greater and a little less, and the difference decreases at each successive step.

The decimal $.618034+$ has some remarkable properties, thus :

Let $x = .618034$. Let $y = 1.618034$. Let $z = 2.618034$.

The *pronix* of $.618034 = x^2 + x = 1 = xy$.

The reciprocal of $.618034 = 1.618034 = y$.

The square of $1.618034 = 2.618034 = z$.

$y + z = 1.618034 + 2.618034 = 4.236068 = z^2 - y^2 = y^3$.

$y \times z = 1.618034 \times 2.618034 = 4.236068 = z^2 - y^2 = y^3$.

The cosine of the angle that the sides of the Great Pyramid make with the plane of the base is $.618034$.

74. In 1872, the following problem was proposed in the *Times* Reprint, Vol. XVIII, p. 104 :

To find n numbers whose sum is a square, and the sum of their squares a biquadrate.

This problem was solved by Samuel Bills of Newark-on-Trent, Eng., who found the triad 64, 152, 409 to fulfil the conditions, and these numbers were supposed to be the least, till the same problem was again proposed by Dr. David S. Hart, of Stonington, Conn., in the same publication, in 1876, Vol. XXIV, p. 55, when the proposer found the triad 8, 49, 64 to fulfil the conditions. These numbers are the least known at present.

$8 + 49 + 64 = 11^2 = 121$. $8^2 + 49^2 + 64^2 = 9^4 = 6561$.

75. Mr. George R. Perkins, of Clinton, N. Y., observed in 1839, (*Mathematical Miscellany*, Vol. II, p. 92,) the singular property that all numbers terminating with the figures 12890625, have all their integral powers terminate with the same figures ; or that

$(\dots\dots\dots 12890625)^n = \dots\dots\dots 12890625$.

76. Dr. D. S. Hart has shown 13, 14, 15 are the sides of the least scalene triangle whose sides consecutively differ by 1 ; that 9, 10, 17 are the sides of the least scalene triangle two of whose sides differ by 1 ; and, also, that 11, 13, 20 are the sides of the least scalene triangle no two sides of which differ by 1 ; the areas being in all cases rational.

77. It is stated that Mersenne once asked Fermat if he could tell without much trouble whether the number 100895598169 was a prime or not. Fermat wrote to Mersenne on April 7, 1643, that the number was the product of *two primes*, namely,

$$898423 \times 112303 = 100895598169$$

Fermat did not indicate his method of discovering the result. But even with the aid of modern tables few persons would undertake the task of answering such a question.

W. Stanley Jevons a dozen years or more ago multiplied *two primes* together and obtained 8616460799, and then said: "It is quite likely that no one but myself will ever know what the two prime numbers are." It seems that Fermat possessed some means of telling when a number was prime or not.

A test by which it is possible to tell whether a number is prime or not can be had by reference to Mersenne's *Cogitata Mathematica*, in which it is stated that in order that $2^p - 1$ may be prime, the only values of p , not greater than 257, which are possible are

1, 2, 3, 5, 7, 13, 17, 19, 31, 67, 127, and 257;

Herr Seelhoff has also shown that 61 must be placed in the line.

The number $2^{61} - 1$ contains nineteen figures and is the highest prime number known at the present time, which value is,

$$2^{61} - 1 = 2305843009213693951$$

78. It is probable that all *perfect numbers* are included in the formula $2(2^p - 1)$, where $2^p - 1$ is a prime. Euler proved that any number of this form is *perfect*, and that the formula included all even perfect numbers. Every perfect number ends either with the digit 6 or the two digits 28, which are the first perfect numbers.

Thus, $p = 2, 3, 5, 7, 13, 17, 19, 31, 61$, then by Mersenne's rule the corresponding values of $2^p - 1$ are primes, and are as follows:

3	131071
7	524287
31	2147483647
127	2305843009213693951
8191	

Edward Brooks, in his "Written Arithmetic," Article 71, states that the following two numbers are perfect:

$$2417851639228158837784576$$

$$9903520314282971830448816128$$

But Mersenne says the only prime numbers not greater than 257

that will possibly produce perfect numbers are 1, 2, 3, 5, 13, 17, 19, 31, 67, 127, and 257. Herr Seelhoff has also shown that the prime 61 has a value that will produce a perfect number, the largest thus far known.

Prof. Ignacio Beyens, in "Educational Times" *Reprint*, Vol. XLIX, p. 85, says that 2417851639228158837784576 is a perfect number produced from the prime 41.

The perfect numbers now claimed to be known are :

6
28
496
8128
33550336
8589869056
137438691328
2305843008139952128
2417851639228158837784576
9903520314282971830448816128
2658455991569831744654692615953842176

If Edward Brooks's second number is correct it would seem that Mersenne's numbers would still require correction between 41 and 61.

79. It is something remarkable, as has been observed by Maseres (*Script. Logarithmici*, Vol. III, p. 479), that the complicated series, which is the log. tan. $(45^\circ + \frac{1}{2}x)$, should have it several terms the same, except with regard to the signs, as those of the reverted series; it being the only instance yet known of such a series. It is this :

$$x + \frac{1}{8}x^3 + \frac{1}{24}x^5 + \frac{61}{5040}x^7 + \frac{277}{72576}x^9, \&c., = z.$$

$$z - \frac{1}{8}z^3 + \frac{1}{24}z^5 - \frac{61}{5040}z^7 + \frac{277}{72576}z^9, \&c., = x.$$

80. The decimal fraction .577 has the peculiarity that it exceeds its cube more than any other *numerical quantity* whatever exceeds its cube. $.577 - .577^3 = .384899$.

The same may be said of the fraction $\frac{1}{2}$, that it exceeds its square more than any other fraction.

81. J. L. McKenzie, has found that the the sum of the squares of the first 24 natural numbers = a square, and that there is no other finite number of squares from 1 to 1000000² that will = a square.

William Lenhart, of York, Penn., in 1839, proved that the 1000 numbers from 1134 to 2133 inclusive = the cube 16830³. He says the same had been shown previously by one M. Pagliani.

82. Dr. D. S. Hart proposed to find three right-angled triangles whose perimeters shall be equal, and whose areas shall be in arithmetical proportion. U. Jesse Knisely furnished these three :

$$20, 48, 52 ;$$

$$24, 45, 51 ;$$

$$30, 40, 50 ;$$

Hence, perimeters equal 120 ; areas, 480, 540, 600.

J. L. McKenzie proposed to find the least triangle whose sides are integers in arithmetical proportion, and the perpendiculars on the sides from the opposite angles integers in harmonical proportion. H. S. Monck furnished this one, 845, 910, 975, and says he believes it the lowest triangle in which the sides and perpendiculars are really distinct.

83. Montucla inserted in "Ozanam," p. 202, edition of 1840, a striking illustration of the principle of the lever and fulcrum founded on the well-known story of Archimedes who is said to have declared that, were he but given a fixed fulcrum, he could move the world. Montucla proceeded to calculate the mass of the earth, and assuming that a man could work incessantly at the rate of 116 foot-lbs. per second (which is a very high estimate), he found that it would take over 3,653,745,176,803 centuries before the earth was moved a single inch.

84. The following equations are given by John D. Williams in his "Algebra," p. 250, which develop the same numerical roots with the signs changed :

$$(a) \text{ Given } x^2 - 3x = 1. \quad (b) \text{ Given } x^2 - 5x = -1.$$

What are the three values of x in each equation?

$$\text{Roots. } \begin{cases} (a) & x = 1.8793892, & -1.5320888, & \text{and } -.3472964. \\ (b) & x = -1.8793892, & 1.5320888, & \text{and } .3472964. \end{cases}$$

85. To separate a number into a number of parts (for their greatest possible power) any number divided by 2.718281828 will produce the exponent for that power. For examples :

$$\frac{24}{2.7182818} = 8.829 ; \text{ and } 2.718281828^{8.829} = \text{a maximum for the parts that 24 can be separated into.}$$

$$\frac{5.436563656}{2.718281828} = 2 ; \text{ and } 2.718281828^2 = \text{a maximum for the parts that 5.436563656 can be separated into.}$$

86. Vanishing fractions, and some other similar algebraical expressions, are such as in certain cases become equal to $\frac{0}{0}$, which symbol, though apparently of no value, cannot be rejected as useless, being of frequent occurrence in various algebraical investigations, and where it is found to represent some fixed quantity. The following problem was the cause of a violent controversy between two mathematicians, Waring and Powell, in 1760, when these gentlemen were candidates for the mathematical professorship at Cambridge. Waring maintained that the value of the fraction $\frac{x-x^5}{1-x}$ is equal to 4, when $x=1$; Powell (or rather Maseres, as was supposed to have conducted the dispute), that it was equal to 0. The idea of vanishing fractions first originated about 1702, in a contest between Varignon and Rolle, to French mathematicians of considerable eminence, concerning the principles of the differential calculus, of which Rolle was a strenuous opposer.

What is the true value of the fraction $\frac{x-x^5}{1-x}$, when x is equal to 1?

If we put $x=1$, there will arise $\frac{1-1}{1-1} = \frac{0}{0}$; but by division,

$\frac{x-x^5}{1-x} = x+x^2+x^3+x^4$; where, if x be now put $=1$, we shall have the true result $=4$, which is therefore in this case, the true value of the symbol $\frac{0}{0}$.

87. "What is a tree?" Prof. Sylvester, F. R. S., thus answers this question in Vol. XXX, "Educational Times" *Reprint*, p. 52:

A tree is a system of points and lines in which every line is limited by two of the points, and every point is connected with every other by a single line or a single series of lines; or, more generally, a tree is a system of ideas in which every idea is related directly or mediately *in only one way* to every other, two ideas being said to be mediately related when they may be regarded as the extremes of a chain of ideas, capable of being so taken in succession as that each non-extreme shall stand in direct relation to its immediate antecedent and consequent.

88. Wm. Allen Whitworth says the only triangle whose altitude and sides are expressed by four consecutive integers is 13, 14, 15, which has an altitude of 12.

89. Mr. O. Root found the three consecutive natural numbers (said to be the lowest three) that are divisible by cube numbers greater than unity, as follows, 1375, 1376, 1376. Examples of larger numbers are 5750, 5751, 5752; and 21248, 21249, 21250.

90. In 1870, the Maine Farmers' Almanac contained the following question, proposed by Artemas Martin, now of the Geodetic and Coast Survey Office, Washington, D. C. :

A boy goes on tossing a penny until he turns up a head ; at whatever throw he succeeds he is to receive that part of a dollar. What is the value of his expectations?

The problem is solved in the Almanac for 1871 by "MECHANIC."

The probability that a head will turn up on any given toss is $\frac{1}{2}$; and the probability against it is also $\frac{1}{2}$; the value of the first toss is, then $1 \times \frac{1}{2}$. The probability that the boy fails on the first toss is $1 - \frac{1}{2}$; the probability that he fails on the first and succeeds on the second is $\frac{1}{2}^2$. The value of the second toss is, then $\frac{1}{2} \times \frac{1}{2}^2$. The probability that he fails on the first and second throws is $\frac{1}{2} - \frac{1}{2}^2 = \frac{1}{2}^2$, and the probability that he succeeds on the third toss is $\frac{1}{2} \times \frac{1}{2}^2 = \frac{1}{2}^3$; the value of the third toss is, then $\frac{1}{2} \times \frac{1}{2}^3$; and generally, the value of the n th toss is $\frac{1}{2} (\frac{1}{2})^n$. Giving n all integral values from 1 to infinity, the whole value of his expectation, is

$$\frac{1}{1 \times 2} + \frac{1}{2 \times 2^2} + \frac{1}{3 \times 2^3} + \frac{1}{4 \times 2^4} + \&c., \text{ to infinity.}$$

Taking the first eighteen terms of this series we get the Napierian logarithm of 2 = .6931472 true to seven places of decimals. Hence, the value of his expectations is $69\frac{1}{2}$ cents, nearly.

91. William Saint, in 1811, proposed in the *Ladies' Diary* the question "to find the least possible integer square number that terminates with the greatest number of equal digits."

This was answered by several correspondents and shown to be $38^3 = 1444$. One of the correspondents, Henry Atkinson, adds to his that no integer square number can end with more than three equal digits ; and that when any square number terminates with either two or three equal digits, these digits will always be 4's.

92. Prof. C. Gill in 1836, states that Peter Barlow asserted that "No triangular number, except unity, can be equal to a pentagonal number."

Prof. Gill, in "Mathematical Miscellany," Vol. I, p. 223, show that the series of numbers as follows are both triangular and pentagonal :

$$1, 225, 40755, 7906276, 1533776805, \&c.$$

The first, third, fifth, &c., terms are also hexagonal numbers.

The series of square numbers as follows, are also octagonal :

$$1, 225, 43681, 8473921, 1643897025, \&c.$$

93. M. De Parville, in *La Nature*, 1884, part 1, pp. 285-289, gives an account of the origin of the toy, Tower of Bramah, which is a sufficiently pretty conceit to deserve repetition.

In the great temple of Benares, beneath the dome which marks the center of the world, rests a brass plate in which are fixed three diamond needles, each a cubit high, and as thick as the body of a bee. On one of these needles, at the creation, God placed 64 discs of pure gold, the largest disc resting on the brass plate, and the others getting smaller and smaller up to the top one. This is the tower of Bramah. Day and night unceasingly the priests transfer the discs from one diamond needle to another according to the fixed and immutable laws of Bramah, which require that the priests must not move more than one disc at a time and that he must place this disc on a needle so that there is no smaller disc below it. When the 64 discs shall have been thus transferred from the needle on which at the creation God placed them, to one of the other needles, tower, temple and Brahmins alike will crumble into dust, and with a thunderclap the world will vanish.

The number of separate transfers of single discs which the Brahmins must take to effect the transfer of the tower is $2^{64}-1$; that is, is

$$18,446,744,073,709,551,615;$$

a number which, even if the priests never made a mistake, would require many thousands of millions of years to carry out.

94. From the history of the theory of numbers some good examples of false induction can be adduced. Taking the following series of prime numbers,

$$41, 43, 47, 53, 61, 71, 83, 97, 113, 131, 151, \&c.$$

it will be found that they all agree in being values of the general expression x^2+x+41 , putting for x in succession the values 0, 1, 2, 3, 4, 5, 6, &c. We seem always to obtain a prime number, and the induction is apparently strong, to the effect that this expression always will give primes. Yet a few more trials disproves this false conclusion. Put $x = 40$, and we obtain $40 \times 40 + 40 + 41$, or, 41×41 . Such a failure could never have happened, had we shown any deductive reason why x^2+x+41 should give primes.

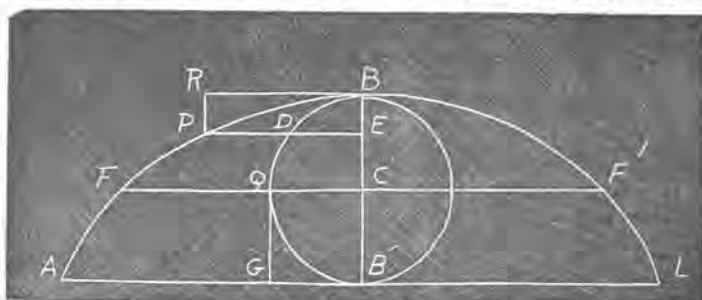
95. Divines have frequently asserted that that numbers cannot express the length of eternity; it is, therefore, required to show those reverend gentlemen, that the number of years contained in eternal duration may be accurately expressed by means of two digits.

ERRATUM. The fourth line of paragraph No. 27 should read,

$$\text{Hence, } 2,718281828^{363337719 \cdot 741} = \text{a maximum.}$$

96. Dr. J. E. Hendricks, of Des Moines, Iowa, furnishes a note to his correction of an error in Davies and Peck's "Mathematical Dictionary," as communicated to NOTES AND QUERIES, Vol. X, p. 221, as follows :

Note. If we join FB , because $FC = \frac{1}{2}\pi r + r$, the area of the triangle FCB will equal $\frac{1}{2}r(\frac{1}{2}\pi r + r) = \frac{1}{4}\pi r^2 + \frac{1}{2}r^2$. Therefore, because area $BCFPB = \frac{1}{4}\pi r^2 + r^2$, the segment $FBP = \frac{1}{2}r^2$; consequently,



"The area $BCFPB$ is equal to the area of the triangle $B'QC$, or $\frac{1}{2}$ of the square described upon the radius of the generating circle," plus the area of the triangle FCB .

That is, the error referred to may be corrected by adding to the quotation from the "Dictionary" the above italicized words.

97. In Barlow's "Theory of Numbers," p. 299, it is stated that in the equation $x^2 - 5658y^2 = 1$ the least value of x and y are,

$$x = 166100725257977318398207998462201324702014613503.$$

$$y = 698253616416770487157775940222021002391003072.$$

Artemas Martin has shown that these numbers are not the least values that will satisfy the equation, but that the true values are,

$$x = 1284836351, \quad y = 17081120.$$

98. In 1697, John Bernoulli challenged the world (first) to determine the brachistochrone, and (second) to find a curve such that if any line drawn from a fixed O cut it in P and Q that $OP^n + OQ^n$ would be constant. Leibnitz solved the first of these questions after rather more than six months' effort, and then suggested that they should be sent as a challenge to Newton and others. Newton received the problems on January 29, 1697, and gave the complete solutions of both problems the next day; at the same time generalizing the second question. The answers were sent anonymously through Montague, but Bernoulli recognized the hand of Newton "even as the lion is known by his paw."

MISCELLANEOUS
NOTES AND QUERIES,
WITH ANSWERS.

"Plato, the most divine, most holy, most wise man, the Homer of philosophers."
—PANÆTIUS.

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No. 4.

"The Mount of Footprints."

My impression is that the following narrative of an historical and geographical subject will be suitable to your pages, and may not be known to many of your readers; so I send you the following notice of it, and some comments thereon, at your option to use or not.

In a copy of a Wesleyan Missionary Record which I incidentally met with, of a modern date, I found the following interesting narrative titled by the missionary, "The Mount of Footprints."

When I was at Timbabwe,* I heard that some miles away there was a great rock full of "spoors," *i. e.* prints of human feet and hoofs of animals; that they were not pictures, but that men and beasts must have passed over the rocks when in a pulpy state. The natives for some reason keep the existence and locality of these spoors a secret, and we heard that the native men about Timbabwe had been warned by the chiefs not to reveal the place to white men, under pain of death.

Having learned so much, we questioned Pianing, our guide, on the matter. After a good deal of hesitation he admitted he had heard of the place of "spoors"; that he had been there; that, in fact, his native village was close to the place, and that his village must be passed through in order to get to the "spoors." He said no white man had ever been there. Be that as it may, it is certain that no description has as yet been given of them.

Our stock of food having been only calculated for the visit to Timbabwe, I returned to the wagon, 15 miles away, to get food, and to

* Timbabwe is the remains of apparently a great city of some former age.

ask Mr. Shimmin to accompany me to see the strange footprints.

We started the next morning with three boys, our old guide being one, having yielded to the temptation of a blanket for his services. For the first ten miles our road was the same as to Timbabwe, and then we struck out southeast. We came into a country of hills and villages and running streams. In some places, high masses of rock rose up in the midst of the villages, with great trees growing in the crevices. Some of the hills had steep sides, forming ledges or terraces; and on the side of one of these hills was a beautiful village called Muzoa. The houses were built on the ledges, or in the crannies of the rocks; with little storehouses perched right on the top of bare boulders, which looked as if the first shower of rain would wash them away; and the trees and flowering shrubs growing all about the village with tobacco gardens at the base, and the whole formed one of the most exquisite pictures I have seen.

Probably few, if any, white men have passed through these hills and valleys before, for the people ran together to see these strange white men. To our surprise even the women and girls came down to have a look at us. At first they stood on some rocks and viewed afar off. Some of the men came and offered articles for sale. As the men found we were harmless, the women and girls came near, and seemed to have a good deal to say about us.

Next morning we walked along the ridge of hills; at one place our guide pointed out some impressions in the rocks over which we were passing. We saw human footprints and others we could not recognize. At last we came to one large mound of rocks on the top of the hills which was the place we came to see. About 500 feet below us lay a valley more than a mile wide, while stretching away to the north-west we had a glorious view, far as the eye could reach, of broken country, rocks, hills, valleys, all mixed up, reminding me of Inchangsee, in Natal. I gave the place of the spoors a new name and called it "The Mount of Footprints."

How shall we describe it? Here are thousands of impressions in the granite rock. Human footsteps by hundreds, some long (eleven inches), some short (five to seven inches); some of the right feet, others of the left feet; some going up the rocks, and others going down. Then, thousands of footprints of animals: lions, jackals, wolves, and various kinds of antelopes, and others we could not certify. In most places the feet are so crowded together it is difficult to separate them; and indeed, on the top of the mount the appearance is as if a crowd of men and animals had rushed up there in a fright in some time of danger, and had hustled each other.

At whatever period these foot-prints were made it must have been before the outer surface of the rocks hardened. The distance from

where the footprints begin to where they culminate on the mount, is about 200 yards ; while the space on the mount where they are so crowded is about 30 yards square. Further on, along the hills southward, Mr. Shimmin could find no sign of footprints, though the rock is exactly the same. Here is a problem for the learned in such things.

A number of natives came to visit us, men, women, and children. They were very much interested in Mr. Shimmin's measuring and sketching the footprints ; they crowded round with looks of wonder and admiration, and followed him from one spot to another. At my request, one boy about eleven years of age put his foot into one of the smaller impressions, and his foot fitted the impression exactly. *

So much for the narrative. May we not, then, without pretending to be amongst the learned, be at liberty to consider from the data given, the period and cause, as far as history will allow, and natural facts known assist us.

First of all, we may notice a fact well known to our Cornish miners, that the granite of this country, which is not one of the most early formation, is found to be so soft, in depths, as one miner emphatically called it, soft as cheese in some cases. It always hardens, as other rocks do in our present atmosphere, on exposure. Hence, as the rock was once so soft as to take the impressions, and so slippery also, thereby, that impressions of the human and other foot-marks do not exist, as if it had been a common desire to get to the top of the peculiar rock before. Then, as from a terrible fire in immense plains all the fierce, with other animals, as well as men, flee together with a common fear, and lose their separate normal antipathies. But a fire will not here account for the different condition of the rock so soft before this general stampede took place. This change forms our most difficult point, and yet our best one for the elucidation with success. Clearly it did not occur during the present condition of our atmosphere on these grounds, as it hardens all rocks, or disintegrates all forms. Nor could this stampede have been one in which the heavy wash of equatorial rains were likely to have time given for the footprints if made long before a great and sudden change took place in atmospheric conditions.

The occasional marks first of all referred to are just such as masses of separated granite might have by the incidental action of men and

* Having only the torn out leaf of the periodical, I do not know the name of the writer of this.

boys, as under common causes, in passing leave thereon. But those on the mount point clearly to a common flight from some increasing, rising cause; while there is not the least reason to consider it of a volcanic or earthquake revolution. Animals do not act simultaneously under those causes. Fleeing from rising waters, from a fertile valley to a hill-top, or from fire, could alone account for that. But as before stated a fire in the same atmosphere, whether before or after the stampede, could not cause the change in the surface state of the rock from its primitive condition. There is but one way to account for it, which history, well authenticated by other means, gives as the key for. If prejudice will allow the examination before the account of the flood of Noah's day, all I think will be clear. That historical event gives us this; a state of the earth's surface, soils, and rocks, more soft and fertile inclined, than after it.

Then the atmospherical change came in which had the effect of so altering the commanding elasticity of the human frame for health, that gradually the length of life, beforehand existing, was shortened.

Thus, how different conditions of the atmosphere have by that hal-
lowed account, existed. Now this hill of about 500 feet in height would form the great central hope of the general habitans of this valley in front of it, in case of a great rising flood. But no early liability before that time could do other than wash away some of the surface of the rock, if changing it at all, or footsteps had existed on it. But allow it to mark indelibly in the rock, the footsteps of those fleeing from the flood of Noah's day, of which we have the sublime, but terrible account in the Bible, and all friends agree in the conclusion that at no other time under laws of natural causes could it be. Directly the swift waters of the rising flood attained the height above the hills, footsteps so caused, in fear and terror, the universal inhabitants of the valley, would be hardened by the cooling salt and fresh waters combined, and further secured by the new state of the atmosphere resultant from the reaction of the solids generally, which had been over expanded by the internal bowels of the earth, to swell to such proportions the waters, and necessarily the crusts also, in a degree above the normal state, perfect. Reaction to action in overplus is equal.

EDWARD DINGLE, Tavistock, Eng.

NATURAL HISTORY—ANSWERS TO 11 QUESTIONS. (Vol. X, p. 220.)

I submit the following remarks in explanation of the questions;

1. Why is it that, *Bees never store honey where it is light.*

Because honey exposed to light granulates, in which form it would be useless to the bees. To prevent actinic energy reaching the stored cells, a yellow screen of wax interposes, which keeps out the actinic ray of solar light and thus prevents the undesirable chemical changes that would ensue.

The yolk of the egg owes its preservation for nourishing use during the albumenine evolution to its yellow (non-actinic) color, as but for this intervention the yolk matter would soon "see corruption" and become useless for its intended purpose.

The bee trait referred to in this question has been crystallized into our language in the word *sincerity*, which means transparency of character, in its figurative sense of *un-waxed*, the Latin *sine*, without, and *cera*, wax, being its derivation, though it puzzled Webster to see it.

2. *The moth has a fur jacket, the butterfly none.*

The nocturnal habits of the moth require it, the diurnal movements of the butterfly do not.

3. *Leaves attract dew; boards, sticks, and stones do not.*

Dew is condensed atmospheric moisture and as such gravitates. Leaves have a chemical use for dew and detain it, while "boards, sticks and stones" have none and do not. Dew integrates the one, but only serves to disintegrate the others by soakage.

4. *A horse gets up fore parts first, a cow hind parts first.*

The strength for the second movement of rising is posterior to the horse, but anterior to the cow.

5. *Corn (maize) never rows unevenly.*

This is supposed to arise from its having opposite radials of growth from the cob-centers.

6. *Fish, flies, and caterpillars, though frozen solid, retain life.*

They retain life because their construction admits of frost-expansion without disruption. A freezing temperature only results to them in torpor. This intactness is well illustrated by a frost-exposed leaden water pipe which, if it has a small rubber tube within it, will not burst "though zero makes attacks."

7. *A squirrel comes down a tree head first, a cat tail first.*

The holding claws of a squirrel are in its hind feet, those of a cat in its fore paws, hence the difference in suspension.

8. *Electricity is never visible but in its form of zigzag lightning.*

Edison thinks differently as to the first point, and photography has proved the second an optical delusion.

9. *A horsefly will live for hours after the head has been pinched off.*

Yes, and the head of a *mosquito-hawk* (*libellula*) will continue eating its victim separated from the thorax. One is reminded by this of the old punctuation puzzle: "King Charles walked and talked half an hour after his head was cut off."

10. *The dragon-fly can devour its own body and the dead still live.*

This seeming paradox is measurably true.

11. *Some flies thrust their eggs into the bodies of caterpillars, but always in such parts of the body that when the larvæ are feeding on the flesh of the foster parent they will not eat into a vital part. Can this be explained? Can the fly reason?*

There are several thousand species of the ichneumon fly and each has its own parasitic victims among caterpillars, plant-lice, and the like. The ovipositing apparatus only enters the non-vitals because they more readily yield to the puncture, while the vital tissues are too compact for admission or after-eating. A seamstress sewing on a suspender button works on the same principle.

The *gastrophilus equi*, or horse bot-fly, reasons differently, and does ovipositing where the animal can reach the ova with its wet tongue, by which means they are conveyed to their habitat, the horse stomach.

The *œstrus ovis* or sheep gad-fly deposits in the nostrils, and the larvæ develop in the frontal sinuses of the sheep.

The wormels, or bot-sores, on the backs of cattle are the ovipositions of the *hypoderma bovis*, or bovine gad-fly.

