

The YOUTH'S INSTRUCTOR

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No. 20



ARCHIMEDES KILLED BY SOLDIERS WHILE ABSORBED IN STUDY

See page five

Spiders on Uncle Sam's Pay-Roll

NOTICE that six large spiders were working for the Panama Canal was given out when Colonel Goethals arranged for a man to take care of them in the instrument-room at the Gorgona shops. From the cocoons the instrument makers will take threads for use in all the engineers' transits on the work, these threads taking the place of platinum.—*Christian Herald.*

Scientific Puzzles

EVERY one knows that the diamond is only charcoal crystallized; but there are a great many other things in nature that though possessing widely different properties, are composed of exactly equal quantities of the same elements.

The white of an egg and rattlesnake poison are formed of identically the same amount of the same elements.

The oil of roses and common coal-gas are each formed alike, both being composed of four atoms of hydrogen and four atoms of carbon.

Sugar and gum arabic are likewise brothers of the same weight and texture.

All the hydrocarbons, known to science as a combination of sixteen atoms of hydrogen and ten atoms of carbon, are alike in their composition. To enumerate some: Oil of orange, lemon, cloves, ginger, and black pepper.

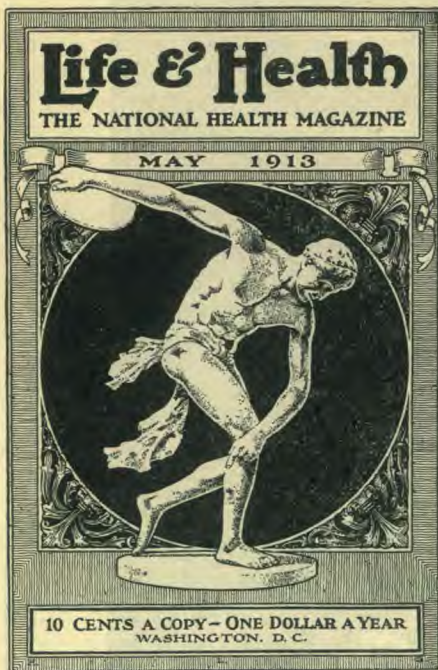
The suggested explanation of these peculiarities is that the atoms are placed differently toward one another in the molecules of the different substances.

Other things just as peculiar are evident when certain substances are united chemically. Thus, hydrogen gas, which is odorless, and nitrogen gas, which is also odorless, when united go to make ammonia, which has a very strong odor. Copper, which has no odor, and zinc, which also has none, when melted and mixed to give us brass, produce a substance with a characteristic odor.—*Scottish American.*

Ideal Lightning-Testing Station

FEDERAL experts, in their observation of lightning flashes and tests of lightning conductors have found an ideal testing station in the Washington Monument. The famous obelisk is struck by lightning a number of times every year, but no havoc has ever been wrought, thanks to an ingenious system of lightning-conductors, the key-note of the installation being found in a small pyramid of aluminum weighing about one hundred ounces, which crowns the capstone of the monument. This head-piece is connected with the rods that descend six hundred feet to a well sunk to a considerable depth below the level of the earth. The monument has been visited by as many as five electric bolts within an interval of twenty minutes, but the protective system has always proved equal to all the exactions imposed upon it.—*Popular Electricity.*

AFTER a search of twelve months and a journey of *twenty-five thousand miles*, an English entomologist has succeeded in capturing a certain species of butterfly. This much-desired specimen was found in the garden of a Japanese gentleman at Kioto.



This is the magazine that tells you **WHAT TO DO**, as well as **WHAT TO AVOID**, for the sake of your health. It also tells you **HOW TO PREVENT**, as well as **HOW TO CURE**, disease.

What a Successful Lady Agent Says

Who Is Selling This Number in Hawaii:

"I like the front cover of the May number. Think it will sell better than the March or April number. Enclosed find payment for the 50 copies ordered."—*Mrs. Bertha A. Bartholomew, Honolulu, April 15.*

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Note These Few

Professor Metchnikoff on "The Cause of Old Age"
The Sun and My Lady's Face
Startling Revelations Concerning Diseased Meat
How to Prepare Six Vegetarian Salads
Does Alcohol Warm the Body?—What Arctic Explorers Say
Is Castoria Injurious?
Friedmann Tuberculosis Treatment
Cure for Tapeworm
Substitutes for Coffee
"Sex Hygiene" Commercialism
A Doctor or a Good Nurse—Which?
Questions Answered by the Editor

If you want to be as strong and healthy as the stalwart Greek "Discus Thrower" (in modern athletics he would be the "Hammer Thrower"), pictured on this cover, follow the principles taught by "Life and Health." And don't forget to pass them on to others.

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Give and Live

FOREVER the sun is pouring gold
On a hundred worlds that beg and borrow;
His warmth he squanders on summits cold,
His wealth on the homes of want and sorrow;
To withhold his largess or precious light
Is to bury himself in eternal night.
 To give
 Is to live.

The flower blooms not for itself at all,
Its joy is the joy that diffuses;
Of beauty and balm it is prodigal,
And it lives in the life it freely loses;
No choice for the rose but glory or doom,
To exhale or smother, to wither or bloom.
 To deny
 Is to die.


The seas lend silvery rays to the land,
The land its sapphire streams to the ocean;
Though heart sends blood to the brain of
 command,
The brain to the heart its lightning motion;
And over and over we wield our breath,
Till the mirror is dry and images death.
 To live
 Is to give.

He is dead whose hand is not open wide
To help the need of a human brother;
He doubles the length of his lifelong ride
Who of his fortune gives to another;
And a thousand million lives are his
Who carries the world in his sympathies.
 To deny
 Is to die.

— Selected.

Recent Advances in Medical Science

G. H. HEALD, M. D.

 O a traveler in the Alps, Mt. Blanc appears no higher than surrounding mountains, and in fact may be hidden by lower peaks. It is to one at a distance that the great white mountain assumes its true proportions and stands as a giant among pygmies. In the same way one looking back on the events of a year just past may fail to select those that will stand out most prominently in the future. Possibly some circumstance that to us now seems utterly insignificant may be the pivot on which future events turn. How much could the wise men of the Roman Empire foresee regarding the influence of a humble peasant, born in Galilee, who raised a small following of common people, and then died on the Roman cross? He was beneath their notice, yet his influence now permeates every corner of the globe.

So in attempting to sketch the recent progress in medical science. I can only bring forth that which at the present seems important.

Grafting Tissues and Organs

Recent work in experimental surgery is so astounding that we have hardly yet got over our surprise. Carrell has not only transplanted tissues from one part of the body to another and caused them to grow, but he has been able to transplant organs, such as kidneys, from one animal to another, and to keep them performing their work for a considerable time. He has also been able to engraft, even more successfully, on one animal the superficial parts of another animal, such as an ear or a leg. Tissues are now also grown outside of the body, just as we would grow cabbages, and after an independent growth they may again be grafted on the body. Carrell has carried animal tissue through as many as eighteen transplantations, keeping it alive and growing for eighty-five days, and fragments of heart have continued to pulsate for two months under artificial cultivation.

Maintaining Life in Isolated Organs

But perhaps the most astounding work of all was the isolation of the "viscera," or organs, of an animal,— the lungs, heart, digestive tube, etc.,— and keep-

ing this apparatus living and working for days after the death of the animal. We have known what it is for many years to keep the heart of a cold-blooded animal alive and beating for some days after it has been removed from an animal, but to keep all these internal organs going, the heart beating, and the tube digesting, in a show-case, as it were, is rather remarkable.

Cancer Juice to Stimulate Growth

The most recent announcement is that the juice of cancerous growths furnishes the means of stimulating an astounding growth in tissues, and its application in animals has caused the healing of wounds with remarkable rapidity, and with no evidence thus far of any resulting cancer growth. It is not at all strange that no person has offered himself for experimentation with cancer juice, for the possibility of inoculation with cancer is too grave a risk to be run without further knowledge on the subject. If it is definitely proved that this cancer juice (obtained by making pressure on malignant growths) is incapable of transmitting cancer, it may become useful to modern surgery in cases where there is great need of stimulating the reparative processes.

Spinal Paralysis

One of the recent triumphs in medicine is the demonstration that anterior poliomyelitis, or infantile paralysis, is an infectious disease, it having been transmitted experimentally from patients to monkeys, and then repeatedly from monkey to monkey. What the virus is has not been determined. It is not a "germ" such as we have in typhoid, diphtheria, cholera, and the like, because it is small enough to pass through the finest porcelain filter. It is supposed to be the lowest form of animal life, much more minute than the bacteria, so small that the highest powers of the microscope are unable to detect it. Without being able to see this germ life, men have been able, by using the regular laboratory methods, to attenuate it so that it can be introduced in the body of animals without danger, and it then affords at least a partial immunity. But thus far this immunity has been of no avail in stop-

ping epidemics of the disease; it is now generally conceded that the virus is usually transmitted through the secretions of the nose and throat, and it has also been shown that the biting stable-fly is one means by which the disease may be transmitted.

