MEASURING THE STARS.

The Part That Photometry Has Played in Astronomy.

A Million Observations With a Single Instrument—Magnitudes of Some Familiar Planets—Some Delicate Work Done by Scientists.

One of the most important and interesting departments of astronomy—as well as one of the least known popularly—is the measurement and recording of the comparative magnitude of the stars—a task which has been carried on, doubtless, since the very beginning of astronomical science. In this reckoning of magnitude, which is known as photometry—the measurement, that is, of starlight—it is interesting to note that an American astronomical establishment stands among the first, if not as the very first, in the world, photometry having been for years one of the principal subjects taken up by the Harvard Observatory, both in Cambridge and at Arequipa, Peru, and the results of the work which it has accomplished having been accepted as standard all over the world.

The first star catalogue, giving 1,080 stars, was published by Hipparchus in the year 125 B. C. It has come down to us through Ptolemy of Alexandria, who nearly 300 years later, in 140 A. D., produced his "Megale Syntaxis"—the "Almagest," of the Arabian and Moorish astronomers—which, either directly or through the corrected catalogue that was based on it by the Persian astronomer, Abd-al-rahman al-Sufi, was the world's standard until Ulugh Bleigh brought out a new catalogue at Samaracand about 1450 A. D. The famous catalogue of Tycho Brahe—the last of the medieval, or the first of the modern, astronomers—in 1580, was the last important catalogue produced without the aid of the telescope.

Hipparchus and Ptolemy arranged the stars in six classes, the first class comprising the brightest—about 20 in all—while the sixth class contained those which could just be made out by the naked eye. After the telescope came into general use magnitudes were extended downward as fainter stars were brought into view by the increasing power of the instruments employed. For many years each astronomer used his own scale, Herschel at the Cape of Good Hope especially using very high numbers—a tendency that has been so reduced since his time that his 20th magnitude is very nearly the 14th on the scale now generally employed. This scale more closely corresponds with that of Argelander, the great German author of the "Durchmusterung," or catalogue of the stars in the Northern heavens, which enumerates over 324,000 stars; the largest number yet catalogued.

Each magnitude, of course, has its typical stars to which the others may be conveniently referred. The stars which do not exactly correspond in magnitude with a typical star are expressed in fractional terms of the nearest magnitudes, decimals being usually employed, although Ptolemy and even Argelander used thirds. Employing the decimal system, a star of 5.4 magnitude will be a shade brighter than a star of 5.5 and so on. An exception is that certain stars, such as Arcturus and Sirius, and the planet Jupiter when at his brightest, are more than a magnitude brighter than stars of the first magnitude, Aldebaran, for example, and are therefore expressed in "negative magnitudes," that is to say, they are preceded by the minus sign. Jupiter, for instance, approaches almost the second negative magnitude—minus 2—or is 16 times brighter than a star of the first magnitude.

It is significant of the great accomplishment of American astronomy that there was no universally accepted system of photometry until the publication of what is now known as the Harvard photometry—the "H. P." as it is familiarly called by astronomers. This was contained in Volume XIV of the Annals of the Harvard Observatory, under the title of "Observations with the Meridian Photometer during the Years 1879-1882"—a massive volume giving a list of 4,260 stars in the Northern sky visible to the naked eye in the latitude of Cambridge, and intended to include all stars not fainter than the sixth magnitude between the North Pole and 30 degrees south of the celestial equator. To this original list another, Volume XXIV of the Annals, has since been added. Technically such a piece of work is called a Uranometria, or catalogue of "naked-eye stars." The similar work produced by Prof. Pritchard at Oxford, for example, containing the magnitudes of 2,784 stars thus observed, was entitled "Uranometria Nova Oxoniensis." The Harvard Uranometria was so elaborate and so accurately done that it has been practically accepted everywhere, and the magnitude of all new stars given on the Harvard scale. A striking illustration of the use to which it is now put occurred last spring when the "new" star appeared in the constellation Perseus. Among the observers who gave their results on the Harvard scale were Nijland and Gyllenskold of Sweden, Pereira of the Portuguese observatory in the Azores, the staffs of the British Astronomical Association and the Astronomical Society of France, and the officers of the Radcliffe Observatory at Oxford, as well as practically all American astronomers.