The last question of the *St. Louis Republican* is "Can the fly reason?"

Yes, all nature reasons either consciously or unconsciously, and externalizes what it thinks. *I am, because I think* said *Dryden*, and this an universal truth.

C. B. BAGSTER, Vineland, N. J.

The following replies to the questions appeared in the *St. Louis Republican*:

1. The writer has seen bees, after the hive was filled, make comb

from the board on which the hive sat to the ground and fill it with honey with no protection against light but the shade of small trees.

2. For the same reason that a sheep has wool and a hog, bristles.

3. There is no attraction about it. It is the office of leaves to throw off or exhale moisture and when the air is cool the moisture is condensed and remains on the surface, as the leaf is so thin that it also becomes cool and does not expel moisture like the stones and other objects which hold the heat longer and are often kept warm by contact with the warm soil.

4. They both take their choice, but there is less difference than appears at first, for the cow gets on her knees first and the horse comes clean on his fore feet before raising his hind quarters.

5. There was a variety of field corn that was common years ago that had eight and one-half rows to the ear almost invariably.

6. They are built that way.

7. The squirrel can flatten his hind parts and straighten his fore legs so that his body will tip back against the tree, being supported by its nails on the fore feet, while the fore claws of a cat are so curved that they will not catch by being shoved forward and her hind parts are too heavy to be balanced like the squirrel's.

8. Did the questioner ever see an electric light?

9. Because he does not die suddenly any more than snakes and eels do.

10. If it prefers to carry its body in its mouth whose business is it?

11. It is too late to ask that question. In all that relates to propagation and self-preservation there is as much evidence of reason in insects as in human beings.

BLACK AND RED REPUBLICANS. (Vol. X, p. 22.) The United States Republicans were so called by the pro-slavery party. These Republicans resisted the introduction of negro slavery into territory where it was not already recognized. They morally hoisted the black flag of no surrender against slavery.

Red Republicans was applied to extreme democrats, who in France used to wear red caps. This was taken from the old Roman custom of manumission. When a slave was manumitted a small red cloth cap, called the "pileus," was placed on his head. The Roman journals had red wrappers. The red cap of the French Republicans was a Phrygian cap, but the red cap given to the Roman slave was sack-shaped.

JOHN H. ALEXANDER.

SATURN AND HIS SATELLITES. (Vol. VIII, p. 65.) Prof. Paul A. Towne communicates the following summary of Saturn and his satellites to the *Religio-Philosophical Journal*, of Chicago : A. B.

The present recognized elements of the entire system of Saturn are as follows : The primary planet has a mean distance from the sun of about 872,000,000 miles, and makes its revolution around the central body in about $29\frac{1}{2}$ of our years. Its rotation on its axis is accomplished in 10 hours, 29 minutes, 17 seconds. The inclination of the equator to the plane of its orbit is $26^{\circ} 49'$. Its equatorial diameter is 91,904 miles. Its weight is 90 times that of the earth ; but it would take 746 globes like the earth to fill the space occupied by Saturn. The breadth of the outer bright ring is 9,625 miles ; the inner bright ring, 17,605 miles ; the dark ring, 8,660 miles. The distance from the outer to the inner bright ring is 1,680 miles. The distance of the dark ring from the planet is about 10,000 miles. The distance of the inner bright ring from the planet is 18,958 miles. The distance of the outer bright ring from the planet is 37,883 miles. The total thickness of the rings is only about 100 miles, so that a section of the inner bright ring is an ellipse with a major axis of 17,605 miles, and a minor axis of 100 miles.

1. Mimas, the nearest of the eight moons to the primary, has a distance of 120,800 miles. It is 1,000 miles in diameter, and revolves about Saturn in 22 hours, 37 minutes.

2. Enceladus has a distance of 155,000 miles, a diameter of about 800 miles, and makes its revolution in 1 day, 8 hours, 53 minutes.

3. Tethys is distant 191,000 miles, diameter of 500 miles, and revolves in 1 day, 22 hours, 18 minutes.

4. Dione is distant 246,000 miles, diameter 500 miles, and revolves in 2 days, 17 hours, 41 minutes.

5. Rhea is distant 343,000 miles, diameter 1,200 miles, and revolves 4 days, twelve hours, 25 minutes.

6. Titan is distant 796,000 miles, diameter 3,300 miles, and revolves in 15 days, 22 hours, 41 minutes.

7. Hyperion is distant 1,007,000 miles, diameter about 1,000 miles, and revolves in 21 days, 7 hours, 8 minutes.

8. Japetus is distant 2,314,000 miles, diameter 1,800 miles, and revolves in 79 days, 7 hours, 55 minutes.

The inclination of all the orbits to the plane of the ecliptic is $23^{\circ} 18' 22''$.

WHAT A FRIEND IS. A London paper offered a prize for the best definition of "What a friend is." The first definition below won the prize. The rest following it are other definitions received.

1. *The first person who comes in when the whole world has gone out.*
2. A bank of credit on which we can draw supplies of confidence, counsel, sympathy, help, and love.
3. One who considers my need before my deservings.
4. The triple alliance of three great powers, love, sympathy, and help.
5. One who understands our silence.
6. A jewel whose lustre the strong acids of poverty and misfortune cannot dim.
7. One who smiles on our fortunes, frowns on our faults, sympathizes with our sorrows, weeps at our bereavements, and is a safe fortress in all times of trouble.
8. One who, going to the top of the ladder, won't forget you if you remain at the bottom.
9. One who in prosperity does not toady you, in adversity assists you, in sickness nurses you, and after your death marries your widow and provides for your children.
10. The holly of life, whose qualities are overshadowed in the summer of prosperity, but blossom forth in the winter of adversity.
11. He who does not adhere to the saying that No. 1 should always come first.
12. A watch which beats true for time, and never "runs down."
13. All insurance against misanthropy.
14. An earthly minister of heavenly happiness.
15. A friend is like ivy, the greater the ruin, the closer he clings.
16. One who to himself is true, and therefore must be so to you.
17. The same today, the same tomorrow, either in prosperity, adversity, or sorrow.
18. One who combines for you alike the pleasures and benefits of society and solitude.
19. One who is a balance in the see-saw of life.
20. One who guards another's interest as his own and neither flatters nor deceives.
21. A nineteenth century rarity.

22. One who will tell you of your faults and follies in prosperity and assist you with his hand and heart in adversity.

23. One truer to me than I am to myself.

PLATO'S PHILOSOPHY. Ralph Waldo Emerson wrote, forty years ago, in reference to Plato and his philosophy ;

" Out of Plato come all things that are still written and debated among men of thought. Plato is philosophy and philosophy Plato — at once the glory and shame of mankind ; since neither Saxon nor Roman have availed to add any idea to his catagories."

XEROPHAGISTS. Pope Clement XII having issued a bull forbidding the practice of Freemasonry, the Masons of Italy, who continued to meet, for the purpose of avoiding the penalties of the bull, called Xerophagists. The word means literally *dry livers*, persons who do not drink, and they adopted the title, because they introduced something like the principle of total abstinence from intoxicating drinks into the institution.

QUADRATURE AND RECTIFICATION OF THE CIRCLE. *Definition.*—To quadrate the circle is to find the side of a square whose perimeter equals that of a given circle ; rectification of the circle requires to find a right line equal to the circumference of a given circle. Both of these equivalents are fulfilled by a square on a line equal to 90 degrees of a given circle. It is impossible to quadrate the circle by the square on the diameter as the linear unit because the diameter and circumference are not in the ratio of 1 : 4. The square on the diameter as a linear unit, produces the side of a square whose perimeter equals a greater than that of the given circle. It is demonstrably false that it requires a square whose perimeter equals that of a circle 36, to measure the area of a circle whose circumference equals 32. No mathematician can extract the square root of the product of the diameter by $\frac{1}{4}$ of the circumference without getting the side of a square that equals 9 plus when 90 degrees of the given circle equals 8. No expert will risk his reputation by venturing to maintain that it does take a square whose perimeter equals that of a greater circle to measure the area of a less circle, which results by the square on the diameter as the linear unit ; unless it can be illustrated by showing that it takes a piece of tire-iron 18 plus feet long to band a wheel 16 feet in circumference. Now if such a marvelous demonstration can be exhibited by any blacksmith in this or any other country, we demand in the name and high claim of progressive science, that the above definition of the quadrature and rectification of the circle be changed accordingly.

E. J. GOODWIN, Solitude, Ind.

NOACHIANS ; NOACHITES ; NOACHIDÆ. Who are supposed to be designated by these several words? J. B. W.

The *Noachians*, according to Webster, were those pertaining to the antediluvian patriarch Noah and his time.

The *Noachites* are Freemasons. It is the name of the 21st degree Ancient and Accepted Scottish Rite, the 22d degree of the Antient and Primitive Rite, and the 35th degree of the Rite of Mizraim. It is also call the Prussian Knight. It is distinct from ordinary Masonry by its traditions carrying it back to the building of the Tower of Babel, and being founded on the immutable principle of justice. The motto is *Fiat Justitia, Ruat Cælum*. Thus they call themselves Noachites, or Disciples of Noah, while they designate all other Masons Hiramites, or Disciples of Hiram. When it was adopted by the Council of the Emperors of the East and West it became a part of the A. and A. S. Rite, although it is an unfitting link, and a disruption of the chain of legendary symbolism. The legend of the degree describes the travels of Peleg from Babel to the north of Europe, and ends with the following narrative :

" In trenching the rubbish of the salt mines of Prussia was found in A. D. 553, at a depth of 15 cubits, the appearance of a triangular building in which was a column of white marble, on which was written in Hebrew the whole history of the Noachites. At the side of the column was a tomb of freestone on which was a piece of agate inscribed with the following epitaph : ' Here rest the ashes of Peleg, our Grand Architect of the tower of Babel. The Almighty had pity on him because he became humble.' "

The dispersion of the human race in the days of Peleg has always been a topic of discussion among the learned, on which the symbolism of the degree is partly founded.

The *Noachidæ* were the immediate descendants of Noah. The word is also applied to Masons on the theory derived from the " legend of the craft," that Noah was the father and founder of the Masonic system of theology. Dr. Anderson first used the word in this sense in the second edition of the Book of Constitutions : " A Mason is obliged by his tenure to observe the moral law as a true Noachida." But he was not the inventor of the name, which, as indicating a Mason, was derived by Anderson from the Chevalier Ramsay.

THE LOGICAL ALPHABET. (Vol. X, p. 257.) The logical alphabet, so called, is found in W. Stanley Jevons's treatise, "The Principles of Science," p. 54. Mr. Jevons theorizes on the alphabet as follows:

In a theoretical point of view we may conceive that the Logical Alphabet is infinitely extended. Every new quality or circumstance which can belong to an object, subdivides each combination or class, so that the number of such combinations, when unrestricted by logical conditions, is represented by an infinitely high power of 2. The extreme rapid increase in the number of subdivisions obliges us to confine our attention to a few qualities at a time.

When contemplating the properties of this alphabet I am often inclined to think that Pythagoras perceived the deep logical importance of duality; for while unity was the symbol of identity and harmony, he describes the two as the origin of contrasts, or the symbol of diversity, division and separation. The number four, or the *Tetractys*, was also regarded by him as one of the chief elements of existence, for it represented the generating virtue whence come all combinations. In one of the golden verses ascribed to Pythagoras, he conjures his pupil to be virtuous:

"By him who stamp't The Four upon the Mind,
The Four, the fount of Nature's endless stream."

Now four and the higher powers of duality do represent in this logical system the number of combinations which can be generated in the absence of logical restrictions. The followers of Pythagoras may have shrouded their master's doctrines in mysterious and superstitious notions, but in many points these doctrines seem to have some basis in logical philosophy.

To a person who has once contemplated the extreme significance and utility of the Logical Alphabet, the indirect process becomes reduced to the repetition of a few uniform operations of classification, selection, and elimination of contradictories. Logical deductions, even in the most complicated questions, become a matter of mere routine, and the amount of labor required is the only impediment, when once the meaning of the premise is rendered clear. The mere writing down of 64 combinations of six letters each is no small task, and, if we had a problem of five premises, each of the 64 combinations would have to be examined in connection with each premise. The requisite comparison is often of a very tedious character, and considerable chance of error intervenes.

I have given much attention to lessening the manual and mental labor of the process. I have used a slate of this kind for more than twelve years, which I call a *Logical Slate*, and it has saved me much trouble. It is hardly possible to apply this process to problems of more than six terms, owing to the large number of combinations.

The Logical Alphabet.

I	II	III	IV	V	VI	VII
X	AX	AB	ABC	ABCD	ABCDE	ABCDEF
	aX	Ab	ABc	ABCd	ABCDe	ABCDef
		aB	AbC	ABcD	ABCdE	ABCDeF
		ab	Abc	ABcd	ABCde	ABCdef
			aBC	AbCD	ABcDE	ABCdEF
			aBc	AbCd	ABcDe	ABCdEf
			abC	Abcd	ABcdE	ABCdeF
			abc	Abcd	ABcde	ABCdef
				aBCD	AbCDE	ABcDEF
				aBCd	AbCDe	ABcDEf
				aBcD	AbCdE	ABcDeF
				aBcd	AbCde	ABcDef
				abCD	AbcDE	ABcdEF
				abCd	AbcDe	ABcdEf
				abcD	AbcdE	ABcdEf
				abcd	Abcde	ABcdef
					aBCDE	ABcDEF
					aBCDe	ABcDEf
					aBCdE	ABcDeF
					aBCde	ABcDef
					aBCDE	ABcDEf
					aBCdE	ABcDeF
					aBCde	ABcDef
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						aBCdeF
						aBCdef

VII

(Concluded.)

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W. STANLEY JEVONS'S PRIME NUMBER—8,616,460,799. (Vol. III, p. 148; X, 234 [77].) In W. Stanley Jevons's work on "Scientific Method," is a chapter on the "Philosophy of Inductive Inference," from which we copy the following extract, as it appeared in a London magazine :

"A person may walk into the most complicated labyrinth or the most extensive catacombs, and turn hither and thither at his will; it is when he wishes to return that doubt and difficulty commence. In entering, any path serves him, in leaving he must select certain definite paths.

"Given any two numbers, we may by a simple and infallible process obtain their product, but it is quite another matter when a large number is given to determine its factors. Can the reader say what two numbers multiplied together will produce the number 8,616,460,799? I think it unlikely that any one but myself will ever know; for they are two large prime numbers, and can only be re-discovered by trying in succession a long series of prime divisors until the right one be fallen upon. The work would probably occupy a good computer for many weeks, but it did not occupy me many minutes to multiply the two factors together. Similarly, there is no direct process for discovering whether any number is prime or not; it is only by exhaustively trying all inferior numbers which could be divisors that we can show there is none, and the labor would be intolerable were it not performed systematically once for all in the process known as the Sieve of Eratosthenes, the results being registered in tables of prime numbers."

We have received the solution to the problem of Mr. Jevons, which we publish herewith, as follows :

If the statement of W. Stanley Jevons copied by you is correct, viz., that he gives the product of two prime numbers, he is in error as to the knowledge being confined to himself. The numbers are 89681 and 96079. The solution is not difficult nor *very* tedious.

The given number, 8616460799, is the square of $92824 + 165823$; that is, $(92824)^2 + 165823 = a$. Hence, one of the numbers is less, and one greater than 92824. Now let $92824 - x$ be the smaller number. Then we may write $(92824 - x)^2 + 2x(92824 - x) + x^2 + 165823 = a$. Hence, $(92824 - x) + 2x + \frac{x^2 + 165823}{92824 - x} = \frac{a}{92824 - x}$ = larger number, in which x must be such a number as will make $\frac{x^2 + 165823}{92824 - x}$ a whole number. Now as a is odd, both factors must be

odd ; as $2x$ is even, in order to make the larger number odd, $\frac{x^2+165823}{92824-x}$ must be even, say $= 2m$.

It may be remarked in passing that as the terminal figure of a is 9, the terminal figure of one number must be 1, 3, 7, or 9, and the terminal figure of the other number must be 9, 3, 7, or 1 ; and to make $92824-x$ odd, x must be odd and its terminal figure 3, 1, 7, or 5.

In equation $\frac{x^2+165823}{92824-x} = 2m$, we have to find such a value of m as will make x integral. Freeing from fractions, we have $x = -m \pm \sqrt{m^2+185648m-165823}$.

An attempt to solve this equation by Diophantine analysis gives substantially our original equation and I have done it by trial.

Remembering the sets of two terminal numbers to which square numbers are limited, it will be readily found that no values of m the terminal figures of which are 2, 3, 5, 7, 9, 0, can possibly make the expression a square ; and moreover when a value is given to m , and the quantity under the radical computed, it can be seen at a glance that it cannot be a square. In fact, in my work I extracted the root only a comparatively few times. As the value given to m must end in 1, 4, 6, or 8, there are only four numbers to try out of each ten.

On the *twenty-third* trial, viz., $m=56$, I found the expression a square the root of which is 3199.

Hence, $x = 3143$. $92824 - x = 89681$. $92824 - x + 2x + 2m = 96079$. Proof : $89681 \times 96079 = 8616460799$.

I do not believe that Fermat knew any short method of telling when a number was prime or not ; but I have no doubt he could divide the product of two prime numbers into the two factors.

JOSIAH H. DRUMMOND, Portland, Me.

Note by the editor. After the above was in type we received from Mr. Drummond a much shorter solution to the problem than the above.

Errata. In Vol. X, p. 222, seventh line from bottom, in formula (a), the minus sign in the denominator should be between c and R in the parenthesis.

In Vol. X, p. 228, fourth line from bottom, $x = 2$ should be $x = 5$.

QUESTIONS.

1. Will some one explain what is meant in Isaiah LXV, 11 (revised version) "Prepare a table for Fortune, and that fill up mingled wine unto Destiny." O. O.
2. Where in the Bible, canonical or apocryphal, is Joshua the son of Nun called "The Robber"? O. O.
3. The Buddhists have the sacred word *Aum*; the Hebrews have *Jehovah*. What was the corresponding sacred word of the Zoroastrians whose sacred book was the *Zend-Avesta*? MASON.
4. What is the meaning of the word *Pyriphlegethon* found in Homer's *Odyssey*, book XIV, one of the four rivers of Pluto's dominion—*Pyriphlegethon*, *Cocytus*, *Styx*, *Acheron*. ACHSAH.
5. "Nimrod" speaks of lamas and emperors who delight to be called "Feet and Golden Feet." Why so called? JOHN ZANE.
6. Has "The Egyptian Book of the Dead" been translated and published in English? J. D.
7. Why is the word *Lewis* applied to the son of a Mason? I.
8. Was there ever a city called *Platonopolis* in which the inhabitants endeavored to live and practice the doctrines of Plato? I.
9. Are there any other words in English except Christmas, Christian, and that family, where the Greek Ch (X) is used in words or abbreviations. Xmas = Christmas; Xtian = Christian. LOGOS.
10. Bishop Heber is credited with saying in his "Life of Jeremy Taylor," "I wish I had not found this in Taylor," referring to some declaration. What was the objectionable matter? LEON.
11. Where can a translation of the poem *De Rerum Natura*, by Lucretius (95-55 B. C.), be found? SEARCHER.
12. Who is the author of the poems, "Bid me to live, and I will live," "Once in the flight of ages past"? SEARCHER.
13. What is the origin of the word *gammed*, used in reference to two or more whale ships meeting, and if the weather is favorable for captains and sailors to visit each other? DAVID M. DRURY.
14. From what secret work is the following quotation taken, and who is the author? TUDOR.

"*This boc iss nemmed Ormulum,*
For thi that Orm itt wrohhte."
15. What is the poem commencing "*Animula, vagula, blandula,*" and who is the author? TUTOR.

QUESTIONS.

1. What are the so-called *Cromlechs* or *Gromlechs* mentioned in Druidical and Masonic literature? Y.

2. Will some writer favor us with an article on the triune symbols of the ancients, and their gods? Jupiter had the *three-forked* lightning; Neptune, the *trident*; Pluto, the *three-headed* Cerberus, etc.

HARRISON.

3. What is the meaning of the word *Britomart*, a word recently used as the name of a modern society? THEORA.

4. Mesopotamia is a name popularly given to Warwick and Eccleston Square districts in London. This part of London is also called *Cubitopolis*. Why so called? TRAVELER.

5. Who were the "Searches after Truth" so called, and what were their tenets, etc.? LLEWELLYN.

6. What is the "Logical Alphabet" mentioned by Boole, De Morgan, and other logicians? LLEWELLYN.

7. Did Columbus believe that the earth was a globe when he discovered America? TYRO.

8. Find two numbers whose sum, product, and sum of their squares shall be equal to each other. THORNE.

9. Who were the *Chorizontes*, "Separators," and why so called by their cotemporaries? L. B. C.

10. How many meanings has the period (.) in its several uses in literature? OBSERVER.

11. In what classic work is found the mythological production of "Cedipus and the Sphinx?" LUCIUS SPANGLE.

12. Who is "Non Quis? Sed Quid? A Cometite" the author of the book entitled "Comet; or, the Earth in her Varied Phases, Past, Present, and Future," published by E. J. Hale & Son, New York, 1869? I OWNIT.

13. Who is the author of these lines? O.

"Not for a moment God could without me endure,
But if I cease to be, then He to cease is sure.
I am as great as God—He is as small as I;
He cannot o'er me be, nor I beneath Him lie."

MODERN NATIONAL FLAGS. *United States* : field with seven red and six white stripes, and a blue canton with stars—Stars and Stripes.

Austria : red, white, and red (horizontally). A shield and crown in the white stripe.

Belgium : black (next the staff), yellow, and red (vertically disposed). A device in the yellow stripe.

Denmark : a red field, with a white cross cutting it into quarters.

France : blue (next the staff), white, and red (vertically disposed).

Greece : a blue field with a white cross in the canton, and four white stripes.

Holland : red, white, and blue (horizontally disposed).

Mexico : a white flag with a black spread eagle, holding in its beak a green serpent.

Norway : a red flag, quartered by blue and yellow stripes, and the first quarter crossed.

Portugal : blue and white (vertically disposed, blue next the staff). Shield and crown in the center.

Prussia : a white flag, with a black eagle and a small Maltese cross in the top corner next the staff.

Russia : a white flag with two blue stripes running from corner to corner like a St. Andrew's cross.

Spain : red, yellow, and red (horizontally disposed).

Sweden : a blue flag, quartered with yellow stripes. In the first quartered with yellow stripes.

Switzerland : a red flag with a white cross in the center.

Turkey : a red flag with a silver crescent and star with eight points.

Venezuela : yellow, blue, and red (horizontally). A device in the yellow stripe.

NATURA NATURANS. "Nature operating is Nature's Creator" was Bruno's phrase (1550-1600) by which he meant it was not God who created all things out of nothing, but that "energizing Nature" was the true creative force. Not *Deus creavit omnia et nihilo*, but *Natura naturans naturavit naturam*. Spinoza taught that God and Nature are identical; and Stahl taught that God is the *anima mundi*, or its vital principle, as the soul is of the body.

THE FIVE M'S. The five M's are said to represent the five forms of Hindu asceticism; Mansa, Matya, Madya, Maithuna, and Mudra (flesh, fish, wine, women, and gesticulation).

THE STARS AND STRIPES. The American Congress, on the 14th of June, 1777, "Resolved that the flag of the thirteen United States be thirteen stripes, alternately red and white; that the Union be thirteen stars, white in a blue field, representing a new constellation." As to the origin of the combination, and who first suggested the idea, some have supposed that it might have been derived from the arms of General Washington, which contained the stars in the upper portion, and three bars running across the escutcheon. There is no means of knowing to this day whether this conjecture is correct, but the coincidence is rather striking. There were several flags used before the striped flag by the Americans. In March, 1775, "a union flag with a red field" was hoisted at New York upon the liberty pole, bearing the inscription "George Rex and the liberties of America," and upon the reverse, "No Popery." On the 18th of July, 1778, Gen. Putnam raised, at Prospect Hill, a flag bearing on one side the Massachusetts motto, "*Qui transtulit sustinet*," on the other, "An Appeal to Heaven." In October of the same year the floating batteries at Boston had a flag with the latter motto, the field white with a pine tree upon it. This was the Massachusetts emblem. Another flag, used during 1775 in some of the colonies, had upon it a rattlesnake coiled as if about to strike, with the motto, "Don't tread on me." The grand union flag of thirteen stripes was raised on the heights near Boston, January 2, 1776. Letters from there say that the regulars in Boston did not understand it; and as the king's speech had just been sent to the Americans, they thought that the new flag was a token of submission. The "British Annual Register," 1776, says: "They burnt the king's speech, and changed their colors from a plain red ground, which they had hitherto used, to a flag with thirteen stripes, a symbol of the number and union of the colonies." A letter from Boston about the same time, published in the *Penna. Gazette*, for January, 1776, says: "The grand union flag was raised on the 2d, in compliment to the united colonies." The idea of making each stripe for a State was adopted from the first; and the fact goes far to negative the supposition that the private arms of General Washington had anything to do with the subject. The pine tree, rattlesnake, and striped flag were used indiscriminately until July, 1777, when the blue union with the stars was added to the stripes, and the flag established by law. Formerly a new stripe was added for each new State admitted to the Union, until the flag became too large, when by act of Congress the stripes were reduced to the old thirteen; and now a star is added to the union at the accession of each new State.

PETROLEUM. Early mention of petroleum occurs in Du Halde's "History of China," London, 1736, Vol. I, p. 229: "There drops from its mountains a certain liquor they call *Oil of stone* which they burn in lamps."

Tri-verbal Thought.

- Acquaintance softens prejudice — *Æsop*.
 Art is power — *Longfellow*.
 Beauty is truth — *Keats*.
 Communism means barbarism — *Lowell*.
 Comparisons are odious — *Cervantes*.
 Concentration alone conquers — *Buxton*.
 Consequences are un pitying — *G. Eliot*.
 Consider the end — *Chilo*.
 Credit is money — *Franklin*.
 Enthusiasm creates enthusiasm — *J. Lord*.
 Error is frail — *Zoroaster*.
 Falsehood is cowardice — *H. Ballou*.
 Genealogies tell tales — *A. B. Alcott*.
 Genius is intensity — *Balzac*.
 Gifts burst rocks — *Franklin*.
 Give sorrow words — *Shakespeare*.
 God is love — I JOHN IV, 8.
 Grace challenges grace — *Shakespeare*.
 Homes make patriots — *Ingersoll*.
 Ideas strangle statutes — *W. Phillips*.
 Joy is wealth — *Ingersoll*.
 Kindness is wisdom — *Bailey*.
 Kiss the rod — *Shakespeare*.
 Knowledge is power — *Bacon*.
 Labor is life — *Carlyle*.
 Love is indestructible — *Southey*.
 Love is rest — *Taylor*.
 Make few acquaintances — *Rothschild*.
 Moonlight is sculpture — *Hawthorne*.
 Murder will out — *Chaucer*.
 Nature defies burlesque — *R. C. Sands*.
 Nature means necessity — *Bailey*.
 Nemesis favors genius — *Disraeli*.
 Nervousness is sympathetic — *Bulwer*.
 Nothing divine dies — *Emerson*.
 Physician heal thyself — LUKE IV, 23.
 Pitchers have ears — *Shakespeare*.
 Politeness smooths wrinkles — *Joubert*.
 Progress is lame — *St. Beuve*.
 Property is robbery — *Proudhon*.
 Prove all things — I THESS. V, 21.
 Quotations confess inferiority — *Emerson*.
 Rely on yourself — *La Fontaine*.
 Silence gives consent — *Goldsmith*.
 Spirit is infinite — *Mary Eddy*.
 Sunlight is painting — *Hawthorne*.
 Sweet is revenge — *Byron*.
 Thought is free — *Shakespeare*.
 Thoughts are winged — *Shakespeare*.
 Truth will out — *Shakespeare*.
 Virtue is beauty — *Shakespeare*.
 Verity is nudity — *A. de Musset*.
 Wealth is power — *Burgess*.
 Words before blows — *Shakespeare*.
 DEXTER.