Measles

The secretions of the mouth and nose of persons having measles have been shown to be infective to monkeys, if they are inoculated within forty-eight hours after the first eruption. After this period the infective power of the virus rapidly diminishes. The disease in monkeys is very similar to that in humans. By analogy we may be pretty certain that the time when the measles patient is most dangerous to others is in the early stage, and that there is practically no danger in the stage when the skin is shedding. It is the child with what seems to be a cold or a sore throat, who is allowed to stay in school instead of being sent home at once, who causes an epidemic of measles, and not the convalescent child who is still shedding a few scales.

Insects and Disease

Among the insects now known to be potential transmitters of disease are the mosquito (malaria and yellow fever), the fly (yellow fever, cholera, dysentery, plague, etc.), tsetse-fly (sleeping-sickness), louse (typhus fever), tick (Rocky Mountain fever), flea (plague), stable-fly (infantile paralysis and possibly pellagra).

Disease Carriers

Research in recent years has more and more pointed to the fact that infectious diseases, such as diphtheria, scarlet fever, measles, typhoid fever, and dysentery, are transmitted not so much by clothes, toys, and the like, as by "carriers;" that is, by persons apparently well who have come in contact with persons having the disease, or have themselves had the disease, perhaps in a mild form, or possibly are just about to come down with it. These carriers, apparently healthy, mingling freely with others, may spread the disease widely without there being any suspicion as to how the disease originated.

Who Taught Us to Vaccinate?

IN the year 1770 a young man by the name of Edward Jenner was pursuing his medical studies with an eminent English surgeon. One day a woman called upon the physician for medical advice, and the subject of smallpox being mentioned in her presence, she remarked, "I can not take that disease for I have had cowpox." At a time when nearly one hundred persons out of every one thousand were falling victims to this

dread disease, it is not strange that the remark arrested the attention of Mr. Jenner.

After finishing his studies he began seriously to investigate the subject, and by 1780 had reached sufficiently satisfactory results to express the hope that he would be able "to propagate a certain variety of cowpox from one human being to another, till he had disseminated the practise all over the globe, to the total extinction of smallpox." His hope was not to be realized at once; but by 1796 the value of his gift of vaccination to the world was virtually demonstrated. Before the close of the century, seventy of the principal physicians and surgeons of London signed a declaration of their entire confidence in it. And yet widespread opposition to its practise was continued for more than a quarter of a century.

So proficient has the medical profession become through the use of wise preventive and curative measures that now the death-rate from smallpox is not more than one hundredth of what it was a century ago. A large share of this decreased mortality is due to the work of Dr. Jenner. And happily he lived to see some of the beneficent results of his work and to enjoy the honor and the rewards of his discovery. In 1802 the English Parliament gave him a grant of £10,000, and in 1807 a second grant of £20,000, while many honors were conferred on him by foreign courts and societies.



JENNER VACCINATING HIS SON

Defeating Typhoid

TO prevent infection, inoculation with sterilized typhoid cultures has proved so effective that many doctors now believe that typhoid fever can be prevented as easily as smallpox. The department of health of New York City

recently announced that inoculation against typhoid fever has passed the experimental stage, and has proved to be a sound prophylactic measure. The department has authorized the health inspectors to inoculate persons, and it also provides free cultures to physicians for their own use. In the five years from 1907 to 1911, the average number of cases of typhoid fever in the United States Navy was two hundred six. The number of deaths averaged thirteen. In January, 1912, inoculation was made compulsory. The reports for the first three quarters of the year are significant. In the first quarter there were twenty-five cases of typhoid; in the second, eight; and in the third, six. During the whole of this period there was only one death. Moreover, no one who was inoculated with antityphoid serum contracted the disease. Of the sixty-two thousand persons who were inoculated, only a few suffered any inconvenience; there were no disastrous results.—*Youth's Companion*.

Epilepsy Cured

SOME five years ago a man in western Texas, who suffered from frequent epileptic fits, was bitten by a rattlesnake. He recovered from the poison of the snake bite. Two years passed, and during all this time he is said to have had no attack of his old trouble. This news attracted the attention of the medical fraternity, with the result that a Dr. Spangler, of Philadelphia, began experimenting on other epileptic patients, with rattlesnake venom. His experiments produced astonishingly favorable results. Almost from the first injection of the poison into the arms of the patients, the number of attacks decreased, and in time the patients were greatly benefited or entirely cured.

Archimedes

NONE of the old philosophers has invested his memory with more of storied interest than Archimedes. Born 287 B. C., he became the friend and most useful servant of Hiero, king of Syracuse. He was a philosopher, astronomer, geometrician, and practical inventor. It is probable that his more abstract pursuits were those in which he himself took most delight; and no doubt some of his wonderful inventions would never have been made but for the pressing demands of King Hiero.

Among the first of a series of remarkable stories that have come down to us concerning Archimedes is that relating to a golden crown which the king had ordered, the metal in which, he suspected, had been alloyed. The problem was to detect the imposition, and he finally laid the task upon Archimedes. Stepping one day into a bath-tub brimful of water, the displacement of the water suggested to the philosopher not only a method of testing the question as to the crown, but opened to him a line of investigation which led to the discovery of his celebrated theorems. The joy of his pregnant thought was so great that, forgetting all else, he leaped out of the bath, and, without stopping to dress, ran through the streets crying, "*Eureka! Eureka!*" (I have found it.)

He afterward made for his royal friend various engines of war which proved most serviceable to the city in a time of siege. Archimedes superintended the building of an immense ship which was partly propelled by a screw; and he invented a simple but ingenious screw-pump, which proved very useful in his own day and is still in use, being called, in honor of the inventor, the Archimedean screw. He was an enthusiastic student of the stars, and constructed with peculiar satisfaction to himself a kind of orrery which exhibited the various movements of the heavenly bodies.

He possessed that power of intense and prolonged concentration of thought which is often an accompaniment of extraordinary mental gifts. When the Romans took Syracuse, Archimedes was absorbed in one of his profound problems. The din of strife fell unheeded on his ear. The rush of the victorious enemy through the streets, bent on pillage and slaughter, disturbed him not. Soldiers discovered his retreat, and looked curiously at him for a moment, possibly taking him for a madman; but he saw them not. Then, alas! sword and spear did their bloody work, and the brightest light of the age was extinguished. Marcellus, the Roman com-

mander, learned with sorrow of the philosopher's death, and gave him an honorable burial.—*Selected.*

A Lesson From Science

DISCOVERED and far-reaching results due to the working of small influences are no more charmingly revealed than in the realm of chemistry, where sometimes almost infinitesimal quantities of certain metals are able to bring about marvelous phenomena. The smallest quantities of platinum are able to upset the equilibrium of large quantities of peroxid of hydrogen, and bring about changes in a few hours which under ordinary circumstances would require days or even weeks to effect. Peroxid of hydrogen, the commonly used germicide so familiar to every schoolboy, has a molecule very similar to that of water, with the exception that it has in it one more atom of oxygen; its chemical symbol is H_2O_2 instead of H_2O . This extra atom, loosely tacked on, seems always ready to jump away, with the result that the liquid is easily decomposed into water and oxygen-gas, a fact which accounts for the weakening of hydrogen peroxid with age. Ordinarily, this decomposition goes on very slowly, but if as much as one sixteenthousandth of an ounce of platinum is added to a dilute pint of peroxid, the equilibrium of the liquid is so much destroyed that within two hours the whole amount will have been changed to simple water and oxygen-gas.

The gas mantle consists of ninety-nine per cent thoria (oxid of thorium), a metal obtained from a sand found in the United States and Brazil, and one per cent ceria (oxid of cerium), another of the rarer metals. Now it is interesting to note that the whole value of the mantle depends upon this paltry proportion of ceria. Mantles of pure thoria will give only a dull leaden light, and are worthless; but when the one per cent of ceria is added, a brilliant light is obtained. Before the discovery of this wonderful power of ceria in brightening the glow of the gas mantle, it was thought that gas must give way to electricity as an illuminating agent; but to-day, with all the improvements used in perfecting the electric light, we are not able to produce a better light for illuminating the study-room than gas used with the gas mantle.

There are many persons who judge their influence small and unenergizing. Let such learn a lesson from the bit of platinum and the one per cent of ceria. It may be that their small influence is just what is needed to rapidly set free and bring out the imprisoned energies and talents of some handicapped young person; perhaps their little word full of cheer and confidence may bring brilliance and radiance to the leaded soul, and make it glow with gloried gladness. Then let their little part be played well; it may—who knows?—have an influence quite out of proportion to its apparent value. There is sometimes "a blessedness in being little." A little word inviting the reckless George Müller to a prayer-meeting was the means of bringing him to Jesus Christ and giving to the world that "apostle of faith" whose influence has gone around the world. The "Imitation of Christ," read in an idle moment by the reckless John Newton, made him a mighty power for righteousness. "The creation of a thousand forests," says Emerson, "is in one acorn."