As would be supposed, it takes a trained eye to notice the finer differences in star magnitudes. On the modern scale a first magnitude star would be expressed as ranging from 0.50 to 1.50, a second magnitude star from 1.50 to 2.50, and so on. For instance, Castor which was measured as 1.56 in the "H. P." would be called of the second magnitude, while its twin star, Pollux, the brighter of the Gemini, is a first magnitude star, measured as 1.12. The Pole star itself is a star of the second magnitude, its measurement being 2.15. The six brighter stars in the Pleiades are all of the second and third magnitudes, as are those in the Dipper. The upper star of the two "pointers" in the Dipper—that is to say, the star on the lip opposite the handle—has a measurement of 1.96 in the Harvard photometry. The pointer below has a measurement of 2.60, which would carry it into the third magnitude. The other bottom star of the Dipper has a measurement of 2.56, and the star at the junction of the handle approaches the fourth magnitude, having a measurement of only 3.41, while the star next to it draws near the first magnitude, with a measurement of 1.85. The next star in the Dipper, the second from the end, is really a double star, but the measurement of the two together gives 2.38, while the end star of all is almost a measurement of 2.02.

Of the better known stars no less than six are of the magnitude zero—Capella, with a measurement of 0.18; Rigel, 0.32; Procyon, 0.46; Arcturus, 0.03; Vega, 0.19, and Sirius, minus 1.43. Other well-known stars with their measurements are Algol, 2.31; Aldebaran, 1.20; Betelgeuze, 0.91; Regulus, 1.42; Altair, 0.97; Deneb, 1.47; Antares, 1.06, and Spica, 1.23.

There are comparatively few stars of the first four magnitudes; only 479, according to an estimate by Prof. Simon Newcomb. It would take the light of 1,016 stars from the fifth to the sixth magnitude to equal 12.7 stars of the first magnitude. When it is remembered that the sixth magnitude star is the smallest that can be seen with the naked eye one can better appreciate the magnitude of the sun, especially when one learns that all the stars thus visible are under 6,000 in number and that it would take no less than 4,000,000,000,000 stars of the sixth magnitude to give us the equivalent of sunlight. Yet the sun itself, if seen from Alpha Centauri, probably the nearest of the fixed stars of the seventh magnitude become visible, and with a telescope with an inch aperture, stars of the ninth magnitude come into the field. With a four-inch telescope the twelfth magnitude may be noted, and with a 10-inch telescope, the fourteenth. Theoretically, it would require a telescope with an aperture of 63.10 inches to discern a star of the 18th magnitude, but on account of the increased thickness necessary in lenses of the larger telescopes they never quite equal their theoretical capacity, as compared with the smaller instruments. On the other hand stars of the 20th and even fainter magnitudes have been discerned by means of photographic telescopes, the great Bruce 24-inch doublet now in use at Arequipa having enormously increased the number of stars recorded, but too faint to be made out through the telescope.

The meridian photometer with which the observations for the Harvard photometry were made is still in nightly use in Cambridge. Over 100,000 observations have been made with it up to the present time. It is composed of two telescopes so arranged that the star which it may be desired to measure and another star which is taken as the standard are thrown into the same field by a common eye-piece. By means of a mirror in front of the object glass one of the telescopes is set upon the Pole star—the Alpha Ursae Minoris of astronomers—which is used as the standard not only because it is always visible, but also because it always has nearly the same altitude, its motion being practically imperceptible. Another mirror is adjusted to bring into view the star to be observed, which may thus be easily compared with the Pole star. Since such a comparison, however, would be little better than the method employed by Hipparchus or Ptolemy, a system of prisms is used by means of which four pencils of light, two from each star, are obtained. Two of these are then eliminated and one from each star reduced to the same size: after which, for the purpose of checking the first result, the process is reversed by using the other two pencils of light. When this point is reached the observer notifies an assistant, who is able to read the result in figures by means of a graduated circle, and thus the light of the star under observation is expressed in terms of the Pole star.

In all photometry the light is thus cut off to afford an equal basis of comparison. Different forms of prisms are used as the case requires; and sometimes what is called a "wedge," as by Prof. Pritchard of Oxford and by Prof. Pickering, the director of the Harvard Observatory. In the 12-inch horizontal telescope which Prof. Pickering is now using the observer sits enshrouded in a cylindrical hood of felt. In the telescope is a vertically moving plate of glass on which the wedge or streak has been photographed, grading from clear glass to opaque blackness. The glass is then moved up or down till a place in the wedge is reached that just cuts off the light of the star, the assistant reading and recording the figures registered on a scale outside of the telescope which shows exactly how far the wedge within has moved. To avoid the necessity of two telescopes a little electric light is used as a standard for comparison; but in order that no variations in the brightness of the light may affect the results the mirror at the aperture is from time to time set upon some star whose magnitude has already been measured so that by means of later computations it is possible to get the magnitude of the stars under observation irrespective of the condition of the artificial light since the standard stars will vary from the accepted scale in the same degree as the stars being observed, and the error which is allowed for in one case may be reckoned in another.