LACONIA — NEW HAMPSHIRE. From whom did New Hampshire receive its name ? ORLANDO.

New Hampshire was formerly called *Laconia*. It received its present name from Captain John Mason of Hampshire, England, to whom it was conceded in 1629 by the Plymouth Company.

THE PLANET MARS.—THEORIES OF THEOSOPHICAL ADEPTS. *To the Editor of the Sun* : Perhaps it would interest your readers to know what the adepts, who started the Theosophical Society, through the late H. P. Blavatsky, say about the planet Mars. That globe is so far away, so inaccessible, and our astronomers differ so in respect to many important matters, that the Theosophists cannot be blamed for giving a measure of credence to their own teachers. Those latter say that the red and ominous Mars is not inhabited just at this period. It is a globe that belongs to the same family as this earth, and like the latter, has six companion globes accompanying it around the sun. But those companions are not visible to one who might be upon Mars, because they are of a different tenuity to his matter, and so unable to impress the organs of vision suitable for Marsian life. Mars was inhabited many, many years ago by a definite number of Egos, who lived as we do in corporeal frames composed of the matter peculiar to the planet. But just as we say the third human race of earth disappeared eighteen million years ago, so our adepts teach that the living, acting, intelligent beings of Mars left that sphere millions of years since and proceeded to another globe — perhaps to one of the six companions of Mars where they will carry on further evolution. This emigration being not final, but only for a definite period that need not be stated, has left the planet or scene of former action in a state which to us is known as obscurity of a planetary body, during which the sleeping body of the globe continues to revolve around the sun obediently to the laws of attraction and repulsion, but is devoid of what we might call human life. And such a state will be also the fate of this earth. Mars, then, being now “in obscurity,” is much covered with ice, and if our astronomers ever become wise enough they will discover such to be the fact. The presence of ice is due to the polar axis being such as to induce congelation. It is unnecessary, because futile, to refer to the manner in which the presence of active, intelligent entities affects climate, as the doctrine would receive no credence in these days. There may very well be great canals on Mars, but they do not prove the presence of living people. They are the remains, if they are canals at all, of former great structures and mighty works of which puny earthmen have no conception, and which they could not duplicate. But they are just as likely to be great fissures in the coat of ice, which are subject to temporary alteration by the sun’s heat. These ideas are a part of the great philosophy of life as related to our solar system and taught by the adepts. The latter gain their knowledge by actual investigation within the solar system and not by unhappy and indefinite deductions from partial facts. It is a philosophy which allows of no “dead matter,” and in addition it asserts the continued presence of intelligence behind operation of nature, but not the intelligence of an extra cosmic god ; it is the intelli-

gence of human minds that have been through vast experience upon many a planet—it is cultivated by the great brotherhood which has its disciples and servants among the minerals, plants and animals, as well as in the greater development called humanity.—*New York Sun*.

WILLIAM Q. JUDGE, Fellow Theosophical Society.

"MISCEGENATION," AND "SUBGENATION." (Vol. X, p. 148.) Some years ago in an article on "Literary Hoaxes," I saw the authorship of the "Miscegenation" pamphlet ascribed to David G. Croley, then editor of the *New York World*, who perpetrated it as a clever scientific skit *ala* "The Moon Hoax," etc. Advance proofs were forwarded to noted abolitionists, the most of whom fought shy of falling in line with the unique views advanced, but the popular Theo. Tilton fell into the cunningly devised trap headlong and returned an enthusiastic letter commendatory of the pseudo-philosophical theories therein promulgated, which fact furnished excellent campaign material for the Democrats.

The opposing pro-slavery propagandist pamphlet, "Subgenation," I suspect was the intellectual offspring of Dr. Van Evrie, the "fire-eating" editor of the *New York Day-Book*, or at least of some one of like sentiments.

J. FRANCIS RUGGLES, Bronson, Mich.

DISCOURSE AT "AMMAUSKEEG-FALLS. (Vol. X, p. 193.) Accept my thanks for a copy of a discourse at Amoskeag falls in the fishing season of 1739, by a brother of my great-grandfather Simmons Secombe, at that time a resident of what is now Manchester. I think that Gov. Belcher of Massachusetts and New Hampshire was present on the occasion, and perhaps it was printed at his request. Belcher was a great friend of the preacher's cousin, Rev. John Secombe, at one time the minister of Harvard, Mass., the author of "Father Abbey's Will" (NOTES AND QUERIES, Vol. IV, pp. 315-316), a queer medley of rhyme and nonsense, once in some repute among the fathers.

Most likely the preacher visited his brother, my great grandfather, who was a resident of Manchester at that time. Tradition has it he lived somewhere near the outlet of Massabesic pond. He probably settled there as early as 1735 and died some five years later. The dates of births of his younger children I found recorded on the old town book of Manchester. What a change in Manchester since his time.

DANIEL F. SECOMBE, Concord, N. H.

The Great Suspension Bridge Between New York and Brooklyn.

We take the following account of the Great Suspension Bridge from the *Scientific American* of July 23, 1892, prepared by Charles C. Martin, who was chief engineer and superintendent of the great bridge.

DETAILS OF CONSTRUCTION.

Construction commenced January 3, 1870.
 Size of New York caisson, 172×102 feet.
 Size of Brooklyn caisson, 168×102 feet.
 Timber and iron in caisson, 5,253 cubic yards.
 Concrete in well holes, chambers, etc., 5,669 cubic feet.
 Weight of New York caisson, about 7,000 tons.
 Weight of concrete filling, 8,000 tons.
 Depth of tower foundation below high water, Brooklyn, 45 feet.
 Depth of tower foundation below high water, New York, 78 feet.
 Size at high water line—of New York tower, 140×59 feet; of Brooklyn tower, 140×56 feet.
 Size of roof course — of New York tower, 136×53 feet; Brooklyn tower, 136×50 feet.
 Total height of towers above high water, 272 feet.
 Brooklyn tower contains 38,214 cubic yards of masonry.
 New York tower contains 46,945 cubic yards of masonry.
 Size of anchorages at base, 129×119 feet.
 Size of anchorages at top, 117×104 feet.
 Height of anchorages, 89 feet front, 85 feet rear.
 Weight of each anchor plate, 23 tons.
 Length of river span, $1,595\frac{1}{2}$ feet.
 Length of each land span, 930 feet.
 Length of Brooklyn approach, 971 feet.
 Length of New York approach, $1,562\frac{1}{2}$ feet.
 Total length of bridge, between Park Row and Sands Street curbs, 6,016 feet.
 Total length of structure between Center and Concord Street curbs, 6,952 $\frac{1}{2}$ feet.
 Width of bridge, 85 feet.
 Height of roadway at towers, above high water, $119\frac{1}{4}$ feet.
 Height of towers above roadway, $152\frac{3}{4}$ feet.
 Clear height of bridge in center of river span, above high water, at 90° F. temperature, 135 feet.
 Grade of roadway, $3\frac{1}{4}$ feet in 100 feet.
 Maximum grade of railway, $3\frac{3}{4}$ feet in 100 feet.

Each cable contains 5,296 parallel, galvanized steel, oil-coated wires, closely wrapped to a solid cylinder.

Number of supporting cables, 4.

First wire was run out, May 29, 1877.

Cable making began June 11, 1877.

Diameter of each cable, $15\frac{3}{4}$ inches.

Length of single wire in cables, 3,579 feet.

Total length of wire in four cables, 14,361 miles.

Weight of wire, nearly one pound to 11 feet in length.

Weight of four cables, inclusive of wrapping wire, $3,588\frac{1}{2}$ tons.

Ultimate strength of each cable, 12,200 tons.

Bridge opened for pedestrians and vehicles, May 24, 1883.

Railway opened to passengers, September 24, 1883.

Cost of bridge at completion, exclusive of land, \$9,000,000.

Total cost to April 1, 1884, \$15,552,878.

DETAILS OF OPERATION

From opening of railway, September 24, 1883, to January 1, 1892 :

One cable-hauling engine, 30 inches diameter, 48 inch stroke ; speed, 70 revolutions per minute.

One cable-hauling engine, 26 inches diameter, 48 inch stroke ; speed, 70 revolutions per minute.

One cable-hauling engine, 22 inches diameter, 36 inch stroke , speed, 80 revolutions per minute.

Greatest indicated horse-power observed, 1,093.15.

Least indicated horse-power observed, 65.6 negative.

Speed of hauling cable, $10\frac{1}{2}$ miles per hour.

Hauling cable, $1\frac{1}{2}$ inches diameter, 12,000 feet long.

" " No. 1, used 1,140 days, hauled 22,142,706 ton miles.

" " No. 2, used 607 days, hauled 25,492,892 ton miles.

" " No. 3, used 393 days, hauled 20,395,073 ton miles.

" " No. 4, used 356 days, hauled 18,923,469 ton miles.

" " Nos. 5 and 6 are still in use.

Weight of cars—12 cars, 8 tons each, used to March 5, 1887.

" " 12 cars, 10 tons each, used to October 29, 1890.

" " 48 cars, 17 tons each, now in use.

" " 12 cars, 19 tons each, now in use.

Number of cars in service, 60.

Number of cars in service during rush hours, 48.

Largest number of round car trips per day, April 30, 1891, 2,159.

Next largest number of round car trips per day, December 31, 1891, 2,014.

Total number of round car trips made by cable, 3,477,000 = 7,388,625 miles.

Total number of round car trips made by locomotives, $78,574 = 166,970$ miles.

Total number of round car trips, $3,555,574 = 7,555,595$ miles.

Each car is moved by cable $2\frac{1}{8}$ miles in making one round trip.

Weight of each locomotive, 22 tons.

Number of locomotives in service, 6.

Number of locomotives in use during rush hours, 5.

Shortest headway between trains, $1\frac{1}{2}$ minutes.

Total number of railway passengers carried, 224,077,923.

Total number of railway passengers carried for last 12 months (1891), 39,890,205.

Largest number of railway passengers for one month (October, 1891), 3,623,016.

Largest number of railway passengers for one day (April 30, 1889), 159,259.

Total number of foot passengers to June 1, 1891, 28,171,839.

Largest number of foot passenger in one month (June, 1883), 909,100.

Largest number of foot passengers in one week, the last week in May, 1883, 668,456.

Largest number of foot passengers in one day (May 27, 1883), 163,000.

THE ALABAMA CLAIMS. What were the Alabama Claims, so called?
E. VAN SCHOOTEN.

The Alabama Claims were a money demand made by the United States of America on Great Britain for damage done by a corvette named the "Alabama," and built at Birkenhead for the Confederates, who were at war with the United States. The British Government, which had declared itself a neutral power, had forbidden the corvette to leave the docks; but, notwithstanding this prohibition, it put to sea, displaying a British flag, and succeeded in destroying 65 of the United States vessels; but in 1864 it encountered the "Kearsarge," off Cherbourg, and it was sunk. After the war, the United States demanded compensation, and five arbitrators met at Geneva, in 1872, to consider the question. The sentence of these arbitrators was to award damages to the amount of 3,250,000*l.*, with interest, in settlement of the claims. The money was duly paid and a large surplus remained in the hands of the United States Government after all recognized claims had been paid in full. The arbitrators were the King of Italy, the President of the Swiss Confederation, the Emperor of Brazil, a representative of Great Britain, and another of the United States.

By B. F. Burleson, Oneida Castle, N. Y.

PROBLEM 18.

SOLUTION.

$A = \$18,774,000,000,000,000,000,000,000,000,000,000,000,000,000,$ -
 000,000,000,000,000,000,000,000,000 at least.

the value of A is represented by $A \div \frac{swgf^2}{n}$ cubic miles of gold,

and the diameter of the sphere representing this volume will be

$$D = \sqrt[3]{\frac{Av}{swgf^3} \div \frac{1}{3}\pi} = \sqrt[3]{\frac{6Av}{swgf^3\pi}}; \text{ or, resorting to logarithms,}$$

$$\begin{aligned} \log D &= \frac{1}{3}[\log 6 + \log A + \log v - \log s - \log w - \log g - 3\log f - \log \pi] = \\ &= \frac{1}{3}[\cdot 778 \cdot 5125 + 76 \cdot 27356763 + 1 \cdot 41162001 - 1 \cdot 260071887 - 8 \\ &\quad - 2 \cdot 640978057 - 11 \cdot 167901767 - \cdot 497149763] = 19 \cdot 96574597. \end{aligned}$$

$$\therefore D = 92,415,000,000,000,000 \text{ miles.}$$

This distance is so immense we are still unable to conceive its magnitude. We will try once more to reduce the characteristic 19 of the logarithm that represents it, so as to bring it nearer to our conception. We will find the time T in which it would take light to traverse the distance of this diameter. Put $l = 192,000$ miles, the velocity of light per second; and $n = 31,556,926$, the number of seconds in a solar year. We shall have $T = \frac{D}{ln}$, or by logarithms,

$$\begin{aligned} \log T &= \log D - \log l - \log n = \\ 19 \cdot 96574597 &- 5 \cdot 28330123 - 7 \cdot 49909476 = 7 \cdot 18334998. \end{aligned}$$

$\therefore T = 15,252,806$ years. This result we may call very nearly accurate since we have used 15.10, and 8 figures in the mantissa of each logarithm employed, and the value of T cannot vary more than a year or two from its exact value. The result is hardly still within the comprehension of the human mind; but we may reasonably draw the following conclusion: Were the center of such a ponderous sphere of precious metal as represents the value of A placed in the center of our solar system it would extend in all directions in the realms of space far beyond the utmost ken of mortal vision, though assisted by the most powerful lenses yet constructed. Arcturus and Orion and the faintest nebulæ would all undoubtedly be crowded from their places to make room for this mighty mass, and for ought we know to the contrary it would occupy the entire universe. No touch of Midas or dream of the alchemist would then agitate the minds of sentient beings, if any such existed; but, riveted to its surface with a force that no finite power could loosen, the cry for the annihilation of the hated mass would constantly be uttered, and the desire for gold be more than satisfied.

The computations necessary for finding A , D , and T involve alone the rules for multiplication, division, involution, and evolution. Hence, they are particularly adapted for determination by using logarithms. With the proper tables it takes but a few minutes to find their values. It has been a matter of much discussion recently in the *Mathematical*

Magazine, published by Artemas Martin, Ph. D., Washington, D. C., whether or not logarithms were of any utility in making computations; Mr. P. H. Philbrick, Professor of Civil Engineering in the State University of Iowa, taking the stand that they are not. If Mr. Philbrick can find the value of T by the use of natural numbers alone as nearly correct as we have given it, and that too in as many days as it can be found in minutes by using logarithms, we shall be more ready to acknowledge the truth of his assertion. Until he can perform this feat, however, we shall pin our faith upon their utility, and bless the man who invented them.

PROBLEM 19.

What is the amount A of a principal $P = 100$ for $n = 1$ year, and rate $r = 6\%$ per annum, if the interest be compounded every instant?

SOLUTION.

The amount of P in n years at $r\%$ when the interest is compounded q times a year is evidently $A = P\left(1 + \frac{r}{q}\right)^{nq}$ (1)

Expanding the right-hand member of (1) by the binomial theorem, we have

$$A = P\left[1 + nq \times \frac{r}{q} + \frac{nq(nq-1)}{1 \times 2} \times \frac{r^2}{q^2} + \frac{nq(nq-1)(nq-2)}{1 \times 2 \times 3} \times \frac{r^3}{q^3} + \text{etc.}\right] \quad (2)$$

When $q = \infty$ equation (2) becomes

$$A = P\left[1 + nr + \frac{n^2 r^2}{1 \times 2} + \frac{n^3 r^3}{1 \times 2 \times 3} + \frac{n^4 r^4}{1 \times 2 \times 3 \times 4} + \text{etc.}\right] = [\text{by the exponential theorem}] = P e^{nr} \quad (3)$$

where e is the base of the Napierian system of logarithms so called.

Whence by taking logarithms in (3) and changing to the common system by multiplying by the modulus of it, we obtain in inverse functions:

$$A = P \log^{-1} [.43429448nr] = [\text{when } n = 1, r = .06, \text{ and } P = 100] \\ = \$106.1836.$$

Hence, we perceive that however often we compound an annual rate of interest it will affect the amount at the end of the year but a little above which it would have been had it not been so compounded.

It is very generally known that money will double itself at simple interest in as many years as the rate per cent is contained in 100; but it is not so well known, however, that it will do the same very approximately at compound interest in as many years as the rate per cent is contained in 72.

JOHN D. WILLIAMS' "FOURTEEN CHALLENGE PROBLEMS." In Circular of Information, No. 3, 1890, Bureau of Education, entitled the "Teaching and History of Mathematics in the United States," by Florian Cajori, M. S., of the University of Wisconsin, p. 96, is a reference to the "Fourteen Challenge Problems," saying six of them are impossible, and all the others had been solved by several persons. As I do not have access to the *Educational Notes and Queries* (Vol. II, p. 8), I should like to see the problems reprinted in your magazine, noting the unanswered problems. Also, name the published works of John D. Williams.

PHILOMATH.

John D. Williams was a bright mathematician who was pleased to propose various intricate problems to his cotemporary mathematicians.

The following problem had been proposed by some one and he solved and sent the solutions to France and London in 1832 :

Divide unity into three such positive parts that each diminished by unity, shall have the remainders cubes.

$$\begin{aligned} & \left(\frac{598506070238850097}{47004080888198088} \right)^3 - 1 + \left(\frac{598506070238850097}{47004080888198088} \right)^3 - 1 \\ & + \left(\frac{470078239287808044}{47004080888198088} \right)^3 - 1 = 1. \end{aligned}$$

We reprint the "14 challenge problems," with the communication of John D. Williams which accompanied the same :

COMMUNICATION.

MESSRS. EDITORS.—It is this day six months since under the signature of *Diophantus*, I proposed through the medium of your paper, to the mathematicians of America, a collection of problems in Diophantine Analysis. No correct solutions having as yet been received to the whole of them, I take this opportunity to fulfil my pledge to furnish such, and enclosed they will come to your hands. I now desire to re-propose them for the ensuing six months ; and shall except from my challenge the Hon. *Nathaniel Bowditch*, LL. D., &c., &c., of Boston, Mass., Mr. *Eugene Nully*, of Philadelphia, and Professor *Theodore Strong*, of Rutgers College, New Brunswick, N. J., only.

The list of gentlemen challenged stands then as follows : Professors Robert Adrain, University of Pennsylvania ; Henry J. Anderson, Columbia College, New York ; Benj. Peirce, Harv. Univ., Cambridge, Mass. ; Mr. J. Ingersoll Bowditch, Boston, Mass. ; Marcus Catlin, Hamilton College, Clinton, N. Y. ; M. Floy, jun., New York ; C. Gill, Sawpitts Academy, New York ; L. L. Inconnaw, Cincinnati, Ohio ; Benjamin Hallowell, Alexandria, D. C. ; Charles Farquhar, Alexandria, Maryland ; Samuel Ward, 3d*, New York.

* I beg leave to state that on the 2d day of March last, I received from this gentleman correct solutions to questions 1, 2, 3, 4, 5, 10, 13, and 14. This I suppose is about his *ne plus ultra* — beyond it I defy him to advance,

"Till riper age shall with maturer force burnish his mind."

It being presumed that there are none in the United States, with the exception of the above list would think of attempting their resolution. The questions proposed are as follows :

1. Make $x^2+y^2=a^2=z^2+w^2=\square$, and $x^2-w^2=z^2-y^2=\square$.

Ans. If $a=7585$, then $x=7400$, $y=1665$, $z=6273$, $w=4264$.

2. Make $x^2+y^2=b^2=z^2-w^2$, and $x^2+z^2=w^2-y^2=\square$.

Ans. If $b=697$, then $x=680$, $y=153$, $z=672$, $w=185$.

3. Make $x^2 \pm 23256x = \square$, $x^2 \pm 75000x = \square$, and $x^2 \pm 103224x = \square$.

Ans. $x=105625$.

4. $x^2-23256^2=\square$, $x^2-75000^2=\square$, and $x^2-103224^2=\square$.

Ans. $x=105625$.

5. Make $x+y+z=a^3$, $x+y=b^3$, $x+z=c^3$, and $y+z=d^3$, in positive whole numbers.

Ans. $a=9$, $b=11$, $c=7$, $d=6$.

6. Make $x^2 \pm 96x = \square$, $x^2 \pm 135x = \square$, and $x^2 \pm 154x = \square$.

7. $182^2x^2 \pm 182x = \square$, $560^2x^2 \pm 560x = \square$, and $630^2x^2 \pm 630x = \square$.

8. Make $136^2x^2 \pm 136x = \square$, $170^2x^2 \pm 170x = \square$, $174^2x^2 \pm 174x = \square$.

9. Make $(m^2+n^2)^2x^2 \pm (m^2n^2)x = \square$, $(m^2-n^2)^2x^2 \pm (m^2-n^2)x = \square$, and $4m^2n^2x^2 \pm 2mnx = \square$.

10. Make $\frac{xyz}{x+y+z} = \square$, $x^2 + \frac{xyz}{x+y+z} = \square$, $y^2 + \frac{xyz}{x+y+z} = \square$, and $z^2 + \frac{xyz}{x+y+z} = \square$, all in whole numbers. *Ans.* $x=96$, $y=135$, $z=154$.

11. Make $(m^2+n^2)^2 \pm 4abm(m^2a^2)(m^2-a^2) = \square$, and $(m^4+2m^2a^2+a^4) \pm 4acm(m^2+a^2)(m^2-a^2) = \square$.

12. Make $x^2+y^2=\square$, $\frac{5}{4}(x^2+y^2)=\text{a cube}$, $xy=2x^3$, $2(x+y)+\frac{xy}{x+y}=\square$, and $(x^4+y^4)(x^2+y^2)-(x^5+y^5)\sqrt{(x^2+y^2)}=\square$.

13. Make $x^2 \pm 97104 = \square$, $x^2 \pm 150000 = \square$, $x^2 \pm 173400 = \square$ and $x^2 \pm 180576 = \square$.

14. Find the least values of x , and y , in whole numbers that solve the equation $x^2 \pm 940751y^2 = 38$.

☞ A certain teacher in this city who goes by the nickname of *Professor* has offered to solve the 9th question for \$5.00 ; I now offer him \$20.00 to prove either its *possibility* or *impossibility*, and shew all the conditions that can exist and those that cannot.

QUERY. Will Professor James Renwick favor me with an explanation of the last twenty lines, Book 1, page 8, of his excellent work "Elements of Mechanics," just published.

Yours, very respectfully, JOHN D. WILLIAMS.

New York, June 1st, 1832.

Nos. 1, 2, 3, 5, 10, 14, of the "14 challenge problems" seem to be taken from the first edition (1828) of Williams' "250 Curious and Abstruse Questions" in his "Key to Daboll's Arithmetic," and were numbered 234, 235, 236, 238, 241, 240, respectively.

As to the possibility or impossibility of solving these problems, it would seem that Williams had solutions to the entire number, from his letter to the editors he says he fulfils his pledge to furnish such, and enclosed them. Only four answers are given to the questions as they appear in *Educational Notes and Queries* ; yet he says he received from Ward answers to eight of them, and one of them is the 14th. The answers to the 5th and 10th are from his "Key to Daboll's Arithmetic."

Asher B. Evans says in *Educational Notes and Queries*, Vol. I, p. 68, that he proved, in 1864, the impossibility of the 14th. Prof. Evans says that $y^2 - 940751x^2 = 1$ is possible and gives the values of x and y . (See also *Educational Times* "Reprint, Vol. XVI, pp. 34-36.)

$$y=1,052,442,265,723,679,403,769,386,042,382,565,332,655,403,940, \\ 191,478,220,799.$$

$$x=1,085,077,945,859,876,434,650,947,825,813,724,885,761,762,667, \\ 300,102,720.$$

The published works of John D. Williams, as far as we know, are :

The Mathematical Companion, containing new researches and improvements in the mathematics, with collections of questions proposed and resolved by ingenious correspondents. Edited by John D. Williams ; 18mo, New York, 1828-1831.

Mathematical Questions, selected by John D. Williams. Appendix, Arithmetical Questions for the benefit of city and country school masters ; 62 problems. 8vo. pp. 8.

Key to Daboll's Arithmetic ; containing correct solutions to all the examples and questions, at full length, (wherever there is the least

appearance of difficulty in the operation,) arranged under their proper heads, and numbered as in the arithmetic ; to which is added a New Method of Solving the Irreducible Case in Cubic Equations, and applied to the extraction of the cube root ; also, 250 Curious and Abstruse Arithmetical, Mathematical, and Philosophical Questions, with their solutions at full length ; many of which have never before been published ; selected by John D. Williams from Walsh's Arithmetic, Willett's Arithmetic, and Hutton's Mathematics. New stereotype edition. 12mo. pp. 180. New York, 1837.

Elementary Treatise on Algebra in Theory and Practice ; with attempts to simplify some of the more difficult parts of that science, particularly the solution of cubic equations and of the higher orders, with notes and illustrations, containing a variety of particulars relating to the discoveries and improvements that have been made in this branch of analysis, and, it is believed, more new and entertaining questions and solutions than can be found in any other work on the same subject ; to which is added an appendix on the application of Algebra to Geometry ; by John D. Williams. 8vo. pp. 614. Cloth. Boston, 1840.

Practical System of Algebra in Theory and Practice, in two parts ; with a new method of solving cubic equations and those of the higher orders, with notes and illustrations ; by John D. Williams. Second edition. 8vo. pp. 204. Boston, 1840.

The following are announced on the title-pages of his Algebras and Key as other works by John D. Williams ; but they have not come under our observation :

"Key to Hatton's Mathematics, containing the Questions and their Solutions." "Arithmetical and Algebraical Amusements." "Arithmetic and Key." "Key to Willett's Arithmetic."

John D. Williams also revised and corrected four at least of the mathematical works of J. Radford Young, and they were published by Carey, Lea and Blanchard, Philadelphia, as follows :

Elements of Plane and Spherical Trigonometry, (with original researches in spherical trigonometry by T. S. Davies) ; 8vo. pp. 148. Mathematical Tables, logarithms, logarithmic sines and tangents, and other tables ; 8vo. pp. 200. Two vols. in one. 1833.

Elements of Mechanics, comprehending Statics and Dynamics, with mechanical problems. 8vo. pp. 258. 1834.

Elements of Analytical Geometry ; with doctrine of the Conic Sections, and the general theory of curves and surfaces of the second order. 8vo. pp. 288. 1835.

MISCELLANEOUS NOTES AND QUERIES,

WITH ANSWERS.

"Every man is a valuable member of society who by his observations, researches, and experiments produces knowledge for men."—SMITHSON.

VOL. X.

NOVEMBER, 1892.

No. 5.

Precious Stones.

The father of jewelry was Prometheus. When he was cut loose by Hercules from the chains that fastened him to Mount Caucasus, he made a ring out of one of the links of his fetters, and in the bezel of it he fixed a portion of the rock. According to Pliny, that was the first ring and the first stone. Hebrew tradition says that the tablets of Moses were of sapphire. In Hebrew the word *sappir* means "most beautiful." It symbolizes loyalty, justice, beauty, and nobility.

The emerald is mentioned by John in his Apocalypse (xxi, 19). An emerald of inestimable value ornamented the bezel of the ring of Polycrates, king of Samos. That monarch, having been all his life favored by fortune, determined to put his luck to a severe test. He threw the ring into the sea. The next day he went fishing. The record of that day's sport still remains unbroken. His majesty caught a fine fish and in the inside of the fish he found his ring. That happened in the year 230 of the foundation of Rome, or 523 B. C., and the ring, considered as a talisman, was placed among the royal treasures of the Temple of Concord. Emeralds from India, Persia, and Peru are the most valuable. According to their tints and their lustre they are classed as Prosines, Neronianes, and Domitianes. According to Suetonius, Nero used to look at the fighting gladiators in his emerald. The stone is the emblem of charity, hope, joy, and abundance. It hath the reputation of curing epilepsy by application, and of being an all-round pain-killer.