EDMUND C. JAEGER.

Riverside, California.

Testimony of Flower and Sun

C. P. BOLLMAN

"LITTLE crocus, tell me why
Underneath the ground you lie
All the lovely autumn through,
Nothing willing then to do;
But when earth is wrapped in snow,
You at once begin to grow,
Gathering from soil and snow
Elements that chemists know,
Building from them bud and flower
To adorn our spring-time bower?
Little crocus, tell me who
Taught you all these things to do,
Helps you look up toward the sky
From the dirt wherein you lie?"

"Know, kind sir," the crocus said,
"It is God by whom I'm fed;
His the life that gives me power,
And sustains me hour by hour."

Then I looked up to the sky,
Where are lights that never die;
Asked of rolling suns and spheres,
"Who sustains you through the years?"

Then there came the answer true:
"God directs in all we do;
Formed us by his mighty power,
And upholds us hour by hour;
Gives us light by which to shine;
Guides us by his hand divine."

Then it was I prostrate fell,
Worshiped him who loves so well,—
Him who notes the sparrow's fall,
Sees the hyssop on the wall;
But who, though so great and high,
Gave his Son for us to die.
O adore him, one and all!
Live responsive to his call!

Flowers and Plants Used in Making Perfumery



QUITE an extensive industry is carried on in the United States in the way of compounding perfumes, although but little attention has been given to the production of the raw materials, which consist chiefly of the essential oils that are extracted from the flowers, fruits, herbage, and wood of plants. Musk and civet are of animal origin. It is estimated by authority that about twenty perfumery oils can be selected which are products of plants that may certainly or probably be grown within the limits of our own country.

The perfumery oils of bergamot, citron, lemon, limes, and orange are obtained from the rinds of their fruits. These oils are extracted in different ways,—by *pressure*, by *distillation*, or by *rubbing* the fruit in a metal cup lined with spikes, the oil settling into a hollow handle. A large number of the oils are extracted by means of distillation.

Maceration is a method of extracting oil by immersing the flowers in melted grease. Oils thus extracted are used as pomade, or digested in alcohol, which takes up the perfume, forming an extract. Purified lard and tallow are used for maceration, and also the fat of deer when pomade and extracts are made; but olive-oil is used for making perfumed oils.

Enfleurage is still another method of extracting perfumery oils. While it is one of the most difficult methods to operate, it is said to give the most satisfactory results. The odors obtained by maceration and enfleurage are nearly the same as that of the living flower. *Enfleurage*, or *inflowing*, is an absorbing process in which the flowers are placed on thin layers of grease spread on panes of glass in frames. The flowers are renewed from day to day, and the perfumed oils are obtained by saturating coarse cotton cloth with olive-oil and laying it over frames of wire gauze.

Rose Perfumery

Attar of roses is considered first among perfumery articles in value of importation, although the climate and soil of the United States in many places are well adapted to rose culture. The sweet odor of the rose is developed best in a very hot climate, where the power of the sun's heat and light is at its height. Nearly all the fruits and melons are sweeter and of a finer flavor when ripened in plenty of bright, intense

sunshine. Fruits ripened during a cloudy, rainy spell are more juicy, but not so sweet.

Rose farming is carried on in Bulgaria in the fertile valley along the southern slope of the Balkan Mountains, and also in the extreme southeast of France between the Alpes-Maritimes and the Mediterranean Sea. The Turkish attar of roses is produced mainly in the Bulgarian district, while the citrus fruits, cassie, and many other perfumery plants are grown in the latter region. In fact, this is the great perfumery of Europe.

Attar of roses is also produced in Asiatic Turkey, Persia, and India, although the European and American supplies come from the first two districts mentioned. The red damask rose is the one cultivated chiefly in Bulgaria, while in France a hybrid variety of the hundred-leaf rose is the leading one cultivated.

Rose-Geranium

The odor of the rose-geranium is quite like that of the rose. There are three well-known species employed for making perfumery,—the common rose-geranium, the skeleton-leaved geranium, and the nutmeg-geranium. It is thought that these geraniums might be grown on a commercial scale in selected localities of our Southern States and California.

Citrus-Trees

The sweet orange, bitter orange, bergamot orange, lemon, citron, sour lime, sweet lime, shaddock, and pomelo, or grapefruit, yield oils mostly from their rinds. These are used in making extracts and perfumes. An oil is also obtained from the orange flowers by maceration. The flower-buds are gathered just before opening, and the green part is removed by hand. It is thought that the most desirable orange perfume is obtained in this way, and that the oil obtained from the bergamot orange peel is of more value than any other orange-peel oils, although it is not easily obtained in a pure state. It is produced largely in the south of Italy, near Reggio.

Orange leaves are said to yield an attar worth three shillings an ounce, the flowers an attar worth ten shillings an ounce, and the rind an attar worth from twelve to sixteen shillings a pound; and that while the oil of bergamot in an adulterated state may sell for ten shillings a pound, it is worth from thirty to forty shillings a pound when pure.

(Concluded next week)

Some Little Clay Jugs

HANGING on the under side of a protecting leaf and gently rocked by the summer breezes, are three little jugs. They resemble Mexican water-bottles, but are not made by human hands. Strange as it may seem, they are the work of an insect, the potter-wasp, and are really mud cells that serve as the nest, or home, for the young wasps. While those shown in the illustration were fastened to a maple leaf, they are not always so found, but often are attached singly to twigs.

These little jugs are made of wet clay which the parent wasp gathers for the purpose, and, when thoroughly dry, are hard and enduring. When a jug is finished, it is filled with small spiders or caterpillars, which are first made dormant by the sting of the wasp, but not killed, and in each jug an egg is laid, after which the opening is sealed with a little clay cork.

In a few days, the egg hatches, making a small grub with a big appetite, which it at once begins to satisfy with the dormant spiders. The feast continues for about two weeks, when the grub, now grown to a good size, spins a cocoon, and in this state remains for perhaps a few weeks, after which it changes to a full-fledged wasp, and, being no longer content in its confined quarters, it deliberately pushes out the little clay plug that has closed the jug, and goes into the world to take up its work in the great realm of nature. And the little jugs are left deserted and empty.—George A. King, in *St. Nicholas*.



The Dwarf Pine

AT top of Mt. Baldy, 10,081 feet high, almost at timber-line, grows the white-barked, or dwarf pine. It looks much like a mat of green against the gray shale of the summit. On the lower levels this same tree will grow thirty or forty feet in height, but on Old Baldy, with snow all the year and high winds never ceasing in their rush from desert to sea and back again, it always looks as if it had been stepped on; never above six feet high here, and often only three, yet the branches spread to thirty or forty feet in diameter. Some one has aptly said that it looks as if it had grown up against a ceiling, for so flat is it that you can walk on it.

John Muir tells of one tree which he examined that was but three feet high, with a trunk six inches in diameter. It was four hundred twenty-six years of age. One of the little branches, an eighth of an inch in diameter, was seventy-five years old. These little branches are so tough that they can be tied in knots, as I myself have often done.—*Selected*.

THE record-breaking automobile prize was won by Percy Lambert, who recently traveled one hundred three and three-fourth miles in sixty minutes, or one hour.

"Look for the Beautiful"

ALL that is truly beautiful in this world speaks to the thinking soul of an eternal Father, God, author of all that is beautiful and good. In beauty we may see the tracings of a divine artist. From the beautiful we may inhale the fragrance of divine love, and feel the thrill of divine life.

Flowers, with their many colors but always harmonious, seem to be still an expression of the efforts of a sin-cursed, dying world to smile and rejoice in the thought of *being* and *doing*, determined to have its dying breath one of fragrance to God and man.

The mountain daisy, the sweet-faced pansy, the doubly fragrant heliotrope, yes, and all the beautiful flowers, from the bursting of the buds to the closing or dropping of the last dying petal, are one continuous smile in behalf of sorrowing hearts, disappointed lives, or dying hopes.

And all through their smiling lives, they are developing seeds that may live to bloom again for other weary souls farther on in the pathway of life.

May these beautiful faces inspire us to smile in spite of all our sadness. May they inspire us to be fragrant, not alone that our own lives may be cheered, but that other lives about us may be sweetened, and that in our own lives seeds may be developed that shall one day bloom in the

garden where beauty will not fade and where love will never die.

A. E. PLACE.

What He Saw

My grandma lives in the country,
Where they let you walk on grass;
And they haven't any sidewalks,
And the trolleys never pass.
In grandma's fields there were queer things
That had yellow spots and black,



And I saw one walk, so funny,
With his house upon his back.
My grandma called him a turtle,
'Twas a sight you shouldn't miss!
I showed my mother how he looked
When he walked—'twas just like this!