The amount of labor required in any extended photometric work is remarkable. At least four observations are made of each star on three nights and in many cases more. The total number of stars in the northern skies which have been measured by the 12-inch meridian photometer at Harvard is 9,233. On 140 nights Prof. Pickering personally made 79,024 observations, or "settings," with this one instrument, and on 29 nights following July 27 of last year no less than 17,824 settings were obtained on 29 clear nights. Since it takes at least a minute to each set of four settings some idea of the sheer amount of time and labor thus involved may be obtained; but the mere observing, while the most important, is by no means the most laborious part of photometry. All observations must be "discussed"—that is to say, computed and finally reduced to the common scale—so that each one of these thousands of settings has required its special series of calculations.

As in so many departments of science, photography, as has been indicated, plays a part in photometry also, although the chief work is still done by the eye as in the days of the first astronomers. In photography the comparative size and clearness of the photographs of the stars on the plates furnish the means of judging the comparative magnitude. At Harvard especially such determinations are an important part of the work of the Observatory where photographing the stars, both in Cambridge and at Arequipa, has been carried to an extent previously unknown to astronomers. On account of the differences in the color of the stars, however, producing various effects on the plate, photography does not always give results directly comparable with those obtained by the eye alone. On the other hand, astronomers are using photographs of the spectra of stars more and more in photometric work, this method having been employed, for instance, by Mrs. Fleming, of the Harvard Observatory, in her studies in Nova Persei, the new star discovered last February at Edinburgh. Here, of course, the advantage of photography in noting stars too faint to be made out visually, even with the strongest telescopes, has none of the disadvantages arising from the confusion caused by color.

It seems unlikely that America, which has now gained the lead in photometry, will relinquish a position that has been so hardly won. Even more extensive work is planned for the future than has been done in the past. By the aid of a recent appropriation from the Rumford Fund of the American Academy of Arts and Sciences, for example, an important investigation has been undertaken jointly by the Yerkes, Lick, McCormick, and Harvard Observatories. Telescopes of 40, 26, 26, 15, and 12 inches aperture are being used—the most complete equipment, probably, that has ever been brought to bear on a single piece of astronomical work. The faintest stars visible have been selected and their light measured with the largest telescopes, while to the Harvard telescopes has been assigned the duty of selecting and measuring brighter stars with which these are to be compared. As Prof. Pickering says in his last report "the friendly spirit in which the directors of these observatories have co-operated argues well for the future of American astronomy."

CREMATION IN ENGLAND.

Perils and Scandals of Burial Promote Municipal Crematories.

At Golders Green, among the open fields to the north of Hampstead Heath, the London Cremation Company has acquired twelve acres of land, which will be set apart for the cremation of the dead. A beautiful chapel is being built, the design of which, by Ernest Yeats, was exhibited at the Royal Academy this year, and the grounds, instead of being a wilderness of gravestones, will be laid out as a pleasantly wooded garden, surrounded by arched cloisters containing niches for the urns and caskets of the departed.

Up to the present all London cremations have had to be performed at Woking, the distance from London making the expense generally greater than that of a funeral. The actual charge for cremation itself is only £5, and as no grave is required and the coffin should be a mere light shell, the cost is not much greater than that of burial. At present, however, only one cremation a day is the average. If there were half a dozen or more the cost might be greatly reduced. The fuel for heating the furnace alone cost 15s., and the cost of labor and materials would not be more than twice as much for five or six cremations in one day. In Hull, where cremation is performed by the municipality, a charge of a guinea is made.

In all cases the remains are reduced to a pure white ash, the heat being so intense that the smoke or noxious gas is given off. The ashes of a full-sized adult person weigh about five pounds, and in bulk would just about fill an ordinary silk hat. After the cremation the ashes are placed in cinerary urns, caskets, or vases, many of which are of most graceful and artistic design. They are in earthenware, white and colored marble, bronze, or copper. Sometimes they are placed in tombs or graves, or in cloistered recesses with suitable inscriptions; sometimes the relatives prefer to take them home, or to have them buried at Woking or elsewhere, or, for sentimental reasons, taken to sea and scattered to the waves. A husband and wife will occasionally leave directions that both are to be cremated after death and their ashes mingled in the same urn.