The diamond was always regarded as the most precious stone. It resists the hardest bodies. The Pontiff Aaron wore a diamond of astounding virtues. It became obscure, and almost black, when the Hebrews were in a state of mortal sin. If the guilty deserved death it became red, but in the presence of innocence it came back to its origi-

nal purity and brilliancy. Rües assures us that diamonds breed, and that a certain princess of the house of Luxembourg had two which had a family in the course of a reasonable time. The same interesting assertion is made also by Boëthius. The diamond was reputed to be a preserver against epidemics and poisons. It calms and foment con-jugal love. The ancients called it "stone of reconciliation." It sym-bolizes constancy, strength, and innocence.

The name of the precious stone in the ring of Gyges has not been handed down to us, but it is probable that it was the topaz whose wonders Philostratus recounts in the life of Apollonius. An attribute of the sun and of fire, being supposed to emanate from it, the ancients called it the golden magnet, as it was credited with the power of at-tracting that metal, indicating its veins, and discovering treasures. Heliodorus, in his story of "Theagenes and Charicles," says that the topaz saves from fire all those who wear it, and Charicles was pre-served by a topaz from the fiery vengeance of Arsanes, queen of Æthi-opia. This stone was one of the first talismans that Theagenes pos-sessed in Egypt. The topaz at present symbolizes the Christian vir-tues, faith, justice, temperance, gentleness, and clemency.

One of the rarest and most precious stones is the carbuncle, which is sometimes confounded with the ruby, from which it differs by the intensity of its fires, produced by an internal lustre of gold; while un-der the purple color of the ruby there only appear dottings of azure or lacquer. Æthiopia produced the most precious ancient carbuncles. The Chaldeans regarded this stone as a powerful talisman. Legend makes the eyes of dragons out of carbuncles. Garcias ab Aorto, phy-sician of one of the Viceroys of India, speaks of carbuncles which he saw in the palace of that prince, which were so extraordinary in their bril-liancy that they seemed "red hot coal in the midst of darkness." Louis Vertoman reports that the king of Pegu wore an enormous one, which at night appeared to be lighted up with sunbeams. The virtues of the carbuncle are resistance to fire, preservation of the eyes, pro-motion of pleasant dreams, creation of happy illusions, and an anti-dote against impure air.

The ruby is valued highest when it contains the least azure. The largest ruby history speaks of is said to have belonged to Elizabeth of Austria, the wife of Charles IX. It was almost as large as a hen's egg. The virtues attributed to rubies are to banish sadness, to re-press luxury, and to drive away annoying thoughts. At the same time it symbolizes cruelty, anger, and carnage, as well as boldness and bravery. A change in its color announces a calamity, but when the trouble is over it regains its primitive lustre.

The amethyst, so called from the Greek *amethystos*, meaning "not drunk," was a favorite stone among the Roman ladies. Its principle virtue was to draw away the vapors of inebriety from the brain. It

also drove away evil thoughts, and attracted the favor of princes.

The opal, fallen from its ancient splendor, is today called an unlucky stone, even by those who laugh at old superstitions ; but it once held a high rank among precious stones. The belief that it attracted misfortune was founded on a Russian legend which found its way into France. The Empress Eugénie had a horror of an opal. At the sight of one in the Tuilleries she manifested terror. That event had the effect of lowering the price of the stone.

The turquoise is considered as a talisman in Persia, its native soil. It preserves its possessor from accidents, and insures constancy in affections. The value of the turquoise depends upon its shade and its size, especially its thickness. Those classed as belonging to the old rock are valued very highly. It is an emblem of youth, of sentiment, and tender recollections, and the turquoise may be called the forget-me-not of stones. It breaks on the death of its proprietor, and it changes its color when he is ill. This last observation is claimed to be perfectly true, and is certified to by nearly all lapidaries. The same thing has been remarked of coral. "Not only do precious stones live," says Jérôme Cardan, "but they are liable to get sick, to suffer from the infirmities of old age, and at last to die."

The most precious of all stones, according to Dr. de Lignières, is the jade, on account of its rarity, its extraordinary qualities, and the mystery of its cutting. It was regarded as a sacred stone, and nobody had a right to possess it except a prince of imperial blood. Argerius Clutius, a famous physician in Amsterdam, at the time of the Renaissance, published a work on the jade, or nephritic stone, as it was then called on account of its action on the renal system. At the same period the Italian authors spoke of the jade as a *osida*, and discussed its wonderful powers for healing sciatica. The legends surrounding this stone abound in history. Good specimens of the jade are extremely rare, and the world is at a loss to know how the Chinese managed to cut it, because it is so extremely hard that nothing can make an impression upon it. Splendid specimens of gray and green jade can be seen in the museum of the Trocadero.

In conclusion, Dr. de Lignières admits the possibility of the soundness of the theory that precious stones may have healing properties. "High scientific authority," he says, "has established beyond dispute the reality of an action *vis*, *vertus*, or *vita*, exercised by a great number of precious stones, leaving out of the question the influence of the imagination, and all the phenomena of auto-suggestion."—*Figaro*.

THE PRECIOUS STONES are twice given in the Bible but with slight variations. Some of those mentioned in the Apocypse have given writers a diversity of opinions as to their composition.

1 Sardius, 2 topaz, 3 Carbuncle, 4 emerald, 5 sapphire, 6 diamond,

7 ligure, 8 agate, 9 amethyst, 10 beryl, 11 onyx, 12 jasper. — EXODUS XXVIII, 17-20. 1 Jasper, 2 sapphire, 3 chalcedony, 4 emerald, 5 sardonyx, 6 sardis, 7 chrysolite, 8 beryl, 9 topaz, 10 chrysoprase, 11 jacinth, 12 amethyst.—REVELATION XXI, 19-20.

CROMLECH. (Vol. X, p. 257.) A cromlech is a huge flat and oblong stone, placed in a sloping position, and supported by pillars of unhewn and perpendicular stones. There were many of them at one time in Ireland, and they are supposed to have been Druidic altars for sacrifice. Their massiveness has defied the ravages of time and revolutions. There is one of them yet in Glansworth, Ireland, which has a surface of 25 by 6 feet. The simplicity of their structure bespeaks for them a high antiquity. Mr. Moore, in his "History of Ireland," says that remotely they were called in Irish "Bothals, or houses of God." This is very near to the Hebrew word *Bethel*. The Druids in ancient Ireland had no temples. Instead of them, on a hill, in an oaken grove, and if possible near a flowing stream, they enclosed a circle, having a diameter of from 70 to 100 feet, and in the center of it raised a cromlech, around which on certain days, the inhabitants marched, and always in the direction of the sun.

Near Keswick, in Cumberland, England, is another specimen of these Druidical symbols. The most stupendous circular temples were those of Stonehenge and Abury, the latter being three miles in length. The body of the temple at Classerniss, in the island of Lewis, sacred to the sun and the elements, is a relic of the Druids.

ORMULUM. (Vol. X, pp. 256.) Ormulum is a series of metrical homilies. Named also Orm, or Ormin. So called from the supposed name of the author, Orm, or Ormin. The subjects of the homilies were supplied by those portions of the New Testament which were read in the daily service of the church. The following is only a fragment of the preface or proem: "*This boc iss nemmed Ormulum,
For thi that Orm itt wrohhte.*"

OTIA ÆGYPTIACA. Discourses on Egyptian Archæology and Hieroglyphical Discoveries. By George R. Gliddon. London, 1849. On the title-page is "*Qui si fa quel che si sa; E si sa quel che ti fa.*" Will some translate this into English? OTTO.

ERRATA. Vol. X, p. 302: second line, for $n+2$ read $n+1$; fourth line, for $10n^2$ read $15n^2$. B. F. B.

ANCIENT HEREDITARY TALISMANS. Some of these talismanic symbols are mentioned in history and the classics, as follows :

AGAMEMNON'S SCEPTRE.

"King Agamemnon arose, holding the *Sceptre*, having been laboriously wrought by Vulcan who in the first place gave it to king Jove, the son of Saturn, and Jove in turn gave it to his messenger [Mercury] the slayer of Argus. But king Mercury gave it to steed-taming Pelops, and Pelops again gave it to Atreus, shepherd of the people. But Atreus, dying, left it to Thyestes, rich in flocks ; but Thyestes again left it to Agamemnon to be borne, that he might rule over many islands, and all Argos. Leaning on this he spoke words amongst the Greeks,"—*Iliad* (translated by Theodore A. Buckley), II, 100-109.

"The king of kings his awful figure raised:
High in his hand the golden sceptre blazed;
The golden sceptre of celestial flame,
By Vulcan formed, from Jove to Hermes came;
To Pelops he the immortal gift resigned;
The immortal gift great Pelops left behind,
In Atreus' hands, which not with Atreus ends,
To rich Thyestes next the prize descends;
And now the mark of Agamemnon's reign,
Subjects all Argos, and controls the main."—*Iliad*, Pope's Translation.

This sceptre, like that of Judah (Genesis XLIX, 10), is a symbol of the far-famed and wide-spread dominion of the house of the Atrides. Grote (Vol. p. 212) says that the sceptre is traced through the hands of Hermes ; he being the wealth-giving god, whose blessing is most efficacious in furthering the process of acquisition."

In Quintus Calaber (Dyce's *Selections* p. 43) the *Sceptre* is symbolized as a *Cup*, and poetized as follows ;

"Thus the monarch spoke,
Then pledged the chief in a capacious Cup,
Golden, and framed by art divine (a gift
Which to Almighty Jove lame Vulcan brought
Upon his nuptial day, when he espoused
The Queen of Love); the sire of gods bestowed
The cup on Dardanius, who gave it next
To Erichthonius; Troas received it then,
And left, with his wealth, to be possessed
By Ilus; he to great Laomedon
Gave it; and last to Priam's lot it fell."

THE STAFF OF ADAM.

It is stated in the Rabinnical writings by Rabbi Eliezer that a certain staff was made from the Tsabæn Tree of golden leaves, and that these golden leaves were an apocalypse of wonders. That the *Staff* was created between the stars, that is in the evening, and was given to the first man in Paradise. Rabbi Eleizer continues :

"Adam gave it to Enoch ; Enoch to Noah ; Noah to Shem ; Shem

to Abraham; Abraham to Isaac; Isaac to Jacob. Jacob carried it along with him into Egypt, and gave it to his son Joseph. When Joseph died, his household of goods were seized and carried to the palace of Pharaoh. When Pharaoh saw the staff, and read the inscription on it, he had a great esteem for it, and planted it in the midst of the garden which belonged to the house of Jethro that he and Jethro might only view and read the inscriptions on the staff. No others ventured to come near it. But Moses when he came into the house of Pharaoh and entered the garden of Jethro, saw the staff, and reading what was inscribed thereon, laid hold of it and carried it away. Afterwards Jethro said of Moses, "This man will deliver Israel out of Egypt." Jethro then gave his daughter Zipporah to wife to Moses."

THE "FOURTEEN CHALLENGE PROBLEMS" (Vol. X, pp. 270-271.) Williams says he received the correct solutions to Nos. 1, 2, 3, 4, 5, 10, 13, 14. You only give the answers to the first six of these Nos. What are the answers to Nos. 13 and 14? Then the six problems, said to be impossible by David S. Hart (*The Analyst*, Vol. II, p. 138), would be Nos. 6, 7, 8, 9, 11, 12.

BENJAMIN.

THE DECALOGUE OF MOSES. Gregory Nazianzen, in one of his poems entitled "The Decalogue of Moses," gives the following :

These ten laws Moses formerly engraved on tables
Of stone; but do thou engrave them on your heart.
Thou shalt not know another God, since worship belongs to me.
Thou shalt not make a vain statue, a lifeless image.
Though shalt not call on the great God in vain.
Keep all sabbaths, the sublime and the shadowy.
Happy he who renders to his parents due honor.
Flee the crime of murder, and of a foreign
Bed; evil-minded theft and witness
False, and the desire of another's, the seed of death.

PILATE'S LETTER TO TIBERIAS : "I have at length been forced to consent to the crucifixion of Jesus Christ, to prevent a tumult among the Jews, though it was very much against my will. For the world never saw, and probably never will see, a man of such extraordinary piety and uprightness. But the high-priests and Sanhedrim fulfilled in it the oracles and their prophets and of our sibyls. While he hung on the cross, a horrid darkness, which covered the earth, seemed to threaten its final end. His followers, who profess to have seen him rise from the dead and ascend into heaven, and acknowledge him for their God, do still subsist, and, by their excellent lives, show them the worthy disciples of so extraordinary a master. I did all I could to save him from the malice of the Jews, but the fear of a total insurrection made me sacrifice him to the peace and interest of your empire."
—*Acts of Pilate*, quoted by Justin Martyr and Tertullian.

The Language of Our Temples.

Europeans travelling in India must have seen that our temples, in whatever part of India they might be, have a uniformity of construction among them ; most of them seem to be built after a certain model plan of some, as it were, very ancient Public Works Department. The reason is that the temples are all symbolical ; they have a language of their own, a language that is taught only verbally by the *Gura* (preceptor) to his *Chela* (disciple). The basic symbol of a temple is an equilateral triangle, having Birth at the left hand corner, Death at the right hand corner, and *Amritan* (immortality) at the top. The base line would therefore represent the present condition of Humanity, the condition mentioned in the *Bhavana Geeta* (ix, 21), and elsewhere. It represents Life, which is *Jeevanam* in Sanskrit, meaning the state of existence of *Jeeva*. This base line becomes the platform or plinth of the temple, and with the steps leading to it, symbolizes the present condition of Humanity, the steps meaning the previous stages we have passed through.

The second part of the temple consists of the four walls, which are cut into niches ; they represent the four great religious systems of this world, namely, the Religion of *Bhakti*, or Love ; the Religion of *Gnanan*, or Knowledge ; the Religion of *Karma*, or Action ; and another which I do not remember. The niches stand for the different religious sects.

The third part is the roof, pyramidal or conical, on the top of which is placed a rod or trident vertically, the rod being the fourth. This is *Brahma-Vidya* (Cognition of Universal Spirit) standing on and uniting in itself all the religious systems of the world. This part is frequently cut into steps. The rod represents *Gnanan*, or more properly, *Tattva Gnanan*, or Knowledge of Reality.

Then comes the *Dvaram*, or the door ; the door must be either on the Southern wall or on the Western wall, so that the worshipper on entering must face either the North or East. It is said that *Gnanan* comes from the North, where the *Devas* (Gods) reside, and the rites and ceremonies from the East.

The sixth is the space inside the temple ; the seventh is the idol. I do not think it is necessary to write anything on the last two portions, and hence leave them to the intuition of the reader. *Shiva*, the third of the Hindu Trinity, has seven faces, but only five are allowed to be given out, and the sixth and seventh are always kept in secret. The mysteries connected with the sixth are only to be divulged to *Chelas* of certain grades, while the seventh, the last, is known only to the *Deekshitas*, or the Initiates. There are certain instructions that are never expressed in language, but filtered, as it were, into the mind

of the disciple. Many formulas form the key to the system of philosophy which the disciple is told to study at his leisure. Most of the disciples are requested to visit the sacred shrines all over India; a few also, such as Hingalaz, outside its present geographical limits. Used to the hard life of an ascetic, it does not become hard to a *Chela* to visit the temples and learn the lessons they teach, which act becomes a source of pleasure to him.

The temples also represent our body, and the idol, the *Fitatwa* (the Spirit) residing in the middle *Chakram* (plexus), *Bnahata*.

Whatever way it is looked at, the Hindu temple has a deep significance to those who do not look upon our ancient ancestors as little better than barbarians, our *Shastras* as all full of fables and absurdities, and our ancient Hindu civilization as but the effect of Eastern imagination.—H. P. MUNKHERJI, Fellow of Theosophical Society, at Burhampore, Bengal, India.

HIRAM, OR HURAM. (Vol. VIII, p. 361.) Hebrew *Hirm*, or *Hurm*, meaning "noble-born." The more correct pronunciation, according to the true value of the Hebrew letters, is *Khuram* or *Khurum*; but universal Masonic usage renders it now impossible, or at least, inexpedient, to make the change. The name of the King of Tyre is spelled *Hiram* every in the Scriptures, except in I Chronicles xvi, 1, where it occurs as *Huram*. In this place the original Hebrew text is *Hiram*, but the Masorites in the margin direct it to be read *Huram*. In our authorized version the name is spelled *Hiram*, which is also the form used in the Vulgate and in the Targums. The Septuagint has *Cheiram*. The word *Abif* is translated II Chronicles iv, 16, "his father." The latter part of the verse in the original is as follows: *Shelomoh lamelech Hbif Huram gnasah*. In the Vulgate it is "Hiram pater ejus." Luther took the correct view of the subject translating the word as an appellative, "So now I send you a wise man who has understanding, Huram Abif."

"ONCE IN THE FLIGHT OF AGES PAST." (Vol. X, 256.) This is the first line of James Montgomery's piece entitled "The Common Lot."

"BID ME TO LIVE, AND I WILL LIVE." (Vol. X, p. 256.) This is in Robert Herrick's works, being a lyric, "To Anthea, who may command him anything."

CLOVIS FLAG. (IX, p. 40.) Clovis is from an old German word *Chlodwig* and means "famous warrior." The modern German word is *Ludwig*, and the French is *Louis*. Clovis was the first Christian king of the Franks; he was born A. D. 465, and by the death of his father, Childeric, became king of the Salian Franks, whose capital was Tournay. After having overthrown the Gallo-Romans under Syagrius, near Soissons, he took possession of the whole country between the Somme and the Loire, and established himself in Soissons. In 493 he married Clotilda, daughter of a Burgundian prince. His wife was a Christian, and earnestly desired the conversion of her husband, who, like most of the Franks, was still a heathen. In a great battle with the Alemanni at Tolbiac (Zulpich), near Cologne, Clovis was hard pressed, and as a last resource, invoked the God of Clotilda, offering to become a Christian on condition of obtaining the victory. The Alemanni were routed, and on Christmas day of the same year Clovis and several thousands of his army were christened by Remigius, bishop of Rheims. The reception of Clovis into a church by a bishop in connection with Rome tended greatly to secure the supremacy of orthodoxy over Arianism, of which at that time most of the Western Christian princes belonged. Pope Anastasius, who fully appreciated the importance of this gain, saluted Clovis as the "Most Christian King." In 507, love of conquest concurring with zeal for the orthodox faith, Clovis marched to the southwest of Gaul against the heretic Visigoth Alaric II, whom he defeated and slew at Vouglé, near Poitiers, taking possession of the whole country as far as Bordeaux and Toulouse; but he was checked at Arles, in 507, by Theodoric, king of the Visigoths. Clovis took up his residence in Paris, where he died in 511. Clovis in several instances used the Arianism of other Christian princes as a pretext for war and conquest and he stained his name by cruelly murdering a number of his own relations whom he looked upon as dangerous rivals; but the writers of the Roman church assert that he was chaste, and just toward his subjects.

The Clovis flag dates from the conquests and exploits of this king.

It was not Clovis, but Clotaire, king of France, who exclaimed on his death-bed, "Oh how great must be the King of Heaven, if he can kill so mighty a monarch as I am."

Waste Basket of Words.

[From "*Journal of American Folk-Lore*," Vol. V, No. XVI, pp. 61, 145.]

In 1656 there was published in London, a book of culinary and medical receipts which had been collected for Queen Henrietta Maria. The book was called "The Queen's Closet Opened," and it contained many words which have now become obsolete, and many which were used in an entirely different sense from their modern one. I give a few such with the clauses of sentences in which they are found :

Coffin. "Put your strak in a deep coffin." "A coffin of paste"
"Make your coffin what fashion you please."

Coast. "Take the thinnest end of a coast of beef."

Froize. "Fry them like a froize."

Simper. "Let it stand and simper over the fire."

Strike. "Take one strike of malt and one of rye."

Whelm. "Loosen it with a knife and whelm it into a dish."

Wame. "Give them a little wame or two." "Set it on the fire & it seethe two or three wames." "Hold your Salmon by the tayl
let him have a wame."

Jag. "Cut him with a jag asunder."

Scotch. "Scotch them grossly with your knife."

Broach. "Broach it on a broach not too big, and be careful you broach it not thorow the best of the meat."

Killar. "Put your cheese in a kiilar that haste a waste in the bottome." This is probably keeler.

Thrume. "Put it into the Fat and thrume it night and day."

Sleet. "In the morning sleet off the Cream in a bottle and put the sleet milk into a tub."

Sucket. "To Candy Suckets of Oranges & Lemmons."

Fils. "Orange pils, "Take away that spongius which under the yellow pils." "Put in lemmon pil." "Pillings of goose horn."

Searce. "Take searced sugar." "Rice flour finely searced."

Contagition. "Persons infected with contagition."

Mot. "Put it in a cheese mot."

Leer. "Put in a leer of butter." "A leer of butter & lemmons."

Slake. "Two or three slakes of mace."

Uncomb. A sore finger.

Tents. "Roll up small like tents." "Make it in tents." — ALICE MORSE EARLE, Brooklyn, N. Y.

I am indebted to my cook for the following words, which are novel to me :

Gorm. An epithet implying a high degree of excellence or superiority. "Can she cook?" "Lord, she's a regular gorm of a critter."

Sprawl. Power of extended activity. In reply to a question about another cook, the reply was, "Oh, well, she's got no sprawl to her."

Plug. To move in a heavy or clumsy manner. "He went plugging along without looking to the right or left." — ABBY L. ALGER, Boston, Mass.

Sculch. This word is in common use in Newcastle, N. H., as meaning any useless thing, or refuse, but is never applied to persons.

Gorm. This is almost a synonymous word; it has perhaps a shade of disgust, or contempt, in excess of "sculch." — JOHN ALBEE.

Plug. Of Mrs. Alger's three words, one only, "plugging," is new to me, and may have been originally a perversion of "ploughing." "He went ploughing along." In that very amusing book, "In Gipsy Tents," a young girl describes a drunken old man, walking on through the lanes at night. "He never spoke, but just went boring on like some old hedgehog" (p. 178). This seems much the same association of ideas.

Sprawl. This word, in the sense of vigor or force, is not uncommon to rural New England, and I have heard it even in Boston. It seems akin, by the association of sound, to "sprit," "spunk," "spirt."

Gorm. A very local word, which I have heard in but two places. In an old note-book of my own, kept in 1851, I find the entry, "gorming," gawky, or awkward. Amesbury, Mass. Some twenty years ago I heard it from a man mending a road near Bethlehem, N. H., who described the gigantic family of Crawford, the white mountain pioneers, as being "all gorming men," that is, large and powerful. Twice only have I thus encountered the word "gormed" as a sort of oath. "When I go a looking and looking about that theer pritty house of our Emily's, I'm—I'm gormed," said Mr. Peggotty with sudden emphasis; "theer! I can't say more — if I don't feel as if the littlest things was her, a'most." The vast weight attributed to the asseveration seems to convey the same meaning of bigness and substance. — T. W. HIGGINSON, Cambridge, Mass.

Bellygut, Bellyhump. Terms used in "coasting." To lie on a sled with the face down.

Bumsquizzle. A term of raillery. "O bumsquizzle!"

Clip. A blow, "To hit him a clip."

Garble. To "garble" drugs, that is, to sort them, and free them from impurities.

Patter. To work in a fussy manner. Some as "potter," "putter."

Putty-head. A term of reproach. Softhead, stupid.

Whip-stitch. An expression of time. An instant, moment. "Why, every whip-stitch you see so and so."

The following phrases are reminiscent of my boyhood in Maine :

"He has n't got a bit of 'sprawl.'" "If he had the sprawl of a louse." These were spoken of a shiftless fellow who seemed unable to provide properly for his family.

"A great 'gorming' (that is awkward) creature." "'Gormed' all over the table." The last was said of one whose table manners were not up to the rural standard.

Bellybunt. This word, in common use in the Kennebec valley, I find to be familiar to several acquaintances as formerly used in other sections of Maine. Boys in Allston, Mass., when riding flat on their sleds with their faces down, are now said to ride "Bellybumps."

Kneebunt. Another coasting term, used to denote the side-saddle fashion of riding the sled.

When a boy throws himself on a sled in motion in either of the positions noted, he "bunts," or "thumps," or "plumps," etc., upon it, according to the manner of speech in his locality.—JAMES C. BROWN, Brighton, Mass.

THE SOUTH SEA COMPANY. What is meant by the "South Sea Company" occasionally mentioned in the press? LLEWELLYN.

The South Sea Company was projected by Robert Harley for the purpose of relieving the nation of the floating debt which amounted at then at about \$10,000,000. The plan was to sell this debt to a number of merchants, who were to be guaranteed six per cent interest, and to have a monopoly of the South Sea trade. The buyers of the debt were incorporated by royal charter as the "South Sea Company," and certain taxes were set aside to pay the annual interest, which amounted to 6000,000*l.* June 27, 1711, a capital of \$4,000,000 was raised for the company under a royal commission. February 18, 1715, the Prince of Wales was made a Governor, and February 3, 1715, the king himself, George I, was a Governor. April 7, 1720, the company offered to parliament to take into its hands the whole national debt, amounting to nearly £31,000,000.

This scheme was the precursor of the "South Sea Bubble," "Mississippi Bubble," and other similar organizations.

THE JEWS' CREED. What is the religious belief of the Jews ?

CHRISTIAN.

A summary of the religious views of the Jews was first compiled in the eleventh century by the second great Moses (Maimonides), and it continues to be with the orthodox Hebrews the Jewish confession of faith to the present day. The thirteenth century undoubtedly opened the epoch of Jewish faith by a full appreciation and recognition of the creed as formulated by Maimonides. It was said of him at the time that "from Moses (the Lawgiver) to Moses (Mendelssohn) there was none like Moses (Maimonides)." Here is the confession :

1. I believe, with a true and perfect faith, that God is the Creator, (whose name be blessed), governor, and maker of all creatures ; and that he hath wrought all things, worketh, and shall work forever.

2. I believe, with perfect faith, that the Creator (whose name be blessed) is one ; and that such a unity as is in him can be found in no other ; and that he alone hath been our God, is, and forever shall be.

3. I believe, with a perfect faith, that the Creator (whose name be blessed) is not corporeal, nor to be comprehended with any bodily properties ; and that there is no bodily essence that can be likened unto him.

4. I believe, with a perfect faith, the Creator (whose name be blessed) is to be the first and the last ; that nothing was before him, and that he shall abide the last forever.

5. I believe, with a perfect faith, that the Creator (whose name be blessed) is to be worshipped and none else.

6. I believe, with a perfect faith, that all the words of the prophets are true.

7. I believe, with a perfect faith, that the prophecies of Moses our master (may he rest in peace) were true ; that he was the father and chief of all wise men that lived before him, or ever shall live after him.

8. I believe, with a perfect faith, that all the law which at this day is found in our hands was delivered by God himself to our master Moses (God's peace be with him).

9. I believe, with a perfect faith, that the same law is never to be changed, nor any other to be given us of God (whose name be blessed).

10. I believe, with a perfect faith, that God (whose name be blessed) understandeth all the works and thoughts of men, as it is written in the prophets ; he fashioneth their hearts alike, he understandeth all their works.

11. I believe, with a perfect faith, that God (whose name be blessed)

will recompense good to them that keep his commandments, and will punish those who transgress them.

12. I believe, with a perfect faith, that the Messiah is yet to come ; and although he retard his coming, yet I will wait for him till he come.

13. I believe, with a perfect faith, that the dead shall be restored to life when it shall seem fit unto God the Creator (whose name be blessed, and memory celebrated without end. Amen).