—Alice L. Clark.

HEAVEN'S gates are not so highly arched as princes' palaces; they that enter there must go upon their knees.—Heber.

Getting the Telephone Started

WHILE trying to aid the deaf and dumb, Alexander Bell discovered the principle of the telephone by accident. He patented his invention on Feb. 14, 1876, and borrowed money to put it before the public at the Centennial Exhibition of that year in Philadelphia. Immediately his troubles began.

"Y—es, it might do as a toy for the children—if he could sell it cheap enough," said the thoughtless and most kindly.

"Pshaw! If it wasn't a put-up game between those two men who did the talking, well, then they were talking through a hole in the wire," said the more thoughtful who really gave his invention any attention.

But it remained for the London *Times* to say the worst. "The latest American humbug!" was that journal's withering verdict. And, unfortunately, this was how most Americans came to regard it. Bell began by demonstrating that people could actually talk

that this news had come to them by human voice "over sixteen miles of wire!" This startling statement gave a loose rein to the imagination. Two months later Charles Williams, a Boston electrician, connected his office in Boston with his house in Somerville, a distance of less than three miles. A few other venturesome Boston men followed suit, and by the close of a year and a half, about eight hundred telephones were in use.—*Pearson's Magazine*.

The Men That Reached the Pole

HE dash and energy and ambition which are usually the possession of men who achieve are pleasantly absent at least from the surface of Capt. Roald Amundsen's character, although they must be abundantly present in the depths.

The captain is a modest man, big, silent, thoughtful, retiring. No one cares less for glory than he, no one



National Geographic Magazine

The first meeting of Robert E. Peary, discoverer of the north pole (4), and Roald Amundsen, discoverer of the south pole (3), at the home of the National Geographic Society, Jan. 4, 1913, Washington, D. C. J. J. Jusserand, the French ambassador (2), James Bryce, ambassador from Great Britain (5), and Dr. Alexander Graham Bell, the inventor of the telephone (7), are among the eminent men gathered together on this unique occasion.

over the wire. He soon gave up doing this. He learned that the people insisted upon taking him as a magician or as a ventriloquist working with a confederate. He speedily discovered that he attracted more attention by living down to that reputation and sending popular tunes over the wire. Not until fall of that same year did he appear to gain any headway. Then, through influence, he induced one of the lyceum bureaus to contract with him for ten lectures upon the telephone at one hundred dollars each.

From these lectures came Bell's first dividend upon his invention. At times he and his friends begged the temporary use of short telegraph-lines, attached telephones, and talked over them in the presence of skeptical reporters. Not until virtually one year after Bell took out his patent did the press venture to commit itself. Then the Boston *Globe* reported a lecture which Bell delivered in Salem, Massachusetts. It stated

cares more for solid worth and achievement. He has no use for the limelight, and he is never theatrical.

This is abundantly shown in his dash for the south pole. When Peary came within hailing distance of the top of the world, he sent his companions back. He wanted to stand there alone with his personal servant, and plant the flag of the United States above a frozen sea. When Amundsen reached the south pole, four of his men were with him. He had no desire to garner all the glory of achievement for himself.

One would think that the leader of such an expedition, in such a moment, would at least wish to plant his country's flag upon the summit of the frozen continent of the south, but even that honor Amundsen refused to keep for himself. And when the fluttering flag came to be photographed at the pole, it is not Amundsen that holds the staff, but another member of the party.—*Christian Endeavor World*.

Pearls of Ceylon

PEARLS have always been regarded as especially appropriate for the ornamentation of royal personages, and the pearls of Ceylon, owing to the extraordinary numbers that have been produced and the active prosecution of the fishery for ages, have probably been more extensively worn by exalted individuals than have the gems of any other region. The pearls of Ceylon are undoubtedly found in the official or personal jewels of every female sovereign and also in the crowns and regalia of most of the male rulers of today.

The most lavish use of pearls is met with among the

most minute, which have no value as pearls, are calcined and sold to the wealthy for chewing with the betel-nut. The same use is made of many American fresh-water pearls, for which a market has now been established in Bombay.

Somewhat larger seed-pearls, which have no sale outside of Ceylon and India, are placed in the mouths of deceased Hindus of means, replacing the rice grains that are employed for the same purpose by the poorer people.

The larger seed-pearls are drilled, strung, and used for ornament. The drilling is done by the most primitive means, and it is a very clever workman who can



CEYLON OYSTERS UNDERGOING THE ROTTING PROCESS

Indian rajahs, some of whom, when clad in their full dress, are literally covered with these gems. These pearly possessions often represent the greatest item of wealth of these nabobs, and are usually heirlooms, added to from time to time and rarely disposed of, so that vast accumulations have sometimes occurred.

The pearls of the Ceylon waters are for the most part silvery white in color; sometimes they are yellowish, creamy, or pinkish. For luster they are surpassed by the pearls of no other part of the world, and for spherical regularity, also, they are unexcelled. Other peculiarities are that their size averages smaller than elsewhere in the world, and that their number exceeds that in any other fishery. Pearls weighing over ten grains are very uncommon, and by far the larger number weigh less than two grains. Specimens worth three hundred fifty dollars at the fishery are rare; the most valuable pearl found in 1904 sold locally for eight hundred thirty dollars, and the record fishery of 1905 yielded one valued at four thousand dollars.

More seed-pearls result from the Ceylon fisheries than from all other parts of the world combined. The

perforate forty to fifty pearls in a day with the ancient bow-drill. This will enable us partly to estimate the labor required to drill the 120,000 seed-pearls in a necklace, dating from the Louis XVI period, now the property of an American lady. By means of one of the modern mechanical drills, 1,500 pearls may be easily and accurately perforated in a day.

Rotting the Oysters

It is a difficult matter to extract the pearls from perfectly fresh oysters either by sight or by touch, or by both combined; consequently it has long been the practise to allow the decomposition of the soft parts before the search for the pearls is begun.

The oysters are piled into dugout canoes and covered with matting, or else set aside in coarse sacks for seven to ten days. Bacterial putrefaction is supplemented by the work of blow-flies and their larvæ, and at the end of the period stated the disintegration, decomposition, and digestion of the oysters have progressed so far that there is little left but pearls, shells, slime, and foreign matter adhering to the shells, together with a large volume of maggots. The first step

in the cleansing process is the flooding of the canoe to the brim; then the naked natives, ranged on either side of the vessel, remove the shells, washing and rinsing them, and removing any detritus in which a pearl may lodge.

Eternal vigilance must be exercised by the owners to prevent the theft of pearls, and one of the precautions taken is to forbid the washers to remove their hands from the water except to drop at their feet the cleansed shells.

Origin of Pearls

Pearls differ from other gems in the brief period of their existence in a natural state, and in the steady renewal of the supply. A pearl, unless plucked when ripe, like a fruit, drops to the bottom and quickly loses its value when the creature that makes and harbors it perishes.

It is interesting to contemplate that in all waters having pearl-bearing mollusks, from the earliest dawn of history down to the present time, much the larger part of the pearl crop has never been harvested and never seen by man, but has been scattered on the floor of the ocean as the oysters have died in the course of nature. This is particularly striking in the case of the pearls of Ceylon, because of the brief, almost ephemeral life of the oysters.

During the first fifteen hundred years of the present era, and doubtless for many preceding centuries, every theory of pearl formation had as its essential feature the idea that every pearl was originally a drop of dew or rain—possibly a tear—that gained entrance into the shell of an oyster in one of various ways. Pliny the Elder, in his celebrated "Natural History," gives a detailed description of this process, and similar accounts appear in the writings of philosophers, travelers, poets, and others in ancient, medieval, and even early modern times.

It is a noteworthy fact that at the present time the Arab, Persian, and Indian divers quite generally believe that at certain seasons the pearl-oysters come to the surface in the morning, open their shells, and suck in or imbibe in some way a dewdrop or rain-drop, which, suffused with sunlight, is slowly transformed into a lustrous pearl. The American consul at Aden recently reported that the scarcity of pearls in the Red Sea was ascribed by the Arabs to the fact that little rain had fallen for several years.

We now know that almost any kind of foreign body—whether a grain of sand, a bit of mud or shell, a piece of seaweed, or a small animal—may by its irritation cause the mollusk to cover it with nacre and make it the nucleus of a pearl. The pearly matter is slowly deposited in definite layers, and the growth of the pearl continues indefinitely.

But if the annual supply of pearls depended on the foreign bodies accidentally gaining entrance into the cavity of the pearl-oyster, there would be no great pearl-fisheries, and pearls would not be the highly prized, costly gems they are.