It was only in 1885, after the Cremation Society had existed for some years, that the use of the crematorium at Woking was first permitted, after strong official opposition. In that year three cremations took place, the body in one case being that of a Brahmin. But since then public prejudice against this form of disposal of the dead has greatly diminished, and last year 300 cremations took place. Probably the new crematorium close to London will bring about a further increase.

The Roman Catholic Church still prohibits funeral rites over persons who are cremated, but many Catholics on sanitary grounds insist on this form of disposal of their remains. In the case of Jews the ashes are taken to the synagogue after cremation for the religious rites, while Church of England and Non-conformist clergymen and ministers generally hold a funeral service at the crematorium chapel.

One of the commonest popular objections to cremation is that it destroys the evidence of poison, and so facilitates crime. The reply to this is twofold. First, only a very limited number of cases of poisoning, these in which one or two metallic poisons have been used, could be detected for more than a short time after burial. Secondly, in every case of cremation a rigid system of certification, both of the fact of death and of its cause, is required. That any doubt is settled once for all, while under the present slipshod system of registration there is no guarantee that the cause of death has been accurately stated in the first instance. The doctor's certificate being given to the family of the patient often glosses over unfortunate facts, such, for instance, as ill-usage or death from alcohol. Proper certification such as is required for cremation would also prevent the dread possibility of the burial of the living.

On sanitary grounds the old system of burial has few defenders. The advocates of "earth to earth" burial point out that by interring the body in a light wicker or other shell will cause it to be resolved into its elements much more quickly than if it were encased in a heavy coffin. But a quickening of the process of putrefaction does not diminish the total amount of contamination of earth and air and water.

To make burial a healthy and sanitary process is impossible where any large number of interments have to be provided for. Whether a body is to be consumed by fire or by slow underground decay the end is the same. By the agency of oxygen it has to be converted into its elements of mineral ash, gases, and water. In an ideal burial a body should be placed in a light, porous soil, sufficiently deep below thoroughly to filter all escaping water before it reaches any underground channel. Then every shower of rain which saturates the soil will sink gradually down, carrying dissolved oxygen and drawing after it, as it drains away, new air from above. Oxidation will go on steadily and no harm will be done.

How different are the conditions in the great cemeteries which encircle London, and among which populous suburbs are springing up! In the first place, most of these cemeteries are in clay soil. Nothing more utterly unsanitary than a clay grave could well be devised. It is a watertight pit, dug in an impermeable soil, filled with broken and permeable material, and with a carpet at the bottom. Sometimes these pits are fourteen or fifteen feet deep, and contain as many as half a dozen super-imposed coffins. The first fall of rain fills the bottom of the pit, the liquid has no escape, and as all dissolved oxygen is at once used up, anaerobic putrefaction of the most intensive type sets up in the body lying in the liquid. No fresh atmospheric oxygen can reach the coffins. When there is heavy rain the grave fills up, and the offensive liquid flows off on the surface to an unknown injury; while in hot dry periods gradually dries out the grave and causes a continual escape of noxious gases into the air. If the grave is drained either at or near the bottom things are little better, for there is no porous soil to render harmless the escaping water, which flows into some channel from which it may do enormous harm.

This is true of a single clay grave, but what of the thousands of nameless dead herded together in the "common" graves of our London cemeteries, often with only a few inches of soil for decency's sake between coffin and coffin? Not a pretence of any protection by the soil can exist in such cases; the whole ground is saturated with corruption. London has now 100,000 burials per annum, enough to cover twelve acres of ground with graves without a footpath between. Practically all these interments take place in suburbs where the population is growing by leaps and bounds. Just as the old churchyards of the city have had to be cleared of their dead, so in a generation or so, unless cremation is soon adopted, we shall be faced with the tremendous problem of clearing Finchley and Highgate, Norwood, Tooting, and Nunhead.—London Times.

WAGING WAR ON MALARIA

Known Facts About Mosquitoes as Carriers of Disease.

What the Scientists Hope to Accomplish Toward Eradicating a Great Evil—A Novel Theory Advanced Regarding Camps of Laborers.