Reformed Judiasm, which is also called *progressive*, rejects the belief in the coming of a Messiah ; the gathering of the Hebrew people to Palestine to form a separate government, and to restore the ancient customs and sacrifices and the Levitical priesthood ; the resurrection of the body and the last judgment day ; and the authority of the Talmud above any other collection of commentaries to the Bible. All these doctrines are found in the orthodox catechisms, rituals, and prayer-books. The doctrines as propounded by Moses Maimonides are considered orthodox by the Jews. The first reformer of Judaism was Saadia ben-Joseph, of Fayum, who flourished in the first half of the tenth century, according to Dr. Isaac M. Wise, a Hebrew savant ; the second reformer to formulate the belief for the chosen people was " the famous body-physician of the calif of Cairo, *Rambam*, known as " the classical Moses Maimonides." They believe in Zechariah xvi, 9, " And the Lord shall be king over all the earth ; in that there shall be one Lord, and his name one."

The Hebrews in the United States number over half a million.

The descendants of Jacob, to whom the law was given by Moses, are comprised under the family or nation of Shemites, a people of many fates and many names, called in the Bible the people of God ; by Mahommed, " the people of the Book " ; by Hegel, " the people of the *Geist*" ; and now generally known as *Hebrews*, *Israelites*, *Jews*. The faith originated with patriarch Abraham in an age of polytheism ; he became the founder of monotheism by a prompt recognition of the one living and *true* God ; and from that remote day to this, all the Jewish people pride themselves on being " children of Abraham." " Abraham is our father " (John viii, 39).

The Assyrians, Babylonians, Phœnicians, and Carthaginians all possessed a nearly identical religion, but one that lacked the essential features of the Jewish religion.

ETYMOLOGY AND DEFINITION. There is so much imperfection to note and query in our *diction-areas*, or, as the common spelling is, dictionaries, that I would like to suggest to you (with the help of your etymological readers), the possible enrichment of your pages, by brief references to the dubious, and often erroneous, definitions of Webster's great International. I am often surprised at the shallowness of Webster's explanations, and sorry that so magnificent a collection of the "symbols of speech" should not define truly, and furnish indisputable accuracy of meaning for our rising students and future orators. This is so entirely within the province of your NOTES AND QUERIES, and its readers are so in touch with this subject, that a few pages occasionally penetrating the Websterian crust could not fail to benefit the publication we so thankfully get from your press. The kind of criticism I would suggest I will illustrate. I will make the word *nonsense* my text since it is that I so much regret to often find in Webster's responses to verbal investigators.

NONSENSE. Webster makes *non* (not) the prefix to *sense* (thought), or non + sense, which is truly nonsense. We commonly hear the expression (as an excuse for levity of manner) :

*"A little nonsense now and then,
Is relished by the best of men."*

And it is that kind of nonce-sense or single-occasion sense that I want to assist to its proper place in our language.

To suppose intelligent people *relish* the negative of sense, is absurd in the extreme. They do no such thing. What they laugh over, and grow fat upon, in their moments of relaxation is that wholesome *sense* that sparkles for the *nonce*, and for the moment arouses the keenest pleasures, in their bones, *Webster* to the contrary notwithstanding.

C. B. B., Vineland, N. J.

THE LION AND THE UNICORN. Ever since 1603 the royal arms have been supported as now by the British lion and the Scottish unicorn; but prior to the accession of James I, the sinister supporter was a family badge. Edward III, with whom supporters began, had a lion and eagle; Henry IV, an antelope and swan; Henry V, a lion and antelope; Edward IV, a lion and bull; Richard III, a lion and boar; Henry VII, a lion and dragon; Elizabeth, Mary, and Henry VIII, a lion and greyhound. The lion is dexter, that is to the right hand of wearer or person behind the shield.

RESPECT FOR THE DOG. The sacred books of the Parsees are full of reminiscences of the respect borne by the primeval Iranian to that friend of man—the dog :

“ Creator! What is the penalty him for who wounds a cattle-dog dangerously, so that its living power is weakened ? ”

And Ahura-Mazda answered :

“ Eight hundred blows with the horse-goad, and eight hundred with the graoshôcharana.”

“ Creator! What is the penalty for him who wounds a village-dog dangerously, so that its living power is weakened ? ”

And Ahura-Mazda answered :

“ Seven hundred blows with the horse-goad, and seven hundred with the graoshôcharana.”

“ Creator! What amount of sin does he contract who gives insufficient food to a cattle-dog ? ”

And Ahura-Mazda answered :

“ The same amount of sin as if he had given bad food to the master of an illustrious house in the material world.”

“ Creator! What amount of sin does he contract who gives insufficient food to a street-dog ? ”

And Ahura-Mazda answered :

“ The same amount of sin as if he had given bad food to the master of a second-rate house in the material world.”

“ Creator! What amount of sin does he contract who gives bad food to a puppy ? ”

And Ahura-Mazda answered :

“ The same amount of sin as if he had injured by giving bad food to a human child.”

“ I, Ahura-Mazda, I have created the dog, clothed him, and shod him. When he is well and by thy hearth, then the thief and the wolf will not come nigh thy village, and rob thee of thy goods.”

SYMBOLIC LANGUAGE. “ When we speak of the eye of God, we use symbolic language. The Egyptian drew the symbol. The Hebrew Scriptures teem with symbolic passages, but the Jew was forbidden to make a graven image of God. The second commandment therefore forbids the abuse of idolatry, not the principle. For such expressions as ‘ He came riding upon the wings of the wind,’ ‘ The eyes of the Lord are over the righteous,’ ‘ His right hand hath the preëminence,’ ‘ The Ancient of Days,’ ‘ He sitteth upon his holy seat,’ ‘ Turn Thy face from my sins,’ call up images before the mind thoroughly human, and the objection to their representation in sculpture or painting, was lest the Jew should halt at the physical expression of God’s being, and not advance to the idea of his moral being.’

JOSHUA — THE ROBBER. (Vol. X, p. 257.) John Kitto, in his "Biblical Cyclopædia," Vol. II, p. 154, gives an account of the epithet, "the robber," as having been applied to Joshua the son of Nun. There occur some vestiges of the deeds of Joshua in other historians besides those of the Bible. Procopius mentions a Phœnician inscription near the city of Tingis in Mauritania, the sense of which was: "We are those who fled before the face of Joshua the robber, the son of Nun." (See *De Bella Vandalis*.)

Suidas, in his article on *Chanaan*, has the following as from the same or a similar source: "We are the Canaanites whom Joshua the robber persecuted."

A letter from Shaubech, king of Armenia Minor, in the Samaritan Book of Joshua, (xxvii) styles Joshua *Lupus Percussor*, "the murdering wolf"; or, according to another reading in the Book *Fuchasin* (p. 154), *Lupus Vespertinus*, "the evening wolf." The letter of Shaubech is as follows:

"From the assembly of the giants, the confederated, well-known, far-famed, victorious, triumphant, mighty in courage, protected with armor, and the foremost of all mortals.

To Yûshuâ the shepherd, the son of Nun, and to his people. Peace from us unto you.

We know, O murdering wolf, what thou hast done in the cities of our associates, and that thou hast in murder destroyed all of their leaders and sent them down to the bottom of the lowest depths, and hast demolished the places in which there was for us aid, and hast put down the provinces which were our supports and from which our helpers were ever providing themselves with food, and has destroyed for us thirty cities, besides residences and small towns, and that thou didst not reverence old men, nor have compassion upon little infants, nor didst thou give ear unto them and grant them protection, nor leave a place unto begging safety of thee, nor grant time for good action. And the reason of this (thy success) was, that then we were distracted by discords and dissensions, and a lack of unity in our councils; but now understand, O murdering wolf, that we are coming unto you with all the kings in harmonious agreement, with spirits in concord, and tongues that have pledged mutual covenants, and hands that have been struck together. With conditions all perfected, and souls full (of wrath) and accumulated complaints, and livers, as it were, cut asunder, whom no stampede can ever overcome, nor a great fire put to fright.

And now after thirty days we will on the battle between us and thee:

in Merj Balâtâ, in front of the mountain in which thou worshipest thy Lord, which is referred to as the Mount of Blessing. And there will be no delay on our part, or on the part of any one of us; so be prepared for those whom thou shalt meet, and make no excuse for thyself by saying that thou art taken by surprise, or that a stratagem has been employed against thee, or that the enemy came against thee by night. And, moreover, know that in our company there are thirty-six kings, and in the army of each king sixty thousand knights, besides foot-soldiers innumerable and countless, who make sport of devices (employed). And there is also with us the son of Yâfet the giant, who has with him a thunderbolt of steel, and when he hurls it, and it is granted full success, it kills a thousand men, and when full success is not granted, it kills five hundred men; and they who are with him are kings, and with them are instruments and implements of war, which they have inherited from their grandfather Nûh (Noah)—peace be unto him. Therefore take knowledge of this and act in accordance herewith, and look out for thyself, for thou art about to be brought to account for what thou hast done. And now peace."

The "thirty cities" in this letter does not agree with the canonical Book of Joshua, where the number is given as "thirty and one (xii, 24); The Septuagint, in this place, reads "twenty-nine."

A PERFECT FULL MOON A RARE OCCURRENCE. A full moon occurs only when the moon is 180° of longitude from the sun, the latter being practically, as well as the earth, always on the ecliptic. But the moon's orbit is inclined to the ecliptic at an angle of $5^\circ 8' 47'' 9$, and is therefore never on the ecliptic except when at its nodes or crossings. The circular disc of the full moon is therefore always seen slightly oblique, except when a full moon happens exactly at the time of its passing through one of its nodes, and it would of course be centrally eclipsed, which is an event of great rarity. The illuminated hemisphere of the moon is therefore presented obliquely to the eye, and must take the projection of gibbosity, in a very slight degree, but which is noticed very distinctly a day or two after the full moon. The longer diameter of the gibbous phase must be parallel with the ecliptic. When the full moon occurs at a node, the sun, earth, and moon are in the same ecliptic plane and the lunar disc must be at right angles to it, and therefore an exact circle, but at all other times the full moon is out of that plane, and its disc must be gibbous. The gibbous line will, as in the case of the old moon, be a semi-ellipse, and always the border of the moon nearest the ecliptic. The other border will be a semi-circle. We therefore conclude that a full moon having a perfect circle, has rarely, if ever, been seen.—*N. E. Journal of Education.*

A LEWIS IS THE SON OF A MASON. 1. A *lewis* is the son of a Mason. In France it is *louveteau*, or young wolf, probably on account of the bad state of education among French Masons. They derived all matters of Masonry from Egyptian hieroglyphics, and sought to give a factitious glory to the institution. There is no nation so exact in mathematics, and so wild in theory, as France. In England and in France to be a *lewis*, or *louveteau*, confers certain privileges; in England that of being initiated at eighteen, if otherwise suitable and a dispensation being granted, and in any case before any other candidate of the same evening, however noble; and in France of receiving Masonic baptism, and the lodge incurs certain responsibilities of oversight and education.

2. A cramp-iron to be inserted into a cavity in any large stone, so that a hook may be inserted to lift the stone by means of a pulley. Mackey thinks the word was derived from the French, as *lévis*; in technical French building it is called *louve*; but if we think of *pont lévis*, a drawbridge, where a winding pulley is or was applied, we can perceive the application of the words.

3. The enemies of Masonry may find some consolation in the same idea as applied to the bands, which they themselves called into existence, of the *louve têtes*, who revenged, by fire and sword, the abominations committed upon their fathers and mothers.

4. The placid Masons of 1723, who knew none of these things, adopted the idea of *lewis* into their system, little supposing what mischief they had imported.

THE EARTH OF COLUMBUS. (Vol. X, p. 257.) It is not positively certain that Columbus believed in "The Earth a Globe." The compilations of John of Beauvis, 1479, were said to be carefully studied by Columbus. The cosmographical manuscripts of the seventh century show that the earth was supposed to be in the form of a cone or top, the surface rising from north to south. Some of the letters of Columbus seem to show that such was his conception of the earth. According to Columbus, the historic hemisphere was true to the spherical figure, but the hemisphere of his far west explorations rose to a lofty eminence at the equator, in what he supposed to be Asia, but afterwards which proved to be the northern part of South America.

"FEET AND GOLDEN FEET." (Vol. X, p. 256.) We observe in a work on the "Origin of Language," by Morgan Kavanagh, Vol. II, p. 165, a few remarks on the "Golden Feet of Buddha." He also refers to the author of the work entitled "Nimrod." He says Buddha is now worshipped under the form of a gigantic foot. This author says the name Buddha has somewhat changed so as to have lost some of its first meaning, that of the sun, and to have signified at last a *foot*. The sole of this gigantic foot, says this author, is covered with hieroglyphics, and the adherents of Buddhism delight in also being called the "Golden Feet." He also continues as follows :

"The name Buddha, Baudha, Butus, Butta, Buduas, Buda, Battus, Boudha, Baouth, Boot, Boutes, Bod, Bud, Padus, Poden, Pot, Woden, (and some others perhaps), is varied in almost every possible combination ; but its etymon and original meaning is that which the form of Buddha's symbol points out, *ex pedes Hercules* (out of the foot of Hercules). Our word *foot* and *boot* are his name, and the latter is the very way in which he is called at his ancient and ruined temple of Bactra, or Boot-Bumian.

"No doubt but Latopolis in Egypt was called Buto with some reference to a cow, and the Greeks too had the same idea in the name Butes or Butas, whether they used it in their own mythology, or as a name from the East. But that is a secondary meaning, drawn from that only image of symbolism which the Supreme Godhead ever suffered to be made of Himself, viz., the quadricephalous cherub or bull. Baachus was worshipped at Elis as a man with a *bull's foot*. Apollo the dragon-slayer gave oracles on the spot where he had destroyed the old serpent, which was also called the *tripod*, because *number* was first generated from the *triad*."—*Nimrod*, Vol. IV, p. 217.

JOHN D. WILLIAMS'S "MATHEMATICAL COMPANION." (Vol. X, p. 271). Florian Cajori, M. S. of University of Wisconsin, in his volume on "The Teaching and History of Mathematics in the U. S.," (Circular of Information, No. 167), p. 96, says there is a copy of the *Mathematical Companion* in the Harvard Library. A visit to the Library to examine the copy failed of finding it. The octavo pamphlet of problems, as follows, in a cover of *The Companion*, announcing its purpose to publish it at intervals of six months, was all that could be found by the librarian :

Mathematical Questions selected by John D. Williams. Appendix, Arithmetical Questions for the benefit of city and country schoolmasters ; 62 problems. 8vo. pp. 8.

"RIDES." The following poems have come under my observation and I communicate the titles, and authors as far as I have them, for publication :

AUGUSTUS T. RAY.

Charlotte Cushman's Ride,	Annie A. Preston.
Daniel Preston's Ride,	Albion W. Tourgée.
The Devil's Ride,	F. W. Small (" Old Si ").
Erl King's Ride,	Wilhelm von Goethe.
Ichabod Crane's Ride,	Washington Irving Ride.
John Gilpin's Ride,	William Cowper.
King of Denmark's Ride,	Charlotte Elizabeth Norton.
Kit Carson's Ride,	Joaquin Miller.
Lady Godiva's Ride,	Alfred Tennyson.
Mary Butler's Ride,	Benjamin F. Taylor.
Mrs. Garfield's Ride,	George Lansing Taylor.
News from Flodden Field,	Walter Scott.
Parson Allen's Ride,	Wallace Bruce, (Poughkeepsie).
Paul Revere's Ride,	Henry W. Longfellow.
The Radical Ride,	A. Jay Walker.
Ride to Aix,	Robert Rowning.
Ride on Black Valley Railroad.	I. N. Tarbox.
Ride of Collins Graves,	John Boyle O'Reilly.
Ride for Life,	(<i>N. H. Journal</i> , Nov. 26, 1881.)
Sheridan's Ride,	Thomas Buchanan Reade.
Skipper Ireson's Ride,	John Greenleaf Whittier.
Tam O'Shanter's Ride,	Robert Burns.
Warren's Ride,	E. H. Weston.
Young Lochinvar's Ride,	Walter Scott.

AUTHORS NOT GIVEN.

Don Quixote's Parole,	Pythias's Homward Race,
Grayson MacArthur's Ride,	Ride of Commendatore,
Israel Putnam's Ride,	Dick Turpin's Ride,
Mazeppa's Circus Feat,	Wilhelm's Ride with Leonore,

BRITOMART. (Vol. X, p. 257.) Britomart is from the Greek *brit*, sweet, and *martis*, a maid. According to the Greek mythology she was a Cretan nymph, daughter of Jupiter and Carme. The name is also applied to Diana who loved Britomart. Spenser applies the name to "a lady knight" who represented chastity, whose adventures are related in *The Faëry Queen*. She is represented as being armed with a magic spear, which nothing could resist.

"She charmed at once and tamed the heart,
Incomparable Britomart.—WALTER SCOTT.

HORÆ—TITLES OF BOOKS. The following books are classed under *Horæ*, "hours."

Horæ Ægyptiacæ, 1851,	by George B. Airy.
Horæ Apocalyptiæ, 1846,	E. B. Elliott.
Horæ Biblicæ,	Charles Butler.
Horæ Daniæ,	Robert Pearce.
Horæ Hebraicæ,	Christian Schöttgen.
Horæ Hebraicæ et Talmduicæ,	John Lightfoot.
Horæ Homileticæ, 1832,	Charles Simeon.
Horæ Juridicæ Subsecivæ,	Charles Butler.
Horæ Lyricæ,	Isaac Watts.
Horæ Mosaicæ,	George S. Faber.
Horæ Paulianæ,	William Paley.
Horæ Sabbaticæ, 1851,	Godfrey Higgins.
Horæ Solitariae, 1815.	(Anonymous.)
Horæ Subsecivæ,	John Brown.
Horæ Syriacæ,	Nicholas Wiseman.
Horæ Tennysonianæ,	A. J. Church.
Horæ Vindicæ, 1848,	E. B. Elliott.

LIGHTNING NOT ZIGZAG. (Vol. X, p. 220.) The poetic and popular conception of the path of lightning is that it is a series of zigzags much sharper than those of a Virginia rail fence. Photography proves however that the track does not contain a single angle, but that it is sinuous like a river. Even as early as 1856, James Nesmith declared before the British Association for the Advancement of Science that he had never observed the zigzag form of lightning, but to his eye the flash always appeared as in a diagram which he offered, showing only curves, and with or without branches or forks. It is now very evident that he was an exceptionally keen observer. Photographs reveal not only the sinuosity of the track but also the ramified character of many flashes, also the ribbon-like streak, flat, thin, and wavy, quite distinct from other forms. There are also meandering varieties.

QUOTATION FROM SCHEFFLER. (Vol. X, p. 257.) According to S. Baring-Gould's "Origin and Development of Religious Belief," Vol. I, p. 389, the quotation below is from the German poet Scheffler, a disciple of Jacob Böhme :

"Not for a moment God could without me endure,
But if I cease to be, then He to cease is sure.
I am as great as God—He is as small as I ;
He cannot o'er me be, nor I beneath Him lie."

THE USE OF THE PERIOD. (Vol. X, p. 257.) We submit the following as some of the uses of the period (.) :

1. It is the period when used to denote a full stop.
2. It is the separatrix when used between a whole number and decimal (2.718281828); or between dollars and cents \$18.75; or between the characteristic and mantissa of a logarithm (2 3025851).
3. It was used in fluxions and fluents over the x and y ($\dot{x}$, $\dot{y}$).
4. They are used for leaders in tabular work (.).
5. They are used for omission of words ("He that believeth shall be saved"—*Mark* xvi, 16.)
6. They are used for a series (1, 3, 5, 7, 9, n).
7. It is used to indicate that letters are the initials of words and that words are abbreviated (U. S. A.; Gov. of New Hampshire); and when the abbreviation is at the end it has a double significance as "the Athens of America" is said to be Boston, Mass.
8. It is a dot when used over the i and j .
9. It is a point within a circle in the Masonic "Monitor," and esoterically explained to symbolize a brother, but esoterically it has a phallic significance. As an astronomical sign it is the sun $\odot$.
10. It is used for the sign of multiplication (2 . 3 . 4 . 5 = 120).
11. It is used to show some decimals are circulates (.142857. .83.)

BOSTON SHEET ALMANAC for the year of our Lord 1774, ornamented with the heads of two New Zealanders, "tattooed," and a war canoe filled with chiefs and people.

"The fifteenth of April and seventeenth of June, remember,
August the thirty-first, and twenty-fourth of December;
On these four days (and none else in the year),
The sun and clock both the same time declare.

The broadside is $22 \times 17\frac{1}{2}$ inches, printed and sold by I. Thomas, near the Market, and by Mills & Hicks, in School Street, Boston [Price, six-pence]. It contains the history of New Zealand, the twelve calendar pages of the almanac, four other pages, eclipses, signs, holidays, interest table, and a page on the character of England, in which Mr. Thomas says :

"England is the Queen of the Isles, the Peru of Europe. It is the most delightful country in the world; but then, a man must be a gentleman before he can live there; and if the high road to hell be sown with delights and pleasures, you must necessarily pass on through England to it."

"SEARCHERS AFTER TRUTH." (Vol. X, p. 257.) The Masons who are known in the Rite of Philalethes are the "Searchers after Truth."

The rite was invented in the lodge of Amis Reunis of Paris, 1775, by Savalette de Langes, Keeper of the Royal Treasury. It had twelve classes or chambers of instructions:

1. Apprentice. 2. Fellow Craft. 3. Master. 4. Elect. 5. Scotch Master. 6. Knight of the East. 7. Rose Croix. 8. Knight of the Temple. 9. Unknown Philosopher. 10. Sublime Philosopher. 11. Initiate. 12. Philalethes or *Searchers after Truth*.

The first six degrees are called Petty, the last six High Masonry. The rite existed only during the time of De Langes, and dissolved at his death. Its meetings were called convents and the members made special studies in the occult sciences.

CHORIZONTES. (Vol. X, p. 257.) The word *Chorizontes* means the "Separators." They were, according to Anthon, a party of critics in Greece and elsewhere who believed that the *Iliad* and *Odyssey* were not composed by the same person. Seneca refers to "the separators" as engaged in the controversy, and when the Venetian scholia was published it seem to be conclusive that there had been an interesting discussion of the real authorship.

A view of the *Iliad* which is in some measure conservative, and which aims at reconciling divergent theories, has been quite fully expounded by Dr. Christ, in the "Prolegomena" to his edition of text (1884). Dr. Christ divides the *Iliad* into forty lays which follow each other in the order of the text, and were meant to be recited in that order, though composed at various times. He strengthens the conclusions that the *Iliad* is the enlargement of an epic by a great poet.

"DIVES AND LAZARUS." Why is it that the parable of the rich man and Lazarus is spoken of as "Dives and Lazarus"? JOEL MAY.

Dives is a Latin word meaning "rich," or "rich man." It is a common or appellative noun, or more strictly, an adjective used as a substantive, but it is often regarded as a proper name, when allusion is made to the parable in Luke xvi, 16-31. It is said that the mistake originally arose from the fact, that in the old pictures on this subject, the inscription or title was in Latin, "*Dives et Lazarus*," and that uneducated persons probably supposed that the first word was the name of the rich man, as the last was unquestionably was that of the beggar.

WHAT IS UNIVERSOLOGY ? Stephen Pearl Andrews, in his work entitled "The Basic Outline of Universology," says that it is "Revelation through Science ; Philosophy of Integralism ; Advent of the Reconciliative Harmony of Ideas." On page 642, it is further elaborated :

"To supply the Philosophic Ground of this Complex Unity is the office of Integralism. This Ultimate Conciliation of Contraries in the Universal Type of Harmony. The Diverse Views which are entertained, for example, by different Minds, upon the Being and Nature of God, or of the Supreme Governing Potency of Creation and Administration in the Universe of Being, are destined, through Universology, to a similar adjustment. *The devout Catholic, the orthodox Baptist or Quaker, and the conscientious Atheist, will shake hands with each other, and find a new and intense bond of Unity in their very differences. Each will come to know, and love to recognize, that the other has wrought, with an echoing fidelity to his own, in another department merely of the Grand Exhibition of the whole Armory of Truth.*" The Universe of Fact and Principle was simply too large, and the Aspects of Truth too multifarious, to be mastered by the Infancy of Man. The New Catholicity of the Adult Age of the Race can alone compass them.

"THE GRAND RECONCILIATION, THE CROWNING HARMONY OF HUMANITY, could only be led in by the Radical Discovery of THE UNITY OF ALL INTELLECTUAL CONCEPTIONS."

"ORIGINAL SIN." George R. Gliddon says, in "Types of Mankind," p. 610, that on the coast of Africa the *Sooahelle* dialect, so restricted in its barbarous jargon that all its vocables implying civilization are borrowed from the Arabic, a missionary, who translated the "First three chapters of Genesis" into the native tongue, could find no more euphonious rendering for the word "God" than this word—*Mooigniazimoongo*. And in America, no idea of "original sin" can be conveyed to an *Ottomi* Indian, without the agglutination of monosyllables into "TLACATRINTILIZTLATLACOLLI"; nor will the last *Delaware's* heart experience "repentance" until his mind has perceived the sense of "SCHIWELENDAMOWITCHEWAGAN."

PLATONOPOLIS. (Vol. X, p. 256.) Brewer's "Historic Note-Book," p. 696, says in reference to "the city of Plato":

"The city of Plotinus the Neoplatonic philosopher, in Campania, where he intended to carry out his socialistic ideas and philosophical system. It does not appear that he was able to complete his project, for we find nothing more about it except that the Emperor Galen gave him permission to build the city."

PREACHING AT THE ISLES OF SHOALS. As early as 1650, Rev. John Brock began to preach here. Mather relates the following story of him :

" Mr. Brock brought the people into an agreement, that, exclusive of the Lord's day, they should spend one day every month together, in the worship of our Lord Jesus Christ. On a certain day, which, by their agreement, belonged unto the exercises of religion, the fishermen came to Mr. Brock and asked him if they might put by their meeting, and go a fishing, because they had lost many days by reason of foul weather. He seeing that without his consent they resolved upon doing what they had asked him, replied :

" *' If you will go away, I say unto you, catch fish, if you can ! But as for you that will tarry, and worship the Lord Jesus Christ this day, I will pray unto him for you, that you may take fish until you are weary.'*

" Thirty men who went away, with all their skill, could catch but four fishes. The five who tarried went forth afterwards, and they took five hundred. The fishermen, after this, readily attended whatever meetings Mr. Brock appointed them."

THE CINCINNATI. A patrician military order or society established in this country at the close of the Revolutionary War, about 1783, by the officers of the American army. The name was derived from the Roman dictator Cincinnatus (456 B. C.) and was adopted in allusion to the change made by them from military to agricultural pursuits. Provision was made that the privilege of membership should pass by descent to the eldest son of each deceased member. The society aim was " to preserve inviolate the rights and liberties of human nature," promote friendly feeling between the different States, and to aid suffering officers and their families. George Washington was the first president of the order. It was at one time large and popular, but is now fast declining.

CALVES-HEAD CLUB. This club, " in ridicule of the memory of Charles I," consisting of Independents and Anabaptists, and formed in the times of the Revolution, was in existence as late as the eighth year of the reign of George II. They met annually, and dined upon calves-heads prepared in various ways, by which they represented the king and his friends. Their meetings were finally broken up by a mob. Macaulay says, referring to George Saville, Viscount Halifax :

" Indeed, his jests upon hereditary monarchy were sometimes such as would have better become a member of the *Calves-Head Club* than a privy councillor of the Stuarts."

" GREAT MEN are the inspired (speaking and acting) texts of that divine Book of Revelation whereof a chapter is completed from epoch to epoch, and by some named history."—CARLYLE, *Sartor Resartus*, II, 8.

SERIES. — PROBABILITY AND EXPECTATION.

[SEVENTH PAPER.]

By B. F. Burleson, Oneida Castle, N. Y.

There is no more difficult subject that mathematicians have to elucidate than the theory of probabilities. Owing to this cause in part may be attributed the fact that it is the least understood of any. Another cause may be traced to the fact that the most direct elementary illustrations of its principles are supplied by games of chance, and this has led to the delusion that its investigation tends to the encouragement of gambling. This it seems to us is a false idea. We think that the best argument against this vice would be a clear mathematical analysis of all games of chance.