It has now been pretty definitely established that the great bulk of the annual pearl crop of the world—probably ninety per cent of it—represents animal parasites which normally pass a part of their life-cycle within the pearl-oysters, and during that period, becoming encapsuled in the tissues of the mollusk, are in time covered with a nacreous coat, owing to the irritation they impart to the oyster. It was not until the middle of the nineteenth century, however, that the parasitic origin of pearls was proposed and established,

and some of the earliest research was addressed to the Ceylon pearl-oyster. But it was only during the present century that the true rôle of the parasite and its life history were satisfactorily cleared up.

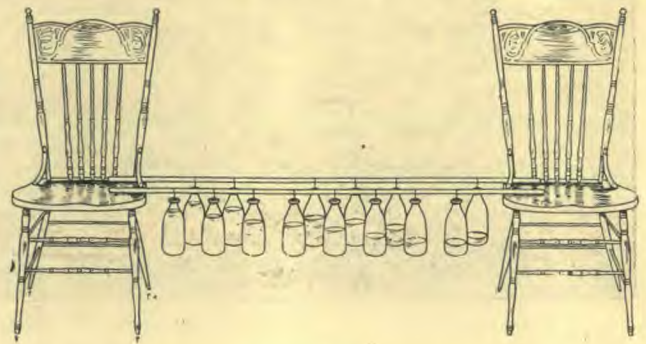
It is now known that the minute spherical larvæ of various marine worms, but particularly of cestodes, enter the pearl-oysters and become more or less embedded in the soft tissues, as many as forty of these larval worms having been found in one Ceylon pearl-oyster. As a result of the irritation caused by a larva, the oyster forms a protecting epithelial sac about the intruder, and then, if the latter dies, its mass is gradually converted into carbonate of lime, pearly nacre is secreted by the contiguous epithelium, and the growth of the pearly mass proceeds with the growth of the shell, which is formed in the same way.

We are thus prepared to accept the well-known saying of a celebrated French investigator, that "the most beautiful pearl is in reality only the brilliant sarcophagus of a worm."—*Hugh M. Smith, in National Geographic Magazine.*

An Old-Bottle Piano

YOU can probably find sixteen or eighteen empty bottles, and I am going to tell you how to make a bottle piano, on which you can play real tunes, and which will give you any amount of fun, says a writer in *Cassel's Little Folks*.

You will require two poles,—broom handles will do,—two chairs, the bottles, and some water. Place the two poles across the chairs and suspend the bottles from them, using pieces of string with double loops. If the bottles are all the same size, you



obtain the different notes by pouring water into them; the more water you pour into a bottle, the lower the note will be. But if the bottles are of different shapes,—and there is no reason why you should not hang up all the empty bottles you can lay your hands on,—upon striking them with a stick you will find that each bottle gives forth a different note, and can be tuned by pouring in a little or a lot of water, according to the note required. If the bottles are all alike, you will pour a little water in the first bottle, a little more in the second, still more in the third, and so on until the eighth is almost full. On the second pole you can get in the sharps and flats, and if you wish you can add a third pole, and go an octave higher by using smaller bottles.

For playing the bottle piano, use a wooden stick or cane; for quick tunes, use two sticks, one in each hand; and for still faster work, two performers are required, one on each side of the piano.

A little practise will enable any girl or boy to play quite a number of tunes upon the bottle piano.—*The Family.*

Little Miss Bee

W. S. CHAPMAN

CURLED up in a tiny little house made of wax, about three fourths of an inch in length and a third as much in width, and hanging suspended below a lot of other cells all attached to an upper cover of a queer wooden box, or house, lay a pretty little creature just recently hatched from a wee little egg dropped by her mother into the wax house, or cell, as she passed from cell to cell, filling them with eggs holding her young larvæ.



QUEEN-CELL

Three days had passed since Mother Bee dropped Baby Bee in its cell, and the little creature was just beginning to examine her surroundings and taste the nice food prepared for her, which she found lying at the bottom of the cell. For nine days after, she did no more than eat and sleep.

Every day big Worker Bee came to the mouth of the cell, and laughing in bee fashion, dropped into it for Baby Bee to eat a tiny bit of jelly-like food called royal jelly. And my! my! how that child grew, uncurling each day and straightening out upward until her body completely filled her six-cornered home.

By this time Baby Bee's head was nearly even with the top of the cell, and she spent most of her waking moments critically examining her surroundings, although not a ray of light ever was seen in the chamber which, to Baby Bee's eyes, seemed so vast and deep, except a small beam of light far down at the floor, evidently an opening, where she could see great big bees, like the one who fed her, scurrying in and out as fast as their small legs and wings would let them.

One thing seemed to be a puzzle to her, and that was a constant b-r-r-r sound, but this she afterward learned was the noise made by hundreds of pairs of wings of worker bees whose duty it was to keep their wings going rapidly day and night to produce a strong current of air, and so keep it pure and of an even temperature. This enabled the young in the eggs to hatch out safely, and prevented the wax cells from melting.

Baby Bee, with her great wondering eyes, gazed, no doubt, in awe at the vast dome of cells above her own, scores upon scores, some new and clean, others black with age, all filled, apparently, with food or young bees. Hour after hour she would crane her little neck, I suppose, turning her head from side to side while watching the worker bees as they crawled over these cells and performed their allotted tasks, some depositing honey, others feeding the young, and still others repairing old cells or making new sections. Then she could look below at the hurrying crowds coming and going at the opening where the beam of light entered, amazed, I presume, at the haste and bustle shown everywhere and the spirit of work that actuated the working bees.

On the ninth day came big Worker Bee as usual and

fed her, but afterward lingered at her side. If your ear had been rightly tuned to hear bee talk and your mind able to translate it, this is what you might have heard Worker Bee say to little Miss Bee, as she gently stroked her with her antennæ:—

"Honey-Lump, it's time now that you began to prepare for presentation, in the blue chamber which you see below, as queen of the hive; for you come of royal blood, my child, and your mother is a genuine Italian queen of the purest strain. This is why I have fed you on the costly food, royal jelly, that it might build you up into a perfect queen like your mother. Common bees like me, or the drones, are never permitted to touch this food. Should we use it we would become useless as workers and attendants on the queen.

"Now, Honey-Lump, I am ordered to shut you up in your cradle home for a week to give you time to change your clothes and prepare yourself for your exalted station as our future queen. The coat you now wear is not a very becoming one, nor adapted for use in the blue chamber, being more in the style of a night-dress; but underneath that you wear a lovely jacket all jeweled, and a charming skirt, gathered in at the waist, as well as cunning little pantalets.

"Altogether, you are a sweet little bee, and the whole hive is anxiously waiting for you to make your début; so, my little future queen, spin your cocoon, crack off the old gown, and be prepared to go with me when I call for you a week from to-day."



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WORKER

QUEEN

DRONE

While faithful Worker Bee was gently but firmly sealing over the top of Baby Bee's cell, she was vainly trying to poke her little nose over the side to see what was going on away down on the floor of the hive, because while Worker Bee had been explaining the reason for sealing her in, a great commotion had begun below. To quiet the child the worker, perhaps, explained:—

"Your mother, the present queen, is about to leave the hive and set up her court in a new locality. This she determined upon as soon as I reported your birth to her, and announced that our baby queen was perfect in every way, and soon would appear in the blue chamber.

"In her farewell speech, your mother is explaining that for many reasons it is not advisable to have two queens in a hive at the same time. She advises all the young worker bees to remain in the hive to carry on the necessary work, care for the hatching bees, and to keep the temperature of the hive at the right degree.

"Now, Honey-Lump, I'll hold the lid up just a trifle so that you can see the mother queen leave the hive. You can pipe to her a 'Good-by' if you wish, not too loud, else she will think you are in trouble and fly back to your help.

"What's that you ask, Honey-Lump?"

"Are there any other baby queens here but me?"

"Why, yes, there are about fifteen others."

"If I am to be queen, what will become of the others?"

"If you hatch out first, you will be queen, and then it will be for you to say what the fate of the others will be."

"I'll kill every one of them. I won't have any rivals!"

"O! you young savage! Put your head in now and let me seal you up so you will be the first queen out."

At the end of the fifteenth day from her birth, our little Baby Bee had grown quite large, had broken open her larva coat and was anxiously waiting for release from her prison home. Hearing nothing from Worker Bee, she began nibbling at the sides of the top of the cell, slowly turning and nibbling, turning and nibbling, until about seven eighths of the entire edge had been broken loose. Suddenly, as her head pressed upon the lid, it gave way and dropped down, swinging by the edge that had not been gnawed through.

Gleefully wriggling out of the cocoon she had spun and out of the opening, the little creature stood upon the edge of the cell a brilliant and beautiful full-grown Italian queen bee.

O, how hungry she was! After fasting for so long a time she ate ravenously of the food she found stored in the cells. Her hunger satisfied, she evidently understood that she was now to act as queen of the hive, and proceeded to make sure of her position by attacking each cell that was hung lower than the great mass of cells and contained a baby queen. With a fierce cruelty, dreadful to witness in so beautiful and so young a creature, she would force an opening in the side of the cell, seize the poor little defenseless occupant and sting it to death, striking the blow at the narrow waist where the body joined the thorax.