BOSTON, Sept. 28.—A paper of much popular interest, soon to appear in the "Journal" of the Massachusetts Association of Boards of Health, upon the relation of mosquitoes to malaria, has been prepared by Dr. Theobald Smith, of Harvard University, who, under the direction of the State Board of Health, has given considerable attention to the disease as it has prevailed in Massachusetts during the past six years. Through the kindness of the officers of the association, it has been made possible to present in advance some of the more important passages of the paper. Though it aims only to present a "brief connected survey" of recent discoveries regarding malaria and mosquitoes, it nevertheless brings out a number of points which will be entirely novel to the general reader. Coming at a time, too, when the season's vigorous campaign against the mosquito is closing, with the advent of cooler weather, Dr. Smith's article may be taken as a resume of what has been done, and what may be done, in the warfare against malaria—especially what may be accomplished by smaller communities and by individuals when mosquitoes and malaria come round again another year.

Dr. Smith, it will be remembered, was the discoverer of the difference between the bovine and the human bacillus of tuberculosis, as has recently been pointed out in connection with Dr. Koch's address in London. In the matter of malaria, too, whatever he may say in regard to the nature and transmission of the disease has more than usual interest from the fact that the present knowledge of human malaria is largely based upon the investigations of animal malaria which he undertook, with the assistance of F. L. Kilborne, some ten years ago, and which resulted in the discovery that the "tick" was the "intermediate host," as it is called, or general medium, as it may be less technically termed, which carried from diseased to healthy cattle the so-called Texas fever that has so often ravaged the herds of the great Southwest.

The paper begins by pointing out that malaria and the part of the mosquito in spreading it have been studied by four classes of men. The first step was the study of the disease itself from the standpoint of the physician; the second, the study of the malarial parasite, to which the medical biologist and the zoologist have devoted themselves; the third, the study of the mosquito, undertaken by the zoologist and entomologist; and the fourth, the investigation of the best way to get rid of the mosquito, which is the work of the entomologist and the sanitary engineer. The fact, which is well established, and on which the whole warfare against the mosquito depends, that the germ of malaria develops partly in the red corpuscles of the blood, and partly in the stomach and the stomach walls of the mosquito, so that both mosquito and man are required to enable it to complete its life cycle, was the discovery of many men, each working on knowledge supplied him by others. By one investigator or another it was found also, as Dr. Smith points out in an interesting paragraph, that malarial parasites live in the red corpuscles of frogs, turtles, lizards, and snakes; that birds—crows, pigeons, finches, and sparrows—in different parts of the world are also affected with malaria; and that the parasite occurs in mammals other than man, as cattle, sheep, and dogs—in all of which it produces severe and destructive diseases.

Man, accordingly, was not the only one affected with malaria, the same disease was general in animal life. Nevertheless, all efforts to prove that the parasites of animals were able to infect the human subject or that the human malarial parasite was able to infect animals, proved a failure. Only one thing carried the parasites of human malaria, and that was the mosquito. Moreover, although it was found that the Culex mosquito carried the malaria of birds, only the Anopheles mosquito could carry that of human beings. Regarding the mosquito in general and the Anopheles in particular, Dr. Smith says:

"In consideration of the large number of species which occur in most localities—it is said that there are not less than 250 species that have been determined in the entire world—it is, of course, a problem of the greatest importance to find out which species cause malaria and which do not. In solving this problem perhaps no one has done more than a certain Italian zoologist, Grassi, who studied the distribution of the mosquitoes in Italy. He found—and his work has since that time been confirmed—that of the two great genera of mosquitoes that are commonly found in various localities, Culex and Anopheles, Anopheles is the one that carries malarial parasites.

"By making careful comparative studies with infected Culex and by allowing patients to be stung by Anopheles, he reached the conclusion that the genus Anopheles is the one which transmits human malaria, and that Culex has nothing to do with it. From this position Koch dissented several years ago, when he studied the disease in Italy, and he claimed that probably also some species of Culex transmit the disease. But I am not aware of any further statement of his upon the subject, and I think we must rest contented with these statements for the present, since the Italian scientists have made personal and very thorough investigations into the subject.