Poison, Gauss, Laplace, and De Morgan have treated the subject in the most profound manner; but owing to the difficulty of understanding these writers on this theme, only a few have ever mastered them completely. Some have raised the religious objection that there is no such thing as chance, and to calculate such is to deny the existence of an over-ruling Providence. Such assertions are founded mostly on total ignorance of the science. They remind us of the man who attempted to destroy Lord Rosse's great telescope because he thought it was irreligious to pry into the secrets of nature.

We shall not attempt in this paper to enter very deeply into this intricate subject, being satisfied to give only a few results wherein our topic, series, enters chiefly as a factor in games of chance.

An important branch of the theory of probabilities is called expectation, which may be divided into two parts, viz., moral and mathematical. What is the moral expectation in a game of chance wherein the winning or the losing of money is at stake? The answer seemingly lies outside the pale of mathematics to determine; yet Bernoulli, who has written upon it says, that the value of a small gain or the inconvenience of a small loss is directly proportional to the amount of gain or loss and inversely proportional to the fortune of the person affected. We quote one of his examples as an argument against gambling.

"A, whose whole fortune is £100, bets £50 even with B on an event that is equally liable to occur or fail (such as the tossing of a penny for heads or tails). What is the moral of A's fortune after making the bet, and before it is decided?"

Applying his method as stated, Bernoulli finds it to be £87. Thus A by making this bet has depreciated by 13 per cent the value of his fortune. Although this result be questionable, still it is certain that no legitimate method can show that A has done otherwise than to impair his possessions by entering into such a scheme.

But it is the mathematical expectation in games of chance that we aim more particularly to treat of which may be formulated by the rule. "The value of a contingent gain is the product of the sum to be gained into the chance of winning it." That is, $E = Pv$, where v is the value of the stake and P the probability of winning it. We now offer a few problems with their solutions to illustrate our subject.

PROBLEM 20.

A, B, C, and D, in playing whist, agree that the person who first cuts an ace shall have a stake of \$313. What is the value of each person's expectation before the play begins, each taking his turn at cutting in the order named as the game progresses.

SOLUTION.

Let $b = 48$, the number of cards in the pack that are not aces; and $a = 4$, the number that are aces. Let $n = 4$, the number of players, and r = the number of the person who cuts = 1, 2, 3, or 4. Let P_r = the probability of the r th person's winning. In order that the r th person may have a cut the preceding $r - 1$ persons must all fail.

Thus $\frac{a}{a+b} \left(\frac{b}{a+b} \right)^{r-1}$ is the chance that he will win at his first cut.

If he fails, and then all the others fail also, he will get another cut; and a chance of winning by a second cut by analagous reasoning, will

be $\frac{a}{a+b} \left(\frac{b}{a+b} \right)^{n+r-1}$, and so on. Thus the entire chance of winning will be the sum of an infinite geometrical series of which the first

term is $\frac{a}{a+b} \left(\frac{b}{a+b} \right)^{r-1}$, and the common ratio $\left(\frac{b}{a+b} \right)^n$.

∴ by summing the infinite descending series, we obtain,

$$P_r = \frac{a}{a+b} \left(\frac{b}{a+b} \right)^{r-1} \div \left[1 - \left(\frac{b}{a+b} \right)^n \right] \dots \dots \dots (a)$$

Substituting the numerical values of the letters in (a), we have,

When $r = 1$, P_1 = A's chance of winning = $\frac{2187}{7825}$.

When $r = 2$, P_2 = B's chance of winning = $\frac{2028}{7825}$.

When $r = 3$, P_3 = C's chance of winning = $\frac{1872}{7825}$.

When $r = 4$, P_4 = D's chance of winning = $\frac{1728}{7825}$.

∴ E_1 = A's expectation = $\frac{2187}{7825} \times \$313 = \$87.88$.

∴ E_2 = B's expectation = $\frac{2028}{7825} \times \$313 = \$81.12$.

∴ E_3 = C's expectation = $\frac{1872}{7825} \times \$313 = \$74.88$.

∴ E_4 = D's expectation = $\frac{1728}{7825} \times \$313 = \$69.12$.

Total,

\$313

PROBLEM 21.

There are $n = 100$ tickets in a bag, numbered 1, 2, 3, n . A man has purchased a chance to draw several together from it at random and is to receive a number of cents equal to the product of the numbers he draws. Find in each case the value of his expectation if the number of tickets he draws be 1, 2, 3, 4, or 5.

SOLUTION.

Let s = the sum of the first n natural numbers, m = the sum of their products taken two and two, p = the sum of their products taken three and three, q = the sum of their products taken four and four, and r = the sum of their products taken five and five.

By summing the first, second third, fourth, and fifth powers of the first n natural numbers, we obtain, by factoring,

$$1+2+3+\dots+n = \frac{1}{2}n(n+1) = s \quad (1)$$

$$1^2+2^2+3^2+\dots+n^2 = \frac{1}{6}n(n+1)(2n+1) = s^2-2m \quad (2)$$

$$1^3+2^3+3^3+\dots+n^3 = \frac{1}{4}n^2(n+1)^2 = s^3-3sm+3p \quad (3)$$

$$1^4+2^4+3^4+\dots+n^4 = \frac{1}{80}n(n+1)(6n^3+9n^2+n-1) = s^4-4s^2m+4s^2p+2m^2-4q \quad (4)$$

$$1^5+2^5+3^5+\dots+n^5 = \frac{1}{12}n^2(n+1)^2(2n^2+2n-1) = s^5-5s^3m+5s^2p+5sm^2-5mp-5sq+5r \quad (5)$$

From these five equations we obtain by substitution in regular sequence,

$$s = \frac{1}{2}n(n+1) \quad (6)$$

$$m = \frac{1}{24}n(n+1)(n-1)(3n+2) \quad (7)$$

$$p = \frac{1}{48}n^2(n+1)^2(n-1)(n-2) \quad (8)$$

$$q = \frac{1}{5760}n(n+1)(n-1)(n-2)(n-3)(15n^3+15n^2-10n-8) \quad (9)$$

$$r = \frac{1}{11520}n^2(n+1)^2(n-1)(n-2)(n-3)(n-4)(3n^2-n-6) \quad (10)$$

The chances of drawing 1, 2, 3, 4, or 5 specified numbers are respectively,

$$C_1 = \frac{1}{n}.$$

$$C_2 = \frac{1 \times 2}{n(n-1)},$$

$$C_3 = \frac{1 \times 2 \times 3}{n(n-1)(n-2)},$$

$$C_4 = \frac{1 \times 2 \times 3 \times 4}{n(n-1)(n-2)(n-3)},$$

$$C_5 = \frac{1 \times 2 \times 3 \times 4 \times 5}{n(n-1)(n-2)(n-3)(n-4)}.$$

ANSWERS.

$$\begin{aligned}
\therefore E_1 &= s \times c_1 = \frac{1}{2}(n+1) = [\text{when } n=100] = & \$0.50\frac{1}{2} \\
\therefore E_2 &= m \times c_2 = \frac{1}{2}(n+2)(3n+2) = & \$25.41\frac{1}{2} \\
\therefore E_3 &= p \times c_3 = \frac{1}{6}n(n+1)^2 = & \$1275.12\frac{1}{2} \\
\therefore E_4 &= q \times c_4 = \frac{1}{240}(n+1)(15n^3+10n^2-10n-8) = & \$63752.00\frac{1}{2} \\
\therefore E_5 &= r \times c_5 = \frac{1}{8}n(n+1)^2(3n^2-n-6) = & \$3176548.89\frac{1}{2}
\end{aligned}$$

PROBLEM 22.

If a person throwing four dice is to receive (1) as many dollars as the sum of the numbers he throws on each, or (2) as many dollars as are represented by the product of the numbers he throws on each, what is the value of his expectation in each case ?

SOLUTION.

Quadruplets may be thrown in six ways ; their sum is 84, and the sum of their products is 2275. Triplets may be thrown in 30 different ways ; their sum is 420, and the sum of their products is 6986. Pairs of triplets may be thrown in 15 different ways ; their sum is 210, and the sum of their products is 3003. Single doublets may be thrown in 60 different ways ; their sum is 840, and the sum of their products is 8939. Numbers not repeated may be thrown in 15 different ways ; their sum is 210, and the sum of their products is 1624. Now the chance of throwing any one out of these five combinations are as the number of permutations in the letters,

$$a a a a, \quad a a a b, \quad a a b b, \quad a a b c, \quad a b c d,$$

respectively ; that is, 1, 4, 6, 12, 24. But the chance of throwing any special quadruplet is 1 out of $6^4 = 1296$ throws. Hence, out of every 1296 throws the chances are :

- 6 throws will give all the quadruplets ;
- 120 throws will give 4 times all the triplets ;
- 90 throws will give 6 times all of the pairs of doublets ;
- 720 throws will give 12 times all of the single doublets ;
- 360 throws will give 24 times all of the numbers not repeated.

Now the total value of these 1296 throws is in both cases of the problem.

6 throws =	\$84, or =	\$2275
120 " = 4×420 =	1680, or 4×6986 =	27944
90 " = 6×210 =	1260, or 6×3003 =	18018
720 " = 12×840 =	10080, or 12×8939 =	107268
360 " = 24×210 =	5040, or 24×1624 =	38976
1296 or	\$18144, or	= \$194481

∴ The value of a single throw is in the first case $\$18144 \div 1296 = \14 , and in the second case $\$194481 \div 1296 = \$150.06\frac{1}{2}$.

We gain the following fact from the result of the first case. The probability is that a person will turn 14 in throwing 4 dice, or seven with two dice. The meaning of this is, *not* that he will throw seven the first time, nor the second, nor perhaps for many throws; but if he throw a number of times, add the result, and divide by the number of throws, the result will be more and more nearly equal to seven the greater be the number of throws. It might prove a very interesting and instructive experiment on say 100 throws of two dice, in backgammon. If the mathematical result be not very nearly verified by such a trial, we may surely conclude that the dice are loaded, or else very ill made.

PROBLEM 23.

Four men A, B, C, and D, not all accustomed to the use of the square and awl, wish to determine accurately the dimensions of a large room. A measures the length twice over, the breadth three times, and the height five times, and finds as the sum of his results that $2l+3b+5h = 4270$ inches. Similarly B finds as the sum of his that $l+2b+3h = 2540$ inches, C of his that $3l+b+4h = 3630$ inches, and D of his that $l+4b+h = 2860$ inches. What are the probable dimensions of the room? and which of the four is the best mechanic?

SOLUTION.

The usual method of approximating to the truth where several varying observations or measurements are given with tools or instruments, and all closely verging on accuracy, is by finding the arithmetical mean, and calling it the correct result; but in cases like the problem in question, where the result required does not come directly from experimental knowledge, but requires to be discovered by calculation, this simple method is inapplicable, and the method known as "Least Squares" is adopted for finding the most probable correction. The theorem on which this method is founded, was first propounded by Legendre in 1806, and afterward proved to be true by Gauss and Laplace. Legendre's theorem is stated as follows:

"If the mean of a number of distinct observations be so taken that the sum of the squares of its differences from the actual observations (generally designated errors) shall be a minimum, this mean will be under these circumstances the correctest obtainable value."

The method by which this mean of several distinct observations or measurements (the more the better) is found, is shown as follows, by taking the problem itself as an example. Let there be a series of equations as

$$\begin{aligned}
X &= 4270 = 2l + 3b + 5h \\
X_1 &= 2540 = l + 2b + 3h \\
X_2 &= 3630 = 3l + b + 4h \\
X_3 &= 2860 = l + 4b + h \\
&\text{etc., etc., etc.,}
\end{aligned}$$

Where the unknown quantities are l , b , and h , connected by various equations with X , X_1 , etc., quantities which are determined by actual observations or measurements, all of which are hypothetically assumed to be erroneous. The errors in each are

$$\begin{aligned}
4270 - X, \text{ or } 2l - 3b - 5h, \\
2540 - X_1, \text{ or } l - 2b - 3h, \\
3630 - X_2, \text{ or } 3l - b - 4h, \\
2860 - X_3, \text{ or } l - 4b - h.
\end{aligned}$$

The squares of these four errors are now added, and we obtain the result, $46041000 + 15l^2 + 30b^2 + 51h^2 - 49660l - 65920b - 92700h + 30lb + 52lh + 56bh$.

Now to find the value of l , b , and h , which will render this expression a minimum, we must differentiate it with regard to l , b , and h , as variables in turn, and put each of these partial differential coefficients equal to zero. Doing this we obtain

$$\begin{aligned}
-24830 + 15l + 15b + 26h &= 0, \\
-32960 + 15l + 30b + 29h &= 0, \\
-46350 + 26l + 29b + 51h &= 0.
\end{aligned}$$

From these three equations the most trustworthy and probable values of l , b , and h are readily found by algebra to be

$$l = 628\frac{1}{2} \text{ inches; } b = 478\frac{1}{2} \text{ inches; } h = 316 \text{ inches. } \textit{Answers.}$$

A and B it will be seen were unskilled with the square and awl, C quite well accustomed to them, and D an expert in their use.

The method of Least Squares which we have endeavored to explain very cursorily in the above solution, is one of the most important and triumphant achievements yet accomplished in the theory of probabilities. It is of incalculable aid to the astronomer in making observations and correcting errors. It may confidently be asserted that but for the discovery of this law astronomy could not have made the great advances it has during the present century.

ERRATA Vol. X, p. 222 (Sept., 1892), in denominator of the last term of value of P , solution of problem 15, for $R^n - 1$, read R^n . Same page, in formula (a), in denominator, for $R^n - (eR)$, read $R^n (e - R)$.

Page 224, solution of problem 17, in last term of equation (2), for $n - 1$, read $n + 1$. Same page, in denominator of middle term of value of P , in formula (e), for $2R^{n-2}(R-1)^2$, read $2R^{n-1}(R-1)^2$. Same formula, last term, in denominator, for $2R^n(R-1)^2$, read $2R^n(R-1)^2$.

MISCELLANEOUS

NOTES AND QUERIES,

WITH ANSWERS.

" Mnemosyne is the mother of the muses, but Jupiter is the Father,"
—ANCIENT MAXIM.

VOL. X.

DECEMBER, 1892.

No. 6.

The Zodiac of Denderah.

(Vol V, p. 148.) The circular zodiac of Denderah, which is now in Paris, had been sculptured on the ceiling of a small apartment, built on the platform of the great temple of Isis at Dendyrah (the ancient Tentyris of the Egyptians); another astronomical subject formed the appendant of the zodiac, and between the two tableaux there was a large female figure in bas relief, with the feet turned toward the entrance of the temple and the head towards the sanctuary, the frontispiece of the temple itself facing the north and the Nile, which in that part of its course is from east to west. Denderah is situated about 12 French leagues or 36 miles to the north of the ruins of Thebes, in latitude $26^{\circ} 8' 34''$.

The apartment which contained the circular zodiac is composed of three pieces of which the first one is open; it is that of the middle, which had the zodiac on its ceiling this latter having been removed, the second piece is now uncovered like the first, so much so that the tableau, which made an appendage of the zodiac, and the large female statue are exposed to the waste of the elements; it would be very desirable to transport them also to Europe. The three saloons spoken of, particularly the first, are covered with splendid bas reliefs, which may be classed among the best sculptures of the Egyptian style.

The angle which is made by the axis of the temple and also by that of the zodiacal tableau with the meridian of the place is 17° east.

This tableau is composed of two principal parts; one is a kind of circular plateau, which is a little jutting out from the ground; the other is the space which separates it from the surrounding square; finally, at each side (at the south and at the north side), there was a

large space covered with zigzags, which it was not believed it was necessary to carry to Paris. The second is mostly filled up with twelve large figures, supporting the circular plateau, and keeping a position toward the center, as do almost all the personages of the plateau; four among them, occupying the angles, which are kneeling, are of the masculine gender, bearing the mask of the sparrowhawk, a bird consecrated to Osiris.

The side of the square which encloses the zodiac is about 2.42 meters (about 8 feet English), and the diameter of the circular plateau 1.52 meters (about five feet English). The total length of the room is 6.46 meters (about 21 feet English), and its width 3.53 meters (about 11.58 feet English). The interior of the circular plateau must be examined with some attention, in order to distinguish the figures of the zodiac. Taking a position at the north side and looking towards the nave of the temple, we recognize first above our head and a little to the right, the *Lion*. It is followed by the *Virgin*, holding a large ear of corn; then by the *Balance*, the *Scorpion*, the *Sagittarius*, and the *Capricorn*; the other half of the circle includes the *Waterman*, the *Fishes* with their node, the *Ram*, the *Bull*, the *Twins*, and the *Cancer*, all twelve turning in the same direction, with the exception of the last one. The figures following each other in succession, form nearly a circular band, eccentric with the circle of the plateau; this position appears more irregular by the transposition of the *Cancer*, which instead of being before the *Lion*, is above its head, as if it had been the object to mark on the circumference an initial point; on account of this double motive, the *Cancer* is far nearer the center than the *Capricorn*. The *Twins* are also a little ascending towards the center, which makes the curve of the twelve signs resemble the spiral of a single revolution.

With regard to the analogy between the figures of the zodiac of Denderah and those which have been transmitted to us in the Grecian and Roman zodiacs, M. Dupuis observes, that it is not so exact as M. Visconti and M. de Lalande thought to have discovered:

"Aries, or the *Ram*, in the Grecian sphere has its tail turned towards the *Bull*; in the zodiac of Denderah it is turned towards the *Fishes*. In the Grecian zodiac the *Bull* is in a couching position; in the monument of Denderah on the contrary, it is salient, like a furious *Bull*, which is a very different attitude. The *Twins* of the zodiac of Denderah are far different from those of the Grecian zodiac. The *Virgin* has no wings in the Egyptian monument, but it has wings in all the Grecian zodiacs. In the monument of Denderah, the *Sagittarius* has two faces, its horse has wings; the Grecian *Sagittarius* has only one face and no wings. The *Waterman* of the Grecian zodiac represents a man having a vase or an urn on his thigh, from which escapes a stream of water. The monument at Denderah on the con-

trary shows a man in a standing position, holding two small vases, one in each hand, from which he pours the water. The pretended analogy between the zodiacs was asserted, it would seem, with a view to make this Egyptian monument appear of Grecian origin according to M. visconti, and to disparage thereby the incontestible antiquity of the zodiac of Denderah, ascending to about 2,500 years before our era," according to several opinions.

After having noted the twelve signs, our attention is directed to some other extra-zodiacal figures. The center of the plateau is occupied by an animal resembling a Fox or a Jackal, surrounded by various emblematic figures which seem to correspond to some circumpolar constellations. The precise point of the center of the plateau is situated under the anterior right paw of the Jackal.

Not only is the series of the twelve principal figures in conformity with that of the twelve signs, but there is also much analogy between the space which both occupy relatively either in the tableaux or in the Heavens. Thus, the *Cancer*, the *Twins*, the *Waterman*, which occupy the least space in the celestial vault, are represented by the figures in the zodiac, filling the least room; and on the contrary the *Virgin* (with the interval separating it from the two next figures), the *Lion*, and the *Fishes*, occupy also a larger space either in the Heavens or in the sculptured zodiac.

It is obvious, that there was an intention to designate some extra-zodiacal constellations; indeed, if we look on a celestial globe, after having ascertained the position of the twelve signs, to find which are those which are sensibly corresponding to them, be they northern or southern, we recognize easily under the *Lion* the figure of the Hydra; a little farther on the Raven perfectly distinct; between the *Virgin* and the *Balance*, Boötes easily distinguishable by his ox-head; on the line separating the *Bull* from the *Twins*, the giant Orion armed with his club, and in a lively attitude of marching; on his left, the Crow, with the star of Isis or Sirius, lying down in a boat; the Swan placed between the *Capricorn* and the *Sagittarius*; finally near the center, the little Bear, also known by the name of Fox; there are many more which might be found, but these indications would be too conjectural.

Proceeding in our review, we observe the circumference of the plateau occupied by 36 to 37 figures or emblematic groups, looking towards the center; almost all accompanied by some hieroglyphics, and by one or more stars, one, two, three, six, twelve, and up to fifteen, symmetrically disposed; but this number of 36 is too considerable in order to belong to so many constellations; these figures are in very unequal distances from each other; they seem to act the same part as those which in the large zodiac of the portico of Denderah, are placed three by three, under the twelve signs, each in a *boa*.

The empty space which remains between the plateau and the side

of the square is occupied as, before stated, by twelve large figures, and besides by a zone, ornamented by hieroglyphics, which are divided by eight equal bands and by four other hieroglyphic inscriptions, of three, four, or five columns each.

Nothing remains, in order to finish the description of the monument, but to remark : (1), two small inscriptions placed at the two ends of a diameter, passing through the *Cancer*, between the above described zone and the circular plateau ; (2), two hieroglyphic groups of complex signs also situated at the two extremities of a diameter traversing the *Bull* and the *Scorpion*. These two groups have one form, which is common to both ; both are accompanied from one side of the axis to the other by two half circles or hemispheres, and the only difference between them is the emblem with which they are crowned. There is also within the same space a little disc before the mouth of one of the large standing figures, which is placed in the prolongation of the radius passing through the *Cancer*.

It might be possible to draw several conclusions from the form and position of some emblematic figures which are distributed in the interior of the plateau, from the center to the zodiacal bend or curve, six of which are accompanied by a star, but it will suffice to observe : (1) that the initial point of the twelve signs is between the *Lion* and the *Cancer* ; (2) that the twelve figures of the Egyptian circular zodiac differ somewhat from that of the Greeks, while some analogy exists, for instance the *Fox* and the *Scorpion* and the *Seacalf*, which is threatened by a man with a spear near the *Capricorn*. These two constellations are not in the Grecian sphere ; (3) that this tableau represents with accuracy, although not with mathematical precision, the situation of the principal constellations in the Heavens. It may be added, as being probable, that the large figures which support the tableau, denote the twelve months corresponding to each of the twelve signs, and that the first month of each season is represented by a standing figure, and the two others in a kneeling position ; indeed, each of these four principal signs has before it, either a particular hieroglyphic inscription, or one of complex signs, of which we have already spoken ; and in all likelihood, two of these inscriptions have reference to the summer and winter solstices, and the two others to the autumnal and vernal equinoxes.

With regard to the astronomical or chronological epoch, represented by this monument, we shall not hazard an opinion, this being a scientific question absolutely foreign to this description, requiring very difficult researches, and which cannot be treated with success, except by those who should possess a profound knowledge of the Egyptian symbols. Many conjectures have been made about it ; and all give to the zodiac an origin of many thousand years anterior to the Adamic period, as established by the priests ; everything induces the

belief, that the least probable of these conjectures will come nearer the truth than the theological calculations. M. Dupuis says in this respect :

"Up to this date, we only know one thing, which is, that the equinoctial and the solstitial points at the epoch at which this zodiac was composed, corresponded to the constellations of the *Ram*, the *Bal-ance*, the *Cancer*, and the *Capricorn* ; but they have corresponded to it during 2,160 years, namely, since the year 2,548 up to the year 348 before the commencement of the vulgar era. With inthose limits is included the epoch indicated by this monument. We know that the equinoctial node by its retrograde movement travels over one degree in about 72 years. If we suppose that the colures traverse these constellations in their midst, as in the zodiac of which a copy was brought by Eudoxis from Egypt into Greece, and we shall have the mean term, which fixes the epoch of this zodiac at 1,468 years before our era, namely, at the reign of Sesostris, or at about 46 years before the renewal of the Sothic period, which took place under his reign, as we have shown in our essay on 'The Phenix.' It would seem difficult to bring that epoch nearer."

General Dessaix was its first discoverer, and M. Denon, one of the savants who accompanied the French expedition into Egypt, made the first drawing of it ; since then the Government of France has bought it from the Pasha of Egypt for the price of 150,000 francs, and it was transported to Paris in 1822 through the care of Saulnier and Lorrain. —*Translated from the French of Dupuis in the Origin of Religious Belief.*

THE DAUGHTERS OF THE KING. The Order of the Daughters of the King was organized on Easter Even, 1885. It is desired by its promoters that a careful distinction shall be made between the Daughters of the King and the King's Daughters. The former is the older society, and differs from the King's Daughters in many important particulars. In the first place, it is more of an Order than a Society, and is distinctively Episcopal. Its work is definite, and is "for the spread of Christ's kingdom among young women," and "the active support of the rector's plans in the parish in which the particular chapter may be located." Its badge is a cross of silver, a Greek cross fleury, and its mottoes are *Magnanimeter Crucem Sustine*, and "For His sake." Its colors are white and blue, white the old royal color of Israel, and the blue the color of the Virgin Mary, the "Blessed Daughter of Israel's King, the Mother of the King of Kings." There are nearly 100 chapters scattered throughout the United States of America.

ERRATUM. Vol. X, p. 294, third line, for George B. Airy read Reginald S. Poole.

The New Geometry and Commensurable Arithmetic

An event so great as that of the perfection of mathematics is well worth the attention of every true scientist. The record of such an event in history, at this commemorable period, will add glory to this nation's achievements in this nineteenth century. As yet, only a few are aware of the fact that a new geometry has been completed which differs in many essential points from the text-books of Euclid and Legendre. The "New Geometry" makes the study more interesting and easily understood by solving the polemic problems, which, for centuries, interfered with progress in mathematics. Now, Geometry and Arithmetic can harmoniously unite in proving the truth. The average mathematician, however, thinks it idle to speculate on mathematics as to whether it is a perfect science or not. "Figures never lie," says the expert bookkeeper. "Euclid and Algebra are good enough for me," remarks the geometrician, who honors Legendre and trusts to exhaustive algebraic processes for imaginary results, which prove nothing definite. Many scholars of high degree believe the science of mathematics is based on incommensurable principles and declare seriously :

"It is a waste of time to look for a finite notation expressing geometric proportions, because *that has been proven impossible.*"

These expressed opinions, backed by "authorities," and by current university teaching, have delayed the publication of the New Geometry until a sufficient number of broad and liberal minded mathematicians united in demanding attention to so important a matter.

One eminent scholar of late years has had the moral courage to advocate reform in mathematical teaching, although at the time occupying a College chair. This gentleman is the well-known Professor Henry T. Eddy, formerly of Cincinnati University, now President of the Rose Polytechnic Institute, Terre Haute, Ind.

Quoting abstracts from his address, delivered before section A of the American Association for the Advancement of Science in Philadelphia, 1884, he says :

"I think I do not state the matter too strongly when I say that, during the years in which I was an undergraduate, mathematical study was regarded with deep-seated aversion by the average student, an aversion not capable of adequate expression in any ordinary way. The burial of Euclid and the cremation of Analytics were a mere joke; but the inward disgust and hatred of mathematics which existed in the minds of the students of my day left an impression not to be effaced in a life time. Now, what was the cause of such pronounced hostility? The answer is not far to seek. We might say, that either the study failed of being understood because it was uninteresting, or that it awakened no interest because it was not well understood.

Both these statements were true. I have found the same state of affairs in every classical college respecting which I have had any intimate knowledge from that day to this. * * * *

I am convinced that mathematics has been long and sadly misused at the hand of its pretended cultivators, the classical colleges of this country. That this has been done ignorantly and in obedience to long established educational usages makes it our duty to see that so important a matter is rectified as soon as practicable.

"Geometry is a study which ought not to be in the college course at all, but should be finished in the preparatory schools (the public schools). * * * *

It is greatly to be desired that the study of Euclid should be preceded by exercises in practical geometry, with compasses and ruler, and by construction of geometric figures. * * * *

In conclusion, I wish to call for reform in mathematical teaching, I call for deliverance from the imprisonment it has suffered, for removal of the bands with which it has been bound. I call for the introduction of a spirit of free inquiry.

* * * * I think we ought to form an association of the mathematicians of this country for the purpose of concerted action in improving the mathematical training in our colleges."