Fourteen of these little creatures had fallen, victims of her rage, when turning a corner in the hive, she must have been greatly startled to meet another young but full-grown queen, which had left her cell shortly after our Baby Bee had taken possession of the hive. Evidently each realized that a struggle for supremacy must come, and that one must die. Slowly they circled around each other, watching, closely watching, for an opening to rush in and sting before being harmed herself.

At last the moment came, but both made a rush, and each had an advantage over the other. In a second more both of them would have dropped, stung to death, but the worker bees watching the combat, separated them, it being a law among bees that when the advantage is mutual in a combat, with a prospect of death to both queens, thus leaving the hive without a queen, the combatants must separate and try it over again.

And so these two beautiful creatures, filled with rage and hatred, slowly separated, eying each other closely, waiting for the auspicious moment to arrive. At last, quick as a flash, the queen bee darted forward, caught her adversary and delivered the fatal blow, her opponent dropping dead at her feet. Then those worker bees that had been engaged in carrying

out the bodies of the baby queens that had been stung to death in their cells, came forward, and lifting the body of the dead queen, dropped it to the floor below, then pushed it through the opening, when it rolled off the landing and fell into the grass below the hive.

And now, with none to dispute her authority, our beautiful Italian queen descended into the blue chamber, where all the drones, her future husbands, for a bee queen has many, were waiting her arrival; and I suppose that a reception was held, all bowed before her, and promised to love and serve her faithfully. How her little heart must have beat with joy and pride as she looked over that assembly of young and handsome drones, all so large and dignified, and reflected that they were so devoted to her and her interests that their lives were soon to be given as a forfeit because of their loyalty.

Of course her heart would naturally go out to them in love and affection, so we see her and her husbands soon busily preparing for the wedding trip outside, where all the courtships and marriages take place in the air as the queen bee flies in and out among the drones. Alas for these lover husbands! their infatuation for their queen proves their undoing; for each one, as he whispers his love in her ear, is stricken with death, and falls to the ground a corpse.

The queen bee soon perceives that she is about to become a mother, and seeks the hive again, where she busies herself dropping her eggs in the various cells where they belong, every fertilized egg producing either a queen or a worker, the unfertilized hatching out the drones.

While all this has been going on the worker bees have been busy day after day gathering honey for the winter food, and wax to manufacture additional cells. As the honey season draws to a close, the working bees notify the drones that are yet in the hive, and which never work, that they will not be supported any longer, and order them to leave. In sorrow, no doubt, and possibly with cries of despair, they crawl out of the hive, and perhaps on the edge of the platform "bunch up," that is, hold onto one another, until the mass may become like a round ball as big as your fist. In this way the poor things hang until, killed by hunger, they fall to the ground.

And at this time, too, will be seen the old faithful worker bees, which have furnished the comb and the food, nursed the young, and performed all the work of the hive for six weeks, now, nearly four months old, with wings worn and little better than stumps from excessive flying to and fro in carrying honey and wax, prepare to commit suicide, and so rid the hive of their presence. Slowly, and tottering in feebleness, they crawl to the opening and fall to the ground, going out into the grass as far as their failing strength will permit, where they die, unlamented by the young brood they served so patiently. Indeed, many a faithful old worker on her way out is dropped upon and killed by these heartless young occupants of the hive. This was the sad fate of our dear old Worker Bee that cared for Baby Bee so well and tenderly. As she crawled painfully toward the entrance, she turned to take one last look at the royal queen, the child of her care, which was too busy among the cells to notice her departure, when a young worker bee sprang upon her, stung her savagely, and she sank down in death at the door. Poor old faithful Worker Bee!

"QUIET and peace reign where justice rules."

Budded Stock

ALL but the oldest of California orange groves are "budded stock," which means that the seed of the common orange is planted, and the little seedling of a foot high is inserted into a slit near its base a bud of Washington Naval or Valencia. As soon as this bud has "set," or begun to grow, the seedling is topped, and later it is sawed or cut off completely just above the bud, which in time almost covers the scar. The old root and sap make fruit, luscious and marketable.—*Selected.*

How Paper Came to Be Invented

LONG years ago a little, thin Japanese gentleman walked through his pretty garden to his home; his hands were clasped behind his back, and he was thinking, as he crossed the bridge to pluck a fresh wistaria blossom that hung just over his head. This little gentleman had a great many parcels to send out from his shop every week, and he had always wrapped them in silk; but this was an expensive material, and he wanted something cheaper to use for this purpose. All at once a wasp came liting toward him, but he thrust it away that it might not nip his nose, and—lo!—there at his hand was a wasp's nest. My, but he came very near angering the whole family! Think, then, what he might have suffered from these stingers for days to come! What a shapely nest they had made, now he came to think of it! It was so strong, too! It was made of thin wood pulp, softened into a thin paste by the jaws of the insect, then formed and left to dry.

"Why can't I do that same thing?" thought the Japanese merchant to himself. "Get certain wood, form it into a pulp, by means of water from the river near by, and make something like this wasp's nest in consistency, to wrap about my packages." So this was the way paper was first discovered. An innocent wasp flew across the path of a gentleman who walked one day in a vine-clad garden in old Japan.—*The Pilgrim Visitor.*

Heroes of Medicine

SIR GEORGE TURNER was the medical officer in Cape Colony who for twelve years rendered services to the cause of humanity which have never been adequately recognized, except by very few. It was he who completed the system of inoculation against the rinderpest, begun by Dr. Koch, and produced a curative and preventive serum. It was he who, during the Boer war, when the ravages of typhoid were so severe, undertook, at Lord Roberts's request, the supervision of the military hospitals and concentration camps at constant risk of his own life. Finally it was he who, coming across a leper asylum at Pretoria, with about fifty Dutch and forty native patients, gave all his spare time to work among the poor creatures, doing all he could to alleviate their lot, prosecuting tireless research into the nature of the disease. He virtually lived with them in order that he might better study the disease, in order that he might hand down his discoveries to posterity.

Among the New-year's honors conferred by King George of England was the granting of knighthood to Dr. George Turner.

But Sir George Turner is now a leper. He contracted the disease in trying to relieve the suffering of

others, men and women whom he scarcely knew. Already his right arm is useless. He is living in solitude, compiling the information which he has gathered. Knighthood is small reward for him. Proportionate reward can never come to him in this life.—*Washington Post.*



M. E. KERN
MEADE MACGUIRE
MATILDA ERICKSON

Secretary
Field Secretary
Corresponding Secretary

Society Study for Sabbath, May 31

1. OPENING Exercises (fifteen minutes).
2. Bible Study (fifteen minutes).
3. Mission Study (fifteen minutes).
4. Social Meeting (fifteen minutes).

Suggestions for the Program

1. Review Morning Watch texts; prayer; minutes; special music; report of work.
2. Success in the Christian Life, No. 7. We must constantly resist temptation. Rom. 12: 21. The principle of successful resistance in the realm of thought is given in Phil. 4: 8; of word, in Prov. 15: 1; and of deed, in Rom. 12: 20. Deut. 13: 6-10 speaks of temptation which comes through associates. 1 Sam. 17: 16, 10, 11, illustrates how the enemy persists when we are afraid. Isa. 50: 7; James 4: 7; Zech. 3: 1-4.
3. Our work in the West Indies. "A Review of 1912," showing the progress our work has made in that field during the year. Make the article in the INSTRUCTOR on "Our Work in the West Indies" the basis of the mission study, but add to this items of interest concerning the work there gleaned from other papers. If possible, have a map.
4. For suggested topic see Matt. 4: 4, 7, 10. Have we not been successful so far as we have practised Christ's method of resisting temptation?

Missionary Volunteer Reading Courses

Senior No. 6 — Lesson 33: Review of "The American Government"

NOTE.—Select five questions from those given below, write out your answers, and forward your paper to your Missionary Volunteer secretary. This review completes our present course. We hope to welcome you next fall, and others whom you have interested in joining the Reading Course.

1. MENTION some of the President's duties and responsibilities. What provision is made for succession in the presidency in case of vacancy? In general, what offices does the Treasury Department perform?
2. What is the strength of the United States Army? the Navy? Outline the activities of the bureaus of the Department of the Interior.
3. State what services the Geological Survey renders. Show that the Department of Agriculture and the Weather Bureau are of practical benefit to the people of the States.
4. Describe briefly the functions of the different branches of the Department of Commerce and Labor. How does the work of the Bureau of Standards concern the layman? State how the government seeks to promote health.
5. Give an idea of what the Smithsonian has done and is doing. What benefits will the completion of the Panama Canal bring? What supervision has the Interstate Commerce Commission?
6. Outline the government of the Philippines. How is the membership of the House fixed? What power is vested in the Senate? For how long are senators elected? representatives?
7. What are the powers of the Supreme Court? Of what does the United States judiciary consist? What are the duties of the Department of Justice?
8. Why was the Pan-American Union organized? How is the District of Columbia governed?