The fearless and clear statements of so honored a scholar as Prof. Henry T. Eddy about existing fallacious college training in mathematics leave no doubt about the value of a new geometry founded on research more comprehensive than any hitherto published. Without dilating on the causes and motives which lie back of the compilation of the new geometry other than such as were inspired by the Professor at the time of his memorable address, it is sufficient to say that the research went on in silence; and from time to time since then most valuable discoveries, relating to geometry, were brought to light and formulated into a series of new truths, which now constitute the "New Geometry," and as often happens in research, while looking for something desired, accident exposed unlooked-for facts. It was found that the supposed "impossible" could be made possible by substituting new methods of operations for the old. It was found that nothing pertaining to geometry was incommensurable, that everything is commensurable.

For some time, however, these new methods will undoubtedly meet with opposition, partly from prejudice, and partly because they involve studious inquiry on the part of those engaged in teaching; but the fact remains the same, a new geometry has been compiled, which proves mathematics to be a perfect science, and it is hoped that sufficient support to bring the work to notice will be given by the faculties of learned institutions so as to chronicle the event at the Columbian Exposition. For information address T. R. WHITE, A. M., 60 West Twenty-Second Street, New York.

HONOVER, THE ZOROASTRIAN WORD. (Vol. X, p. 256.) In "The Basic Outline of Universology," by Stephen Pearl Andrews, p. 52, are some commentary notes which say *Honover* is the Zoroastrian sacred word. The Word by which Brahma created the world is *Om* (Aum).

"In the system of Zoroaster, Honover is represented as the Word by which the world was created, the Most Immediate Revelation of the God Ormuzd. Back of the triad, Brahma, Vishnu, and Siva (Creator, Preserver, and Destroyer), and back of Om is Brahm, the Supreme God, in Absolute Repose, without change or any known attributes, the Absoluto-Absolute Conception, like that Aspect of the God of the Scriptures 'with whom is no variability, neither shadow of turning' (James 1, 17). Brahm must not therefore be confounded with Brahma, the head of the triad. It is this Conception, rather, which from the Absolutist Standing-point (Naturoid) is the First and Last Word of Philosophy. The Conception embodied in Brahma is so from the *Practical* Point of View (Artoid), and that embodied in Om (the Loges) is so *Mediatorially* (Absolute Idealism—*Hegel*), or from the Scientoid or Logical Standing-point."

Stephen Pearl Andrews then says, and quotes, the following inspirational and mystical poem by Ralph Waldo Emerson is a remarkable epitome of the First and Last Word of the speculative reasonings of Man, which as a principle of philosophy he characterizes as *Convertible Identity*, meaning that All Things are All Things else ; or that Every Thing is in its *very* Ground one and the same :

BRĀHMA. BY RALPH WALDO EMERSON.

If the Red Slayer thinks he slays,
Or if the Slain think he is slain,
They know not well the subtle ways
I keep and pass and turn again.

Far or forgot to me is near,
Sunlight and Shadow are the same,
The vanished gods to me appear,
And one to me are shame and fame.

They reckon ill who leave me out
When me they fly, I am the wings;
I am the doubter and the doubt,
And I the Hymn the Brahmin sings.

The strong gods twine for my abode,
And pine in vain the sacred Seven,
But thou, meek lover of the Good,
Find me, and turn thy back on Heaven.

THE HUMAN FORM. BY WILLIAM BLAKE.

To mercy, pity, peace, and love,
All pray in their distress;
And to these virtues of delight,
Return their thankfulness.

For mercy, pity, peace, and love,
Is God, our Father dear;
And mercy, pity, peace, and love,
Is man, his child and care.

For mercy has a human heart,
Pity a human face,

And love the human form divine,
And peace the human dress.

Then every man of every clime,
That prays in his distress,
Prays to the Human Form Divine,
Love, Mercy, Pity, Peace.

And all must love the Human Form,
In heathen, Turk, or Jew;
Where Mercy, Love, and Pity dwell,
There God is dwelling too.

The Basis of Egyptian Religion.

"No history can be learned with certainty except from evidence contemporaneous with the events recorded — no religion can be studied with profit except in the words of its own votaries."—*P. LaPage Renouf.*

Was the religion of Egypt, of the educated and initiated Egyptians, a gross polytheism, or was it a monotheistic belief? If we hold the latter opinion, if we think the educated Egyptian belief held that the gods of the popular mythology were either personified attributes of the Deity or parts of the nature which He created, we must deny the statements of Mr. Coleman in his article on "The Veil of Isis," that Isis and Neith were two distinct divinities.

In the September NOTES AND QUERIES, Mr. Coleman "reaffirms" his previous statements. And here let me regret that I inadvertently used the word "rank" instead of "order" which Mr. Coleman quoted. But how Osiris could be of the "third order," even chronologically, when his worship was one of the oldest in Egypt, is not easy to see.

In regard to the identification of the Egyptian deities with those of Greece and Rome, turning to the March NOTES AND QUERIES, we find on page 66, "At an early period the Greeks seemed to have identified Neith with their own goddess Athene — corresponding to the Roman Minerva," followed by authorities. If such identifications are misleading, worthless, and not "accepted," why quote them to the confusion of the reader? But aside from the identification of the deities, the ideas and opinions of the Greek and Latin authors about the religion of Egypt are growing less and less valuable as time goes on and fresh discoveries are made. Herodotus, who has been quoted and re-quoted, is not a final authority. As long ago as 1859, Rawlinson said of Herodotus that "priests took advantage of his simplicity and ignorance of the language whether spoken or written to impose on him such a history as they wished to pass current among the Greeks." (Rawlinson's "Herodotus," Vol. I, p. 48.) And their religion was kept concealed from the common mass, even of the Egyptians themselves, and much of our knowledge has been gained from books not intended for human eyes and buried with the dead.

Since the time when Bunsen and Wilkinson wrote much has been discovered to support the monotheistic theory and to discredit many

of the statements of classical writers. Birch says, in his edition of Wilkinson, 1878 :

"The information derived from the classical authorities of Greece and Rome has become by the light of the learning of the last half century of secondary value. Egyptian ideas deduced from Egyptian sources, having far more importance, to the student and reader, than those transmitted from classical writers, have been given whenever practicable," (Birch's "Wilkinson's Egyptians," Vol. I, XIII, preface.)

As to the essential question of the unity of Egyptian belief, I quoted a number of texts in which certain gods are identified. No text which bears on the opinions of the Egyptians themselves concerning their deities can be "irrelevant." Our knowledge of Isis and Neith is not dependent on one inscription at Sais, not now extant, but on all inscriptions and writings on the subject. Rawlinson thus recently speaks of the esoteric Egyptian belief :

"Besides the common popular religion — the belief of the masses, there was another which prevailed among the priests and among the educated. The primary doctrine of this esoteric religion was the real essential unity of the Divine Nature. The sacred texts known only to the priests and to the initiated, taught that there was a single Being, 'the sole producer of all things both in heaven and earth, himself not produced of any,' 'the only true living God self-originated,' 'who exists from the beginning,' 'who has made all things but has not himself been made.' " * * * "No educated Egyptian conceived of the popular gods as really separate and distinct beings. All knew that there was but ONE GOD, and understood that when worship was offered to Khem or Kneph, or Maut, or Thoth, or Ammon, the One God was worshiped under some one of his forms or in some of his aspects. He was every god, and thus all the god's names were interchangeable." (Rawlinson's "Story of Ancient Egypt," pp. 38-39, G. P. Putnam's Sons, 1887.)

Maspero, in his recent works, also speaks of the secret doctrines of the priests of Amon-Ra ("Story of Life in Ancient Egypt and Assyria," p. 152, 1890), and many other authorities and texts could be quoted in this connection.

I do not desire to "unqualifiedly" affirm or reaffirm any statement; merely calling attention to texts and authorities on the subject and the reader who so desires will find in the works of Renouf, Rawlinson, Maspero, Brugsch, Wilkinson (Birch's edition), and the texts edited by Prof. Sayce, facts on which to base an intelligent opinion of the religion of the Egyptians.

KET.

THE USE OF THE PERIOD. (Vol. X, 295.) I was much amused and even instructed at the article in the November No. of N. AND Q. on the use of the period (.), and noted down several more uses in which it is combined as a factor. In order to have them on record for the information of others I submit them as a continuation of that article.

12. When placed over itself it makes the colon (:); when over the comma (,) it makes the semi-colon (;). It forms a part of interrogation (?) and exclamation *points* (" points well taken ").

13. In proportion it is used in twos and fours; in the arithmetical (4 .. 8 :: 12 .. 16); in the geometrical (4 : 6 :: 6 : 9). In arithmetical ratio the sign .. is read *minus* or the arithmetical ratio of, and the sign :: is read *equals* or is equal to. In geometrical ratio the sign : is read *is to* or the ratio of, and the sign :: is read *as* or equals.

14. In the sign of division with the dash between two (÷).

15. In the sign of geometrical proportion a dash between four (∷).

16. Three periods placed triangularly with one point upward (. ' .) is read *Therefore*; but three when placed with one point downward (' . ') is read *Since* or *Because*. In Masonic literature three points are often used after initial letters to indicate abbreviated titles, and the like, R. ' . W. ' . for Right Worshipful, M. ' . W. ' . for Most Worshipful, A. ' . L. ' . for *Anno Lucis*, " the Year of Light."

17. The *diæresis*, two periods placed over the ä, ë, ï, ö, ü, to denote the separation or resolution of one syllable into two, and also the pronunciation of vowels in foreign words: reäffirm, aërial, reïncarnation, coöperation; volapük, Müller, etc.

18. In chemistry, one point (.) indicates one equivalent of oxygen, and it is written above a symbol representing an element, and repeated to indicate two, three, or more atoms or equivalents. They are thus placed: $\text{Fe}^{\cdot}$, denotes a compound of one atom or equivalent of oxygen with one of iron; $\text{S}^{\cdot\cdot}$, denote a compound of three atoms or equivalents

with one of sulphur. When used in connection with a the comma, $\text{F}^{\cdot}$, it denotes a compound of two atoms or equivalents of sulphur and one of iron. A dash drawn across the symbol having either of the foregoing signs above it, denotes that two atoms or equivalents of the

stancesub represented by the symbol are joined with the number of atoms or equivalents of oxygen or sulphur indicated by the dots or commas, thus, $\ddot{\text{Fe}}$ represents a compound of two atoms or equivalents of iron and three of oxygen, forming sesquioxide of iron.

19. The point is used with the plus sign (+) and right-angle ($\perp$) to make a cipher alphabet ($\frac{+}{\perp}$), ($\frac{\perp}{+}$), etc.

20. The telegraphic alphabet is made up of dots and dashes :

A	B	C	D	E	F	G	H
—	—	—	—	—	—	—	—
I	J	K	L	M	N	O	
—	—	—	—	—	—	—	—
P	Q	R	S	T	U	V	
—	—	—	—	—	—	—	—
W	X	Y	Z	&			
—	—	—	—	—	—	—	—
,	?	1	2	3			
—	—	—	—	—	—	—	—
4	5	6	7	8			
—	—	—	—	—	—	—	—
	9	0					
—	—	—	—	—	—	—	—

21. The period in music indicates that the note is to be performed in a manner similar to the staccato, that is, the note is to be struck with force, and performed in a short, sharp, and emphatic manner. To indicate a still lower degree of emphasis and distinctness the slur is sometimes put over the dots ($\overline{\dots}$).

22. Several periods placed under a word in proof-sheets denotes the restoring of a word which has been crossed out, *stet* being also witting in the margin.

23. Points are written both above and below Hebrew letters, there called Masoretic points, to indicate pronunciation, etc.

24. The points are usually employed to show an ellipsis of a word as C r C s.

I presume there are other uses for the period or point, but these given show that it is an important little point. A TEACHER.

The Wild Columbine for A National Flower.

For the first time in the history of the world and of women, she stands side by side with man in a grand international enterprise, not separate and alone, but as a joint exhibitor of the labor and products of the world. Could any point of time in our country's history be more propitious for the settlement of the question, "What shall be our National Flower?" Blood and battle and disunion have decided this question for other nations, but we are not like other nations; we claim to be the apostles of progress and civilization; and so peace, harmony, and union should be the occasion of our adoption of some floral emblem that will typify such a condition.

The woman's department of the Columbian Exposition is the official channel of communication through which all women or organizations of women, may be brought into relation with the Exposition. Its lady managers are from every State and Territory in the United States. Its supporters will be from every cottage and hamlet.

By these lady managers, and by those women who stand as an army for their support, it is suggested that the claim of the Wild Columbine as our National Flower, be thoughtfully considered, because of its appropriate connection with the time and the occasion.

First, it wears our National colors. Growing in every section of our country, its color at the South is more often blue, at the North, white; at the middle and Western States, red with a golden interior. Its name, *Columbine*, has for its origin the same Latin word as that of Columbus, also that of Columbia, the name our Nation rightly bears. The district where our National Capitol stands bears a like name, also one of our largest rivers, and one of our most important colleges.

Finally, the great significance of the name is in that of the Great Exposition itself. The Wild Columbine has a further claim, that of descent. Botanically, it belongs to the genus *aquilegia*, a name derived from the Latin *aquila*, "the eagle," our nation's chosen emblem, and at all times the emblem of dignity and strength.

Like the eagle, the Wild Columbine chooses the highest cliffs for its dwelling, where it has all the delicate beauty, grace, and power of endurance belonging to American womanhood, all the courage and hardihood of America's noble sons. It typifies American Independence and thrift in that it grows and thrives under the most adverse circumstances, swinging its dainty bells from the crevices of bear rocks with an air of prosperity, just as gaily as when transplanted to the highly cultured garden. In form it is symbolic of our government. Its trumpet shaped petals, like tongues of many nations, cluster around a central shaft, which shaft becomes the seed-bearing receptacle for

future generations. Under cultivation the trumpet-shaped petals become doubled, one within another, adding richness and beauty by its all embracing power, which may signify that no voice, however, humble, is denied utterance under our form of government.

Last of all, the Wild Columbine never, under any circumstances, becomes a noxious weed, or the farmer's pest. It is the true emblem of a pure and glorious country.—*M. Sears Brooks in The Eastern Star*.

Mrs. Lincoln, in her "Lectures on Botany," mentions five species of the Columbine:

Aquilegia canadensis (Wild Columbine), horns straight, stamens exsert; leaves decompose; growing frequently in crevices of rocks.

Aquilegia cærulea, horns twice as long as the petals; nectaries acute; segment of the leaves deeply lobed; Southern.

Aquilegia vulgaris (Garden Columbine), horns incurved; leafy; stem and leaves glabrous; leaves decompose. The nectariferous horns become numerous by culture; one hollow horn within another.

Aquilegia brevistyla, sub-pubescent; spur incurved, shorter than the limb; stipe short, inclined; stamens shorter than the corolla. Upper Canada.

Aquilegia formosa, spur straight, much longer than the limb; sepals lanceolate, acute, three times the length of the petals; style as long as the sepals. Oregon.

The symbolic language of the purple Columbine is given by Mrs. Lincoln as "I cannot give thee up", and that of the red Columbine as "Hope and fear alternately prevail."

"THIRTY DAYS HATH SEPTEMBER." (Vol. IX, p. 23.) In a work on the "Doctrine of Combinations, Permutations, and Compositions of Quantities," published in London, 1770, is a chapter on "Chronology, or the Art of Reckoning Time," in which the quadruplet is found, as follows:

*"30 days hath September,
April, June, and November,
February has 28 alone,
And all the rest have 31."*

LOTOPHAGI — THE LOTOS-EATERS. These were a people who ate of the lotos tree, the effect of which was to make them forget their friends and homes, and to lose all desires of returning to their native land. The lotus-eaters only care to live in ease, luxury and idleness. (See Homer's *Odyssey*, Book IX.)

THE SECRET DISCIPLINE. (Vol. VIII, p. 427; IX, p. 11.) I am much interested in the matter to be found in the several pamphlets you so kindly sent me, especially what concerns the word *Tumbochein*, and what is cited by Theodore Temple from "the early fathers," as to "The Secret Discipline." About some of these things I beg leave to offer a few suggestions and ask a few questions.

Concerning the casting away of the flint stone (Vol IX. p. 43) would that have any connection with what was a prevalent form, and I believe the right one, forty years ago, known to those who are ritualistic Masons. Whether Jehosaphat means "Judgment of God" or not, the form avoids the absurd "pinnacle" form, and completes the *special* mention of the four elements of the ancient philosophers, as receiving back in an *unworthy* condition what was derived from them severally—the casting away must always be a sign of unfitness, etc.

H Now does Hutchinson derive "Sibbo"? Is it Greek? or from some other language from which the Greeks may have also derived "lithos." It is not in Liddel and Scott's "Lexicon" as far as I can discover. So many writers speak of roots, without saying of what language, that much of the lore they recover is lost to their readers.

Tumbochein, seems to me a most *appropriate* expression in lieu of the other, especially when connected with the distich. I never saw any mention of the *word* before, but have seen the distich, but not in that connection. The word has a sound which seems to go back to the time which gave birth to those strange works Jachin and Boäme 2

As to the word Shibolet, have you thought of the word *Sibylla*? Liddell and Scott, p. 1336, "according to the old derivation, *Dios Boyle*, "*She that tells the will of Fove.*" Do you understand such a stone (if a stone is intended) would be a *square* stone, *Tessera*, and divided, or in any way used as a *pledge*?

I could only find the word *Cheein* in two places (Liddell and Scott, pp. 1340, 1530), where it is connected with *Sema*, "*Sema Cheein*, to raise a mound or barrow." Hence, *sēna* seems to be a *mound*, but not such a word as could be useful in such a case as this.

It seems to me that *Sibul* must be a word which contained the principal signification, and *la* merely a termination, most likely a sign of femininity; masculine might have been *las*, probably a more ancient than *lithos*, and not necessarily connected with it originally. It might

mean something much more significant than "cherished," and in connection with *lithon*, it might link on to the "*white stone*," with a "new name written in it"—the *white stone* of foundation"—stone "refused," but "*head of the corner*"; and so the prophetess by the power ascribed to her, be supposed to utter the "*will of God*," etc. I only mention these thoughts that your readers may see if any light can be thrown upon them.

I intended saying something about other matters in the "Catechesis," but I have used too much space already. It is a very important matter and there seems to be more in it than is generally supposed. I think the great zeal of the papists, and the constant friendship of the clergy of the church of England towards the craft tends to show that there is something in the opinion that the old Church and Masonry were connected.

H. P. H. B.

THE EGYPTIAN BOOK OF THE DEAD. (Vol. X, p. 256.) The Egyptian Book of the Dead has been translated, and published in English by London publishers, we think by Trübner & Co., in several volumes.

In the work entitled "Seven Homilies on Ethnic Inspiration," by Joseph T. Goodsir (London, 1871), are twenty-two pages (271-292) extracted from the famous "Book of the Dead."

The doctrine taught in it underwent a very noticeable change in the course of the long period during which it exercised authority in Egypt. The oldest part of it is devoted to a certain *palingenesia* (or a new birth, a re-creation, a regeneration, a continued existence in a different manner or form), which is declared to be the greatest of mysteries, wherein the soul is born in two halves, and that the soul hopes to live after death. This point is embodied in different symbols. It appears from the text in this part of the "Dead Book" that it was the assumption of man's nature by the gods, and the mutual participation of each, that constituted the ground of hope of future life held out to Egypt. The seventeenth chapter of the book is "The Crown of Justification." In the oldest part of the book a man's hope after death depended upon the life he had led on the earth; but in the latter portion of the book the future life depended on the improvement of the talent given to mortals in this life.

We here give two chapters of this famous "Book of the Dead" :

CHAPTER I.

O! Osiris, bull of the west. O! Thoth, director of the calendar.
 I am the great god in the boat.
 I am embalmed in thee.
 I am one of the gods in a double wooden case,
 Royally divine.
 Justified are the words of Osiris from their imperfections,
 On this day of investigating my words,
 [Of investigating] also my deeds.
 O! Osiris, one of the gods of the race of Netpe,
 Chastising the sins of the meek in heart,
 Seeking out the imperfections which are in me,
 O! Or [Light], I have been embalmed by thee;
 I have passed in thy name.
 I am Thoth purifying the words of Or from their imperfections,
 On the day of investigating words
 In the palace of the old man [Adam] at On [Heliopolis].
 I am an abiding [or constructed] god, the son of an abiding god,
 Conceived in the abiding land, born in the abiding land [Fouth].
 I am with the wives of Osiris mourning for Osiris,
 In the land of resurrection, that is, nests; hatching,
 Purifying the words of Osiris from their imperfections.
 Stop him says the Sun to Thoth.
 Cleanse the words of Osiris from their impurities.
 The stoppage is made by Thoth.
 I am with Or on the day of coating with mud the mounds of the river.
 To open the door of the place where hearts are washed,
 There to wash the heart of the weak one,
 Closing the secret place of the land of winding galleries, [that is,
 the tombs].
 I am with Or defending the right arm of Osiris in Skem [the desert];
 I am with Or on the day of offering food to the Sun.
 On the sixth day of the festival,
 Even on the division of the festival in On [Heliopolis].
 I am a priest in the abiding land;
 I am incense bearer in Abydos.
 Invigorating them that faint.
 Or, infusing strength into their bodies.
 I am a priest in Abydos in the day that the earth rejoiceth.
 I see the secret places of the winding region [cemetery].
 I ordain the festival of the spirit, the lord of the abiding land.
 I hear the watchwords of his watchers over me.

I am the architect of the great barge of Sochais [a form of Ptah or Fhut].

Building it from the stocks.

[To defray this expense] I am receiving the dues from the festival Of ploughing the land in Bubastis.

O ! ye liberators of souls, ye builders of the house of Osiris.

Liberate the soul of the Osirian Macrobius [or Ouafenh * (he who prolongs life)] ;

He is with you in the house of Osiris.

He sees as you see,

He hears as you hear,

He stands as you stand,

He sits as you sit.

O ! Ye that give meat and drink

To the souls built into the house of Osiris,

Give seasonable food and drink

To the Osirian Macrobius, whose words are justified through you.

O ! opener of roads, O ! guides of paths, open the roads, guide through the paths

The Osir- whose words are justified through you.

He enters into this gate of the house of Osiris.

He goes in exulting. He comes forth in peace,

Even the Osir- whose words are justified.

He is neither stopped nor turned back,

He goes in singing. He comes forth rejoicing.

He justifies his words.

He does that which he is commanded in the house of Osiris.

He sends forth his words through your means [for justification]

Even the Osir- sends them forth in peace to the west.

There they are not found wanting in the balance.

I do not compute my justification in many parts,

My soul stands up square to the face of its judge,

It is found true [or sound] on the earth ;

I place myself before thee, O sovereign of the gods ;

I have retreated into the region of the two truths.

Thou makest me to rise like a living god.

Thou makest me to set like the creator-gods that dwell in heaven.

I am like one of you, being dragged away from the house of the embalming.

I see passing the great constellation [Ursa Major] which traverses the ether.

* Ouafenh, is the name of the person on whose behalf the Turin Papyrus was written. It is not an Egyptian name. Most likely the owner was a Greek of Asia Minor.

The lord of the house of glory [or the divine Eidola] do not turn me back from seeing it.

I smell the incense of [offered] the divine images as I sit with them.

Behold me, O! thou priest of the shrine.

I have heard thy deprecatory prayers.

I have stood upon the deck [of the sleigh],

My soul is not forbidden to look upon its lord.

Hail! dweller in the West, Osiris.

Even in the region of the mighty winds!

Grant that I may stand peaceably in the West.

Let the lords of the hills receive me.

Let them say unto me, "Come in, come, peace be with thee."

Let them assign to me a place among the great gods.

Let the two nurse goddesses receive me at the stated time when I come forth.

I come forth in the presence of Onnophris [the Rigueous One].

Whose words are justified.

I serve Or in the winding region [Resat].

Osiris in the firm region [Touth].

I complete all my transformations.

My heart is given me in every house in which I desire my form [mummy] to be.

Rubric. That this chapter may be known upon earth, let it be written upon the coffin. It is the chapter whereby he comes forth and returns to his house daily and is not turned back. There are given to him food and drink from the great table of Protheis. When he works in the fields of Elysium, wheat and barley are given him [to sow]; for they are provided for him, even as they were upon earth.

CHAPTER II.

The chapter of the day when he comes forth to life after death.

Saith the Osirian Macrobius, whose words are justified (Mencheres*).

Behold I come forth clothed with the moon,

To revolve with the multitudes of my race.

They that dwell in the light take me aboard.

I have opened the gate of this house of glory.

Behold the Oir- deceased comes forth to the light,

Having fulfilled the will of his relatives upon the earth, while living among them.

* Mencheres, or Mycerinus, was the first king of Egypt, by whom Osiris or Mizraim was named king of the dead, and the mummy an image of him.

SUFIC QUOTATIONS. (Vol. X, p. 257.) The quotation sounds Emersonian. Witness this from this transcendentalist :

*I am the owner of the sphere,
Of the Seven Stars and the solar year,
Of Cæsar's hand and Plato's brain,
Of Lord Christ's heart, and Shakespeare's strain.*

Here are three from Angelus Silesius :

*Dost thou alone prize Solomon as wisest of the wise ?
Thou also canst be Solomon, and all his wisdom thine.*

*Man ! wouldst thou look on God, in heaven or while yet here,
Thy heart must first of all become a mirror clear.*

*Ne'er sees man in this life, the Light above all light,
As when he yields him up to darkness and to night.*

Here is one from Jeleleddin :

*Didst thou ever pluck a rose from R and O and S ?
Names thou mayst know : go, seek the truth they name ;
Search not the brook, but heaven, to find the moon.*

SUFIC QUOTATION. (Vol. X, p. 257.) The author desired adopted the name Angelus Silesius, living in the 17th century. His identity, however, is not established. Such writers, if known, were likely to be imprisoned, or put to death. He was a mystic after the pattern of a Sufi, and perhaps a " Transcendentalist." The sentiment prevalent in the verse is that the Internal and External, Spirit and Matter, Life and Form, are necessary each to the other, and therefore must be considered of like eternity and duration. Hence he also says :

*" I see in God both God and Man,
He man and God in me ;
I quench his thirst, and he, in turn,
Helps my necessity."*

A. WILDER.

PLATONOPOLIS. (Vol. X, p. 256.) Plotinos the Feo-Platonic philosopher obtained from the Roman Emperor Galienus the grant of a site in Campania where a city had been destroyed, that it might be restored, for such a fit residence for philosophers, and governed by the laws of Plato. The enterprise was begun, but the persons about the emperor interfered, and the city of Platonopolis was not permitted to exist.

A. WILDER, M. D.

The Correct Columbus Day.

BY BARBARA STANWIX.

I have so often been asked, during the past months, to explain why Columbus Day is celebrated upon the 21st of October, when the discovery was made upon the 12th, that I thought the subject might prove interesting to the magazine which is ever on the alert to satisfy intellectual curiosity.

In very early times the Roman year is said to have consisted of 10 months, but during the kingly period, they arranged their year according to the revolutions of the moon, making it 355 days. These they divided into 12 months, inserting occasionally an intercalary month to make up the deficit. But much confusion arose through ignorance of the priests, who had charge of all such matters, and no one seemed able to adjust the difficulty until the time of Julius Cæsar. He remedied it by adding one day to every four years, giving us the leap year. But this was only a partial reform, and the world for a long time was in as narl as to its calendars simply because it did not complete an exact number of rotations while it was making one revolution around the sun. The precise length of the year is 365 days, 5 hours, 48 minutes, 50 seconds; or 11 minutes, 10 seconds less than the quarter of a day.

Now in the year 325 A. D., when the first Œcumenical Council met at Nice, the vernal equinox fell upon the 21st of March as it ought; but as the centuries went on, this disagreement of 11 minutes, 10 seconds, annually, accumulated until in the year 1582 it had amounted (approximately) to ten days. Accordingly, Pope Gregory, after a great amount of study and calculation, ordained that ten days should be dropped from the calendar, and that the 5th of October, the time at which the change was made, be called the 15th, which accounts for the Old Style and New Style, we sometimes see affixed to modern dates. In order that this displacement should never occur again, it was further appointed that of the centennial years, those only divisible by 400 as well as by 4, should be leap-years. This dropping of 3 days out of every 400 years, fortunately adjusted the calendar so that there is no more danger of displacement.