Our Work in the West Indies

THE West Indian Union Conference embraces all the islands of the Caribbean Sea, beginning with Cuba, all the way down to Trinidad; all of Central America,

Colombia, Venezuela, and British and Dutch Guiana. The union consists of conferences and mission fields. The conferences are Jamaica, Central America, West Caribbean, and South Caribbean; the missions are Cuba, Haiti, Porto Rico, Santo Domingo, East Caribbean, Venezuela, and the Guianas. The principal languages spoken are English, Spanish, French, Danish, and Dutch.

The headquarters of the union are located at Riversdale, Jamaica, where the *West Indian Watchman* and the *West Indian Messenger* are published. About two years ago, when our publishing house burned at Cristobal, Panama, the press was moved to Jamaica, and is well established there now. They have an excellent plant for printing our papers. Much good is done throughout the union by the sale of the *Watchman*. Some of our brethren are very faithful in selling papers, though in many of the islands, where the people are exceedingly poor, it is difficult to collect the three cents, the price of the paper.

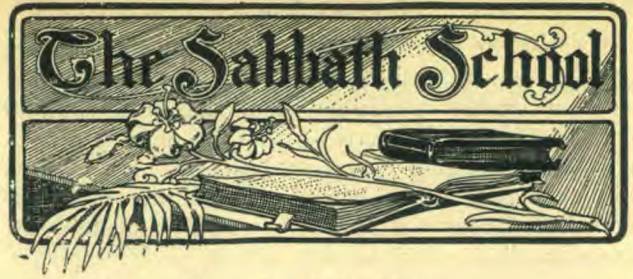
Quite a number have been brought to a knowledge of the truth by reading the *Watchman*. In some instances it takes a long time for persons to decide, but in other cases they see the truth very quickly. About a year ago I baptized a man at St. Thomas who had been reading the *Watchman* eight years before he took his stand. For a number of years he would stand outside the church every Sunday to hear the truth; later he came inside, and finally accepted it.

Not long ago a man and his wife came to meeting one Sunday night and heard a lecture on Daniel 7, and in less than three weeks they accepted the whole message and were ready for baptism. This young man has a fairly good education, and is now planning to attend one of our schools to prepare himself for the Master's service.

One day while traveling on a steamer, I met a Methodist minister, and in our conversation I told him that I was a Seventh-day Adventist minister. Then he said: "I must tell you of a boy on my island. His parents are members of my church, and they called me one day to come and see what I could do with their son. They said, 'He has received some Adventist literature and it has turned his head, so that he is keeping Saturday for Sunday.' They had done all in their power to have him give up this notion, but failed, and so they sent for me. I have tried my best to turn him away from it, but I can do nothing with him." I said, "Thank the Lord for such a truth, which is able to keep a young man [he was then about seventeen years old], who is all alone, against such strong opposition!" He is now doing what he can to sell our paper on that island. Some time ago it was my privilege to visit this young man, and I found him a bright young fellow, with a good experience, and he loves the message. His earnest desire is to attend one of our schools so as to prepare himself for better service. He needs only about seventy-five dollars to pay his passage to the school, and when there he will be able to work his way through.

In many of these islands and countries a good work is being done, and every year hundreds are added to our number, for which we praise the Lord. But there are still many places where the truth has not entered, and where it must go before the Lord comes. We know that there are many more honest souls who will accept the last message of warning, and our earnest prayer is that God will raise up a great army of our young people to enter his vineyard already white for harvest.

H. C. J. WALLEKER.



IX — Jacob in Haran

(May 31)

LESSON SCRIPTURE: Gen. 29: 1-26; 31.

HELPS: "Patriarchs and Prophets," chapter 17.

MEMORY VERSE: "With what measure ye mete, it shall be measured to you again." Matt. 7: 1.

Questions

1. To what place did Jacob come in his journey? Gen. 29: 1; note 1.
2. What did he find in the field? What were lying by it? Why were they there? Verse 2.
3. When all the flocks were gathered, what was done? Verse 3.
4. What questions did Jacob ask the shepherds at the well? What was their reply? For whom did Jacob then inquire? What did the men say? What further information did he gain? Verses 4-8; note 2.
5. While Jacob was talking with the shepherds, who came to the well? What was her work? How did Jacob assist at the well? How was Rachel related to Jacob? What did he say to her? When Rachel learned who the stranger was, what did she do? Verses 9-12.
6. What welcome did Jacob receive from Laban? How long did he remain as a visitor? Verses 13, 14; note 3.
7. What question did Laban ask Jacob? How many daughters had Laban? What is said of them? What was the name of the elder? Which one did Jacob love the better? In what way was he willing to prove that he loved her? Verses 15-18; note 4.
8. What did Laban say to Jacob's proposition? How did the seven years of labor seem to Jacob? Why did the time seem short to him? Verses 19, 20.
9. How did Laban deceive Jacob? What excuse did Laban give for his deception? Verses 22-26.
10. How long did Jacob work for Laban? How faithfully did he labor? Gen. 31: 38-40; note 5.
11. Though Jacob was so faithful, yet how did Laban treat him? Verses 4-7. Had Jacob ever been a deceiver? Repeat the memory verse.
12. What did Laban's unjust treatment cause Jacob to do? Verses 17-21. Who told him to return to Canaan? What promise was given him? Verse 3.
13. When Laban knew that Jacob had fled, what did he do? What warning did he receive? Verses 22-24.
14. When Laban overtook Jacob, what did he say? What effort did he make to recover the stolen images? Verses 25-34.
15. What points in his history did Jacob review before Laban? Verses 36-42.
16. What covenant was made between Laban and Jacob? Verses 43-46, 51-53.
17. What did Jacob then do? Describe the parting scene that took place the next morning. Verses 54, 55.

Notes

1. "With a new and abiding faith in the divine promises, and assured of the presence and guardianship of heavenly

angels, Jacob pursued his journey to 'the land of the children of the East.' But how different his arrival from that of Abraham's messenger nearly a hundred years before! The servant had come with a train of attendants riding upon camels, and with rich gifts of gold and silver; the son was a lonely, foot-sore traveler, with no possession save his staff."—*"Patriarchs and Prophets,"* page 188.

2. "Wells are still the spots where the youth and girls of Bedouin life congregate. The Syrian girl, especially if a Druse or a Christian, unlike the secluded daughters of the towns, is frequently entrusted with the care of her father's flock. The well, the most precious of possessions, is carefully closed with a heavy slab until all those whose flocks are entitled to share its water have gathered. The time is noon. The first comers gather and report the gossip of the tribe. The story of Jacob and Rachel is, in its most minute details, a transcript of the Arab life of to-day."—*Tristram's "Natural History of the Bible,"* page 142.

3. "Like Abraham's servant, Jacob tarried beside a well, and it was here that he met Rachel, Laban's younger daughter. It was Jacob now who rendered service, rolling the stone from the well, and watering the flocks. On making known his kinship, he was welcomed to the home of Laban. Though he came portionless and unattended, a few weeks showed the worth of his diligence and skill, and he was urged to tarry. It was arranged that he should render Laban seven years' service for the hand of Rachel."—*"Patriarchs and Prophets,"* page 188.

4. "In early times, custom required the bridegroom, before the ratification of a marriage engagement, to pay a sum of money or its equivalent in other property, according to his circumstances, to the father of his wife. This was regarded as a safeguard to the marriage relation. Fathers did not think it safe to trust the happiness of their daughters to men who had not made provision for the support of a family. If they had not sufficient thrift and energy to manage business and acquire cattle or lands, it was feared that their life would prove worthless. But provision was made to test those who had nothing to pay for a wife. They were permitted to labor for the father whose daughter they loved, the length of time being regulated by the value of the dowry required. When the suitor was faithful in his services, and proved in other respects worthy, he obtained the daughter as his wife; and generally the dowry which the father had received was given her at her marriage."—*Id.*

5. In Jacob's time it was necessary for shepherds to watch their flocks day and night. Robbers or wild beasts might do great damage to flocks that were not thus protected. Jacob had many helpers while caring for the flocks of Laban, but he was called to strict account if any were missing, and he bore the loss. The life of Jesus on earth is compared to that of a shepherd, and he exercised the traits of character manifested by a faithful shepherd in his tender care and compassion for those who could not help or save themselves.

IX — The Cleansing of the Sanctuary

Questions

(May 31)

1. At the sounding of the seventh trumpet what announcement was made by "the four and twenty elders"? Rev. 11:18.

2. What indicates that during the sounding of this trumpet the mediation of Christ is carried forward in the most holy place of the heavenly sanctuary? Verse 19; note 1.

3. In the final proclamation of the gospel what special reason is given for urging all to fear God and give glory to him? Rev. 14:6, 7.

4. What view of the judgment was given to the prophet Daniel? Dan. 7:9, 10.

5. What further particulars are given concerning this judgment scene? Verse 13.

6. What other prophetic view of the judgment connects it with the heavenly sanctuary? Mal. 3:1-3; note 2.

7. In the typical service how often did the high priest go into the most holy place of the sanctuary? Heb. 9:3, 7.

8. What was this day called? and what was done on this day? Lev. 16:29, 30, 34.

9. What was done for the sanctuary on this day? Verses 15, 16.

10. What prophecy determines the time for the anti-

typical day of atonement, for the final judgment, and for the cleansing of the heavenly sanctuary? Dan. 8:13, 14; note 3.

11. Of how much importance was it that the people should know the time for the cleansing of the earthly sanctuary? Lev. 23:27-29; note 4.

12. During the time of the judgment and the cleansing of the heavenly sanctuary, what gospel message is proclaimed to all the world? Rev. 14:6-12.

13. What constitutes a part of this message? Rev. 14:8.

14. What indicates that this part of this message is to be given with great power before the work closes? Rev. 18:1-3.

15. What call is made to all the true people of God? Verses 4, 5.

16. While the cleansing of the sanctuary in heaven is going on, what corresponding work must be done on earth? Ans.—The cleansing of the church. Compare Eph. 5:25-27 and 1 John 1:9; note 5.

Notes

1. The ark of the covenant was in the most holy place of the sanctuary (Heb. 9:3, 4), and was invisible while the ministration was being carried forward in the holy place. That it became visible when the temple was opened under the sounding of the seventh angel, shows that the ministration had been transferred from the first to the second apartment of the heavenly sanctuary.

2. The coming to the temple mentioned in this scripture and the coming of the Son of man to the Ancient of days mentioned in Dan. 7:13 are the same. This is clear from the connection, which shows that in both cases the judgment is under consideration.

3. The time of the judgment was definitely determined in the councils of heaven. Acts 17:30, 31. When that time arrived, a world-wide message was to be given which would make the fact known to all. Rev. 14:6, 7. The judgment is closely connected with the mediatorial work of Christ in the heavenly sanctuary, and constitutes the closing feature of that work. In order that the believers may enter in by faith with their High Priest into the most holy place of the heavenly sanctuary, the knowledge of his mediation in their behalf is restored to them after the long period during which it is shut away from them by the false system of mediation, while "that man of sin" occupies the temple of God and attempts to take the place of God. At the close, therefore, of the twenty-three hundred years of the prophecy a message is given which announces that "the hour of his judgment is come" and at the same time exposes the work of the Papacy and directs the attention of the people to the mediation of Christ in the most holy place of the heavenly sanctuary as his final work for sinners before he comes in the clouds of heaven.

4. "In the typical service, when the high priest entered the most holy place, all Israel were required to gather about the sanctuary, and in the most solemn manner humble their souls before God, that they might receive the pardon of their sin, and not be cut off from the congregation. How much more essential in this antitypical day of atonement that we understand the work of our High Priest, and know what duties are required of us."—*"Great Controversy,"* page 431, revised edition.

"The subject of the sanctuary and the investigative judgment should be clearly understood by the people of God. All need a knowledge for themselves of the position and work of their great High Priest. Otherwise, it will be impossible for them to exercise the faith which is essential at this time, or to occupy the position which God designs them to fill."—*Id.*, page 488.

"We are now living in the great day of atonement. In the typical service, while the high priest was making the atonement for Israel, all were required to afflict their souls by repentance of sin, by humiliation before the Lord, lest they be cut off from among the people. In like manner, all who would have their names retained in the book of life, should now, in the few remaining days of their probation, afflict their souls before God by sorrow for sin, and true repentance."—*Id.*, page 490.

5. "While the investigative judgment is going forward in heaven, while the sins of penitent believers are being removed from the sanctuary, there is to be a special work of purification, of putting away of sin, among God's people upon earth. This work is more clearly presented in the messages of Revelation 14."—*Id.*, page 425.

THE highest flight yet reached by an aviator is that accomplished by M. Perreyon, who on March 11, 1913, reached the altitude of 19,684 feet.

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A Trip to a Fixed Star

R. DAVID GILL, lecturing on "Fixed Stars," hit upon the following adroit method to illustrate the distance to Centauri. The doctor said, as reported in the *Boston Globe*:—

We shall suppose that some wealthy directors, for want of outlet for their energy and capital, construct a railway to Centauri. We shall neglect, for the present, the engineering difficulties,—a mere detail,—and suppose them overcome and the railway open for traffic. We shall go further, and suppose that the directors have found the construction of such a railway to have been peculiarly easy and that the proprietors of interstellar space had not been exorbitant in their terms for right of way. Therefore, to encourage traffic, the directors have made the fare exceedingly moderate; namely, first class at two cents per one hundred miles. Desiring to take advantage of these facilities, a gentleman, by way of providing himself with small change for the journey, buys up the national debt of England and of a few other countries, and presenting himself at the office demands a first-class single ticket to Centauri. For this he tenders in payment the scrip of the national debt of England, which covers just the cost of his ticket; but at this time the national debt from little wars had been run up from \$3,500,000,000 to \$5,500,000,000. Having taken his seat, it occurred to him to ask: "At what rate do you travel?" "Sixty miles an hour including stops," is the answer. "Then when shall we reach Centauri?" "In 48,663,000 years, sir."

The Runaway Sun

THE brilliant star in the constellation Bootes, Arcturus, is so much brighter than our sun, that, could we remove our sun to an equal distance, it would require a fairly powerful telescope to show it as a faintly glimmering star of about the tenth magnitude. Could we be removed one hundred forty thousand times farther from our sun than we are now, then would our sun appear to us about as bright as Arcturus; while if we increased our distance the same amount from this stellar giant, the difference in his brightness would probably not be appreciable, for Arcturus is eleven and one-half million times farther than one hundred forty thousand times ninety-three million miles. His brightness has been computed (assuming that a given area of his surface gives out the same amount of light as an equal area of our own sun) to be about five hundred fifty-eight thousand times as bright, and that in size he is more than a million times as large as our own sun. His heat is about proportionate to his light, and, if we were placed as near Arcturus as we are to our own sun, the very rocks and metals would melt and turn to vapor like a drop of water in a sea of fire.

In addition to all this, Arcturus is a runaway. That is, his velocity is so great (nearly four hundred miles a second) that the combined attraction of all the stars we know can not stop him nor swerve him from his course; no, not even if the universe is many times larger than the wildest conceptions of astronomers. And this magnificent globe, with its attendant worlds, is sweeping majestically on, passing through our universe for the first time. How grand the words we find in Holy Writ: "Canst thou guide Arcturus with his sons?" Job 38:32.—*Selected.*

Eyestones



If you will go to the pond and find a snail and look on the under side of its foot, you will observe a little, hard plate. When the snail draws itself within its shell, it uses this plate to close the opening; so it is sometimes called the "front door" of the snail. Along the coast of South America there are similar tiny mollusks with minute front doors, or opercula, as they are scientifically called. These stones are called eyestones, since they are of service in removing foreign substances from the eye. They are flat, rounded stones, with concentric grooves on one side, which collect and retain offending substances in the eye as the pressure of the eyeball moves the stone about.

There are natives that make a business of collecting the mollusks for the purpose of securing the opercula for eyestones. Sailors on the vessels plying between North America and South America purchase these and sell them to our druggists.

What Caused the Burning of the Ship



OUR table salt and baking-soda are among the most interesting of chemical substances, the first being sodium chlorid, NaCl, and the second sodium bicarbonate, NaHCO₃. They are both composed of the metal sodium (Na) as a base. Sodium is a white metal of a brilliant luster, and light enough to float on water. It has such a strong liking for water that it must be kept constantly under naphtha, a liquid containing neither water nor oxygen. If it comes in contact with water, especially warm water, it will burst into flame, as it decomposes the water and unites with the oxygen, setting the hydrogen of the water free. But the heat evolved in the process is so great that the hydrogen is set afire, also the sodium.

A great sea disaster, the destruction of the steamship "Hardy," with its cargo, occurred because the captain did not understand this characteristic of sodium. "The cargo of the 'Hardy' consisted of metallic sodium in cases, and of mineral waters. Some of this water reached the sodium and set a quantity of it on fire, and the captain, not understanding the nature of sodium, ordered the hose played upon it. As a result, two tons of it were set on fire, and several explosions followed. Nonplused, the captain then ordered all the cases thrown into the sea. Some of the first of these cases exploded, others were thrown back onto the deck in a fiery condition by the explosion, the vessel caught fire, and a terrific explosion of the cases still in the hold caused the vessel to break amidships and sink."

"Do what you ought, let come what may."