The mathematical demonstration of the above is as follows: The new year commences at midnight on the morning of January 1,

and the next new year would begin, strictly speaking, at 11 minutes, 10 seconds before 6 o'clock A. M. ; that is, the earth would have then reached the same point in its orbit at which it stood at midnight, on January 1, of the previous year. Now casting out of our reckoning the one-fourth of a day, disposed of by the leap-year arrangement, the average falling back per year is 11 minutes, 10 seconds. This multiplied by 1257 (the number of years between 325 and 1582 A. D.) equals 9 days, 17 hours, 56 minutes, 30 seconds, or between 9 and 10 days. Now Congress has declared that 9 days shall be added to October 12 in order that we may celebrate the exact anniversary of the discovery of our beloved America.

Note. The above article was received before Columbus Day, but as the November had gone to press, it appears in the December No.

The One Hundred and Fifty-First Psalm.

In the Septuagint version the "Book of Psalms" contains 151 psalms, the 151st being the following, which is not found in the Authorized Version. (See "Legends of the Patriarchs and Prophets," by S. Baring-Gould, p. 345.)

"A PSALM OF DAVID WHEN HE HAD SLAIN GOLIATH.

1. I was small among my brethren ; and growing up in my father's house, I kept my father's sheep.
2. My hands made the organ, and my fingers shaped the psaltery.
3. And who declared unto my Lord ! He, the Lord ; He heard all things.
4. He sent His angel, and he took me from my father's sheep ; He anointed me in mercy with his unction.
5. Great and godly are my brethren ; but with them the Lord was not well pleased.
6. I went to meet the stranger ; and he cursed me by all his idols.
7. But I smote off his head with his own drawn sword ; and I blotted out the reproach of Israel.

The copy in the manuscript in the Astor Library, New York, is translated slightly different from the above, and is headed :

"ABOUT THE PRINCE (OR THE KING)."

*"I was the small one among my brothers,
And the youngest in my father's house,
And I tended my father's sheep ;
And my hands made a harp,
And my fingers played a hymn.*

*Somebody spoke about it to my Lord.
He is the Lord, and he listened to that word ;
He sent a messenger and gave his orders,
And took me away from my father's sheep,
And anointed me with his holy ointment.
My brothers were fair and tall,
And with them my Lord was not pleased.*

*And I went out to combat the foreign man,
And he cursed me by his impure gods ;
I deprived him of his sword and cut off his head,
And I took away the oppression from the children of Israel.*

In Ludolph's edition of the Ethiopian Psalter, this psalm has a little more, the end being as follows :

*"And I took three stones and threw them against his front and slew him ;
And further, I deprived him of his sword," etc.*

In the Septuagint version there is nothing said about "holy ointment." The line reads :

"He anointed me with the oil of his ointment."

In the Arabic version, the disputed line at the end reads as follows ;

"I slew him with three stones in his front, by the grace of God."

THE DOUBLE PSALM. Every reader of the "Book of Psalms" who has become at all familiar with them, knows that the XIV and LIII, beginning "The fool hath said in his heart, 'There is no God,'" are almost identical. One has noted, however, that in the XIV the Divine name *Jehovah*, to some extent, is translated "Lord," while the LIII contains throughout the name *Elohim*, translated "God." The former is Jehovistic and is divided into seven verses, the latter is Elohist and divided into six verses. They are not precisely alike, but commentators regard them as one. Lange's considers the XIV as a remodelling of the LIII ; Hupfield sees no difference ; Alexander calls the LIII a second edition not intended to supersede the XIV ;

Hengstenberg says that the XIV recurs once again in the LIII, with certain alterations ; Kirkpatrick says the same as Hengstenberg ; Ewald makes the LIII a copy of the XIV ; Cheyne regards the LIII as a corrupted form of the XIV ; Prof. Murray of Johns Hopkins regards the XIV and the LIII as the same poem, the former edited with great care from good manuscripts, but the latter from imperfect manuscripts, or from a later psalter ; Bishop Perowne says that the LIII is only another version of the XIV, which is the original, and that the latter is an adaptation by a later poet to the circumstances of his own time, and in another place he says that the XIV reappears in the LIII, with variations ; Clowes says the LIII is the same as the XIV, with inconsiderable differences. (See *New Jerusalem Magazine* p. 602.)

The Messiah and the Jews.

In your November number (p. 285), is an article on "The Jews' Creed," alluding to their belief as to a Messiah. I have thought the following account of their belief as to the coming of such a personage might be of interest to your readers in connection with the former article. It is taken from the "Book of Zerubbabel," which was printed at Constantinople. Buxtorf, in his *Synagoga Judaica*, gives an abridgement of several of the Rabbinical Books in which a similar account is given.

The name given by the Jews to Antichrist is *Armillus*, which name is derived from Isaiah xi, 4 : "He shall smite the earth with the rod of his mouth, and with the breath of his lips shall he slay the wicked." The Targum gives this passage thus : "By the word of his mouth the wicked Armillus shall die, for with the breath of his lips shall he slay the wicked." There will, say the Jews, be ten signs of the coming of the Messiah :

1. The appearance of three apostate kings who have fallen away from the faith, but in the sight of men appear to be worshippers of the true God.
2. A terrible heat of the sun,
3. A dew of blood (Joel ii, 30), "And I will shew wonders in the heavens and in the earth, blood, and fire, and pillars of smoke."
4. A healing dew for the pious.
5. A darkness will be cast upon the sun for thirty days (Joel ii, 31), "The sun shall be turned into darkness, and the moon into blood, before the great and the terrible day of the Lord come." (Isaiah

xxiv, 22), " And they shall be gathered together as prisoners are gathered in the pit, and shall be shut up in the prison, and after many days shall they be visited."

6. God will give universal power to the Romans for nine months, during which time the Roman chieftain will afflict the Israelites. At the end of the nine months God will raise up the Messiah Ben-Joseph, that is the Messiah of the tribe of Joseph, whose name will be *Nehemiah*, who will defeat the Roman chieftain, and slay him.

7. There will arise *Armillus*, whom the Gentiles and Christians call Antichrist. He will be born of a marble statue in one of the churches in Rome. He will go to the Romans and will profess himself to be their Messiah and their God. At once the Romans will believe in him and accept him as their king. Having made the whole world subject to him, he will say to the Idumæans, that is the Christians, " Bring me the law which I have given you." They will bring it with their book of prayers ; and he will accept it as his own, and will exhort them to persevere in their belief. Then he will send to *Nehemiah*, and command the Mosaic law to be brought to him, and proof to be given from it that he is God. *Nehemiah* will go before him, guarded by 30,000 warriors, of the tribe of Ephraim, and will read, " I am the Lord thy God ; thou shalt have no other gods before me." *Armillus* will say there are no such words in the law, and will command the Jews to confess him to be God as the other nations had confessed him. Then *Armillus*, in rage and fury, will gather all his people in a deep valley to fight with Israel, and in that battle the Messiah Ben-Joseph will fall, and the angel will bear away his body and carry him to the resting-place of the Patriarchs. Then the Jews will be cast out by all nations and suffer afflictions such as have not been from the beginning of the world, and the residue of them will flee into the desert, and will remain there forty and five days, during which time all the Israelites who are not worthy to see the redemption shall die.

8. Then the great angel Michael will arise and blow three mighty blasts of a trumpet. At the first blast there shall appear the true Messiah Ben-David and the prophet Elijah, and they will manifest themselves to the Jews in the desert, and the Jews throughout the world shall hear the sound of the trumpet, and those that have been carried captive into Assyria shall be gathered together ; and with great gladness they shall come to Jerusalem. Then *Armillus* will raise a great army of Christians, and lead them to Jerusalem to conquer the new king. But God shall say to Messiah, " Sit thou on my right hand," and to the Israelites, " Stand still and see what God will work for you today." Then God will pour down sulphur and fire from heaven (Ezekiel xxxviii, 22), and the impious *Armillus* shall die, and the impious Idumæans, that is Christians, who have destroyed the house of

our God and have led us away into captivity, shall perish in misery, and the Jews shall avenge themselves upon them, as it is written :

"The house of Jacob shall be a fire, and the house of Joseph a flame, and the house of Esau (the Christians) for stubble, and they shall kindle in them and devour them ; there shall not be any remaining of the house of Esau, for the Lord hath spoken it,"—OBA. 18.

9. On the second blast of the trumpet the tombs shall be opened, and Messiah Ben-David shall raise Messiah Ben-Joseph from the dead.

10. The ten tribes shall be led to Paradise, and shall celebrate the wedding-feast of the Messiah ; and the Messiah shall choose a bride from the fairest of the daughters of Israel, and children and children's children shall be born to him, and then he shall die like other men, and his sons shall reign over Israel after him, as it is written (Isaiah LIII,) "He shall prolong his days," which *Rambam* (Maimonides) explains to mean, "He shall live long, but he too shall die in great glory, and his son shall reign in his stead, and his son's sons in succession."

EPIMENIDES — QUOTED BY PAUL. (Vol. IX, p. 37.) In Paul's letter to Titus (1, 12), he says :

"One of themselves, *even* a prophet of their own, said, 'The Cretians *are* always liars, evil beasts, slow bellies.' This witness is true."

These words are said, by commentators and classical scholars, to be found in the works of Epimenides, who is reckoned as one of the "Seven Wise Men of Greece" by those who exclude Periander. Epimenides was the son of Agiasarchus, having been born in Crete 659 B. C., probably at Phæstus, one of "Crete's hundred cities" mentioned by Homer in the *Iliad* (II, 790). Anthon says his work on "Oracle and Responses," mentioned by Jerome, is said to have been the one containing the quotation. Lempriere says he was an epic poet, and contemporary with Solon. Paul called him "a prophet." Beside his poems on the "Genealogy of the Gods," "Argonautic Expedition," "Minos and Rhadamanthus," he wrote treatises on "Sacrifices," and the "Commonwealth of Crete," all of which have perished. Many marvellous tales are related of him. He is said to have lived to the advanced age of 157 years, 50 years of which was spent in a cave asleep. Divine honors were paid to him after his death by the superstitious Cretians.

The Cretians affected the utmost antiquity, as a nation, and distinguished themselves as *Eteocretenses*, "true Cretians," a name quite

at variance with this *prophet's* opinion of them. It was not only the opinion of Epimenides that they were "always liars," from whom the apostle quotes this verse, but the same words are found in the works of Callimachus, a native of Cyrene, who wrote several treatises. His productions are nearly all lost. His works, "The Settling of Islands and Founding of Cities," and "Wonders of the World," are among the lost, but, according to classic writers contained much historical information.

Paul also quotes, according to Luke (Acts xvii, 28) from the astronomical poem of Aratus (270 B. C.), entitled *Phænomena*, or "The Appearances," the words, "For we are also his offspring." The same words are also found in a "Hymn to Jupiter," by Cleanthes (240 B. C.).

"THE BOOK OF THE DEAD." (Vol. X, p. 256.) A complete and reliable English translation has never been made of "The Book of the Dead." In 1867, Dr. Samuel Birch translated the "Book of the Dead" in the fifth volume of Bunsen's "Egypt's Place in Universal History." Unfortunately nearly the whole edition of the fifth volume was destroyed by fire, making the work very scarce, selling as high as \$25.00. The translation occupies 165 pages of the volume, and is extremely inaccurate, as is also the Egyptian vocabulary in the same volume. Versions have been made by DEVÈRIA, LEFÈBVRE, GUYESSE, and others in French, but the best by M. Pierret, "*Le Livre des Morts des Anciens Égyptiens*," Paris, 1882. The best text is that of Naville, two vols., with 660 plates, Berlin, 1886, which sells for some \$60.00. The British Museum published in 1890 a fac simile in a folio portfolio of 37 plates, for \$8.00, but it is now out of print. "The Book of the Dead" is very difficult to translate. A knowledge of the language is not alone necessary, but the translator should be thoroughly acquainted with the religion and mythology of Egypt, and also understand the numerous technical or mystical expressions which everywhere occur. Egyptologists are all looking to P. le Page Renouf, as the best living English Egyptologist, to make this translation, fragments of which he has already given us. CHARLES H. S. DAVIS, Meriden, Conn.

Invention of the Steam Engine.

260 B. C. Hiero of Alexandria described machines for utilizing steam power.

241 B. C. The *Æolipile*, a steam engine, described by Hiero of Alexandria. An apparatus consisting chiefly of a closed vessel, as a globe or cylinder, with one or more projecting bent tubes, through which steam is made to pass from the vessel, causing it to revolve.

80 A. D. Pliny describes a boat run by a "pot of hot water and wheels."

1282. Roger Bacon invented a steam engine, and imprisoned for sorcery.

1543. Blasco de Geray built a steamship at Barcelona.

1601. Giambattista made a steam pump for mining uses.

1616. De Caus published an account of a machine to run by steam.

1663. Marquis of Worcester constructed a spherical copper boiler.

1663. Marquis of Worcester built an engine to run by steam.

1769. Watt's first patent taken out and engines set up in factories.

1681. Papin invented a steam-working engine.

1683. Morland built steam engines for mines.

1698. Savery built an engine to drive a mine pump.

1699. Papin built an engine to run a barge. Destroyed by boatmen.

1712. Newcomb, Dartmouth, built the first self-acting steam engine.

1718. Beighton substituted plug rods for cords to valves.

1736. Jonathan Hulls issued proposals for boats driven by steam.

1759. Robinson suggested to Watt the road engine.

1764. Smeaton built a 72-inch cylinder engine.

1765. Smeaton attached a separate condenser to his engines.

1765. Watt invented a condenser separate from the cylinder.

1768. Watt first used oil tallow to keep piston from leaking.

1769. Cugnot, French, made an excellent road engine.

1769. Falck proposed a scheme for double-acting engine.

1775. Tubular boilers first used in America.

1775. Watt's patent renewed by special act of Parliament.

1778. Watt solved the problem of double rotary engines.

1778. Thomas Payne proposed scheme for a steamboat to America.

1781. Hornblower solved the problem of double action.

1781. Watt built the first complete double acting engine.

1783. Potter, a boy, made the valve gear automatic.

1784. Watt's patent for road engines was issued.

1784. Comte d' Auxiron built a steamboat on the Loire.

1788. Comte de Jouffroy built a steamboat on the Saone.

1788. Watt's expansion engine brought to perfection.

Curios in Mathematics. Supplement.

99. (Vol. X, p. 240; paragraph No. 97.) Artemas Martin has shown in the *Mathematical Magazine*, Vol. II, No. 4, p. 59, and in the *Bulletin of the Philosophical Society of Washington*, Vol. XI, p. 592, that the coefficient of y^2 should be 56587 instead of 5658. Barlow's numbers are the least values of x and y in the equation $x^2 - 56587y^2 = 1$.

100. M. Pagliani, in No. 12 of the Gergonne's *Annales de Mathématiques*, June, 1830, solved the problem :

"It is required to find 1000 consecutive numbers of the natural series, such that the sum of their cubes shall itself be a cube."

He found the first number to be 1134, and, consequently, the last is 2133; the sum of their cubes is 16830^3 ; therefore, $1134^3 + 1135^3 + 1136^3 + \dots + 2131^3 + 2132^3 + 2133^3 = 16830^3$.

Artemas Martin has solved the problem : "To find 1,000,000 consecutive numbers, the sum of whose cubes is a cube." He finds

$$16163334^3 + 16163335^3 + 16163336^3 + \dots + 17163331^3 + 17163332^3 + 17163333^3 = 1666833300^3.$$

101. (See paragraph No. 69.) In the *Mathematical Visitor*, Vol. I, January, 1879, p. 56, Artemas Martin found the sides of the 100th triangle to be

$$\begin{aligned} &21669693148613788330547979729286307164015202768699465346081 \\ &\quad 691992338845992696, \\ &21669693148613788330547979729286307164015202768699465346081 \\ &\quad 691992338845992697, \\ &30645573943232956180057972967833245887630954508753693529117 \\ &\quad 371074705767728665. \end{aligned}$$

Fifth-power numbers whose sum is a fifth power have been found by Artemas Martin. (See *Bulletin of the Philosophical Society of Washington*, Vol. X, p. 110; *Educational Times Reprint*, Vol. L, pp. 74-5; and *Bulletin of the New York Mathematical Society*, Vol. I, No. 2, p. 55.) He has found many sets from which the following are selected :

$$\begin{aligned} &4^5 + 5^5 + 6^5 + 7^5 + 9^5 + 11^5 = 12^5, \\ &5^5 + 10^5 + 11^5 + 16^5 + 19^5 + 29^5 = 30^5, \\ &4^5 + 5^5 + 6^5 + 7^5 + 8^5 + 9^5 + 10^5 + 11^5 + 14^5 + 18^5 + 22^5 = 24^5, \\ &3^5 + 6^5 + 7^5 + 8^5 + 10^5 + 11^5 + 13^5 + 14^5 + 15^5 + 16^5 + 18^5 + 31^5 = 32^5, \\ &12^5 + 13^5 + 15^5 + 16^5 + 17^5 + \dots + 23^5 + 25^5 + 27^5 + 28^5 \\ &\quad + 29^5 \dots + 35^5 = 50^5, \end{aligned}$$

Sixth-power numbers whose sum is a sixth power have been found

by Artemas Martin. (See *Bulletin of the New York Mathematical Society*, Vol. I, No. 2, p. 55.

$$1^6+2^6+4^6+5^6+6^6+7^6+9^6+12^6+13^6+15^6+16^6+18^6+20^6+21^6 \\ +22^6+23^6=28^6,$$

$$3^6+6^6+12^6+14^6+15^6+18^6+21^6+27^6+28^6+36^6+39^6+45^6+48^6 \\ +54^6+56^6+60^6+63^6+66^6+69^6+70^6+98^6+126^6+168^6+182^6 \\ 210^6+224^6+252^6+280^6+294^6+308^6+322^6=392^6.$$

Errata. Vol. X, p. 172, paragraph 52, fifth line, for $27+ = 6^2$ read $27=6^2$. Page 228, paragraph 60, fourth line, for $x = 2$ read $x = 5$. Page 236, paragraph 84, fourth line, in equations (a) and (b) for x^2 read x^3 . Page 238, paragraph 91, fourth line, for 38^3 read 38^2 . Page 238, paragraph 92, sixth line, for 225 read 210.

Vol. X, p. 254, first line, the side-head should read "W. STANLEY JEVONS'S PRODUCT OF TWO PRIME NUMBERS—8,616,860,799."

ŒDIPUS AND THE SPHINX. (Vol. X, p. 257.) Œdipus and the Sphinx are commemorated by Hesiod who denominates the Sphinx a destruction to the Kadmeians, and by Sophokles who relates the story of the riddle and its solution. A. WILDER, M. D.

CYROPÆDIA. This word means the "Education of Cyrus." It is a political romance by Xenophon (444?-355?) It refers to Cyrus the founder of the Persian empire, and not to the young Cyrus of the *Anabasis*. In the *Cyropædia*, the author sets forth his own political opinions, and gives an exposition of the principles of an ideal state and of a perfect ruler.

"ANIMULA, VAGULA, BLANDULA." (Vol. X, p. 256.) Hadrian's address to his soul,

*Animula, vagula, blandula,
Hospes comesque corporis.*

The best known translations are Byron's, and Pope's. Byron's begins as follows :

" Ah ! gentle, fleeting, wavring sprite ; "

And Pope's translation begins,

" Ah ! fleeting spirit, wandering fire."

See also Pope's ode, " The Dying Christian to his Soul," beginning,

" Vital spark of heavenly flame."

The Magician's Heavenly Chaos.

I AM A GODDESS FOR BEAUTY AND EXTRACTION FAMOUS, BORN OUT OF OUR OWN PROPER SEA, WHICH COMPASSETH THE WHOLE EARTH, AND IS EVER RESTLESS. OUT OF MY BRAESTS I POUR FORTH MILK AND BLOOD ; BOIL THESE TWO, TILL THEY ARE TURNED INTO SILVER AND GOLD. O MOST EXCELENT SUBJECT ! OUT OF WHICH ALL THINGS IN THIS WORLD ARE GENERATED, THOUGH AT THE FIRST SIGHT THOU ART POISON, ADORNED WITH THE NAME OF THE FLYING EAGLE. THOU ART THE FIRST MATTER, THE SEED OF DIVINE BENEDICTION, IN WHOSE BODY THERE IS HEAT AND RAIN, WHICH NOTWITHSTANDING ARE HIDDEN FROM THE WICKED, BECAUSE OF THY HABIT, AND VIRGIN VESTURES WHICH ARE SCATTERED OVER ALL THE WORLD. THY PARENTS ARE THE SUN AND MOON ; IN THEE THERE IS WATER AND WINE, GOLD ALSO AND SILVER UPON EARTH, THAT MORTAL MAN MAY REJOICE. AFTER THIS MANNER GOD SENDS US HIS BLESSING AND WISDOM WITH RAIN, AND THE BEAMS OF THE SUN, TO THE ETERNAL GLORY OF HIS NAME, BUT CONSIDER, O MAN, WHAT THINGS GOD BESTOWS UPON THEE BY THIS MEANS. TORTURE THE EAGLE TILL SHE WEEPS, AND THE LION BE WEAKENED, AND BLEED TO DEATH. THE BLOOD OF THIS LION INCORPORATED WITH THE TEARS OF THE EAGLE, IS THE TREASURE OF THE EARTH. THESE CREATURES USED TO KILL AND DEVOUR ONE ANOTHER, BUT NOTWITHSTANDING THEIR LOVE IS MUTUAL, AND THEY PUT ON THE PROPRIETY, AND NATURE OF A SALAMANDER, WHICH, IF IT REMAINS IN THE FIRE WITHOUT ANY DETRIMENT, IT CURES ALL DISEASES OF MEN, BEASTS, AND METALS. AFTER THAT THE ANCIENT PHILOSOPHERS HAD PERFECTLY UNDERSTOOD THIS SUBJECT, THEY DILIGENTLY SOUGHT IN THIS MYSTERY FOR THE CENTER OF THE MIDDLEMOST TREE IN THE TERRESTRIAL PARADISE, ENTERING IN BY THE FIVE RELIGIOUS GATES. THE FIRST GATE WAS THE KNOWLEDGE OF THE TRUE MATTER, AND HERE AROSE THE FIRST CONFLICT AND THAT A MOST BITTER ONE. THE SECOND WAS THE PREPARATION BY WHICH THIS MATTER WAS TO BE PREPARED, THAT THEY MIGHT OBTAIN THE EMBERS OF THE EAGLE, AND THE BLOOD OF THE LION. AT THIS GATE THERE IS A MOST SHARP FIGHT, FOR IT PRODUCETH WATER AND BLOOD, AND A SPIRITUAL BRIGHT BODY. THE THIRD GATE IS THE FIRE, WHICH CONDUCTETH TO THE MATURITY OF THE MEDICINE. THE FOURTH GATE IS THAT OF MULTIPLICATION AND AUGMENTATION, IN WHICH PROPORTIONS AND WEIGHTS ARE NECESSARY. THE FIFTH AND LAST GATE IS PROJECTION. BUT MOST GLORIOUS, FULL, RICH, AND HIGH, IS HE WHO ATTAINS TO THE FOURTH GATE, FOR HE HATH GOT AN UNIVERSAL MEDICINE FOR ALL DISEASES. THIS IS THAT GREAT CHARACTER OF THE BOOK OF NATURE, OUT OF WHICH HER WHOLE ALPHABET DOTHS ARISE. THE FIFTH GATE SERVES ONLY FOR METALS. THIS MYSTERY EXISTING FROM THE FOUN-

DATION OF THE WORLD AND THE CREATION OF ADAM, IS OF ALL OTHERS THE MOST ANCIENT, A KNOWLEDGE WHICH GOD ALMIGHTY BY HIS WORD BREATHED INTO NATURE, A MIRACULOUS POWER, THE BLESSED FIRE OF FIRE, THE TRANSPARENT CARBUNCLE, AND RED GOLD OF THE WISE MEN, AND THE DIVINE BENEDICTION OF THIS LIFE. BUT THIS MYSTERY, BECAUSE OF THE MALICE AND WICKEDNESS OF MEN, IS GIVEN ONLY TO FEW, NOTWITHSTANDING IT LIVES, AND MOVES EVERY DAY IN THE SIGHT OF THE WHOLE WORLD, AS IT APPEARS BY THE THIS PARABLE :

I AM A POISONOUS DRAGON, PRESENT EVERYWHERE, AND TO BE HAD FOR NOTHING. MY WATER AND MY FIRE DISSOLVE AND COMPOUND ; OUT OF MY BODY THOU SHALT DRAW THE GREEN, AND THE RED LION ; BUT IF THOU DOST NOT EXACTLY KNOW ME, THOU WILT WITH MY FIRE DESTROY THY FIVE SENSES. A MOST PERNICIOUS, QUICK POISON COMES OUT OF MY NOSTRILS, WHICH HATH BEEN THE DESTRUCTION OF MANY. SEPARATE, THEREFORE, THE THICK FROM THE THIN ARTIFICIALLY, UNLESS THOU DOST DELIGHT IN EXTREME POVERTY. I GIVE THEE FACULTIES, BOTH MALE AND FEMALE, AND THE POWERS BOTH OF HEAVEN AND EARTH. THE MYSTERIES OF MY ART ARE TO BE PERFORMED MAGNANIMOUSLY, AND WITH GREAT COURAGE, IF THOU WOULD'ST HAVE ME OVERCOME THE VIOLENCE OF THE FIRE, IN WHICH ATTEMPT MANY HAVE LOST THEIR LABOR, AND THEIR SUBSTANCE. I AM THE EGG OF NATURE, KNOWN ONLY TO THE WISE, SUCH AS ARE PIOUS AND M DE S, WHO MAKE OF ME A LITTLE WORLD. ORDAINED I WAS BY THE ALMIGHTY GOD FOR MEN, BUT (THOUGH MANY DESIRE ME) I AM GIVEN ONLY TO FEW, THAT THEY MAY RELIEVE THE POOR WITH MY TREASURES, AND NOT SET THEIR MINDS ON GOLD THAT PERISHETH. I AM CALLED OF THE PHILOSOPHERS, MERCURY ; MY HUSBAND IS GOLD (PHILOSOPHICAL). I AM THE OLD DRAGON THAT IS PRESENT EVERYWHERE ON THE FACE OF THE EARTH ; I AM FATHER AND MOTHER ; YOUTHFUL AND ANCIENT ; WEAK AND YET MOST STRONG ; LIFE AND DEATH ; VISIBLE AND INVISIBLE ; HARD AND SOFT ; DESCENDING TO THE EARTH, AND ASCENDING TO THE HEAVENS ; MOST HIGH AND MOST LOW ; LIGHT AND HEAVY. IN ME THE ORDER OF NATURE IS OFTENTIMES INVERTED, IN COLOR, NUMBER, WEIGHT, AND MEASURE. I HAVE IN ME THE LIGHT OF NATURE ; I AM DARK AND BRIGHT ; I SPRING FROM THE EARTH, AND I COME OUT OF HEAVEN ; I AM WELL KNOWN, AND YET A MERE NOTHING ; ALL COLORS SHINE IN ME, AND ALL METALS BY THE BEAMS OF THE SUN ; I AM THE CARBUNCLE OF THE SUN, A MOST NOBLE CLARIFIED EARTH, BY WHICH THOU MAY'ST TURN COPPER, IRON, TIN, AND LEAD INTO MOST PURE GOLD.

THE DIVINE SOPHIA. " The Great Mother lay with Δ , and the I, and the $\square$, the second I and the pentagram ($\pi = 31415$) in her bosom, ready to bring the forth, the valiant sons of the $\Delta \square I I$ (4,320,000, the Cycle) whose two elders are the circle $\odot$ and point .