"With the life history of the mosquito studied as it has been, the theory that the mosquito is the only agent in transmitting malaria is believed to be scientifically proved. The only difficulty has been to explain the conditions under which malaria appears when large public works are undertaken—canals dug, railroad embankments built, or drinking water and sewerage introduced. Is there simply the overturning of the soil, on which the epidemic of malaria follows. The old theory, says Dr. Smith, that the malarial organism lives in the soil for untold ages until it is turned up, is utterly ridiculous and cannot longer be entertained, so that the question arises as to how it is possible to account for malaria appearing under such conditions. For undoubtedly it nearly always does appear." Dr. Smith answers the question thus:

"There are several conditions that we should take into account. In the first place, all such work involves the temporary formation of inequalities of the soil, the interference with the natural shedding of the water from the soil, and the consequent formation of puddles in which mosquitoes may breed. Then to the economic conditions which prevail today we have been customary, in order to get work done, to import laborers in large numbers from different places or from malarial regions. This leads at once to the formation of laborers' camps. These camps have generally been near a good water supply, because proximity to water was a necessity for camp life. Sometimes this water was running, sometimes it was stagnant. Then a third condition was that probably through a number of malarial epidemics in other parts of the country where they had been at work, or who were brought from regions where malaria is endemic, there were individuals who had the parasite in all its forms. We have, then, all the conditions that are necessary to produce malaria. We have the infected individual; we have an opportunity for the mosquito in to breed, and we bring the infected individual in contact with the breeding grounds of the mosquito. It seems to me that these facts are sufficient to explain, in accordance with the present theory of malaria, the existence of malaria under conditions such as I have described."

In conclusion Dr. Smith takes up the methods by which malaria can be suppressed. In Africa and in Asia, where in the tropical portions it is the existence of European empire, the suppression of malaria seems to him to be questionable; but he believes that in Massachusetts it should be entirely possible. In his opinion, to eradicate or to suppress it, if we are to assume a certain epidemic form in the immediate past, the things to be done are three-fold, an endeavor, in the first place, to rid the neighborhood of mosquitoes; secondly, to protect individuals from the bites of mosquitoes; and, lastly, to protect those sick from malaria from the bites of mosquitoes, to prevent, in the first place, the infection of mosquitoes, and to treat carefully all cases of malaria.

Dr. Smith points out that the use of oil to destroy stagnant pools is a palliative, not a permanent [illegible] ... to remove the source of danger. Naturally, however, he does not pay much attention to the claim that when kerosene is [illegible] larvae the mosquitoes [illegible] becomes [illegible] and converted into dangerous sparks [illegible] dwellings. "This," he says, "is one of the [illegible] in which the rural genius is [illegible] wherever [illegible] turning from this work of public sanitation [illegible] to another."

Passing from this point, Dr. Smith advises, in regard to the sick room, the dissemination of information that people generally who live in malarial regions should be informed of the danger of the open air after sundown. "Recently," he says, "the Italian investigators have been conducting experiments to convince the value of such preventive methods [illegible] with malaria. Different members of the national malaria commission undertook to live along the [illegible] roads passing through very dangerous malarial swamps. They screened [illegible] houses in which these railroad officials lived with proper screens, prevented them from going out [illegible] and supervised the lives of the people during the season [illegible] exposed at night. The statistics which they published for the year 1899-1900 show that fully 90 per cent of such people remained free from malaria in these regions, [illegible] people who were not protected suffered from malaria during the season. The method of protecting people by keeping away the mosquito is [illegible] mechanical way [illegible] very valuable means, especially in places where there is always danger of contracting malaria."

The last matter taken up is that of immunity. Koch in his African studies found that among the natives the children [illegible] malaria, but as these children grew up they no longer showed the parasite in their blood, and [illegible] the blood. As adults they are no longer susceptible [illegible]. The same phenomenon has been noted in the case of negroes, [illegible] they do not always carry the parasite in their blood. [illegible] be therefore infectious to those that are susceptible. "The reason," says Dr. Smith, "why we have no immunity [illegible] in this country [illegible] malaria [illegible] are treated and the parasite dies. Our systems are not permitted to undergo the peculiar influence of the parasite [illegible] to immunity, so that [illegible] malaria [illegible] may leave us [illegible] disease again another year. [illegible] it is quite possible [illegible] to speak of malaria [illegible] a disease toward which [illegible] acquire immunity. [illegible] respect, except [illegible] system to withstand malaria [illegible] full immunity is acquired." [illegible] impossible [illegible] blood. One has to be [illegible] native African for [illegible]

LOST.

LOST—Dog; brown, long ears, sore under jaw, name Rover; reward. 1232 F st. nw. [illegible]

LOST—Near Metropolitan Club, a red onyx fob seal, with engraved coat of arms; a liberal reward will be paid for its return to Metropolitan Club, 17th st. and H st. [illegible]

LOST—A small, brown rat tan terrier, with collar and blue ribbon about neck; liberal reward if delivered to 933 D st. nw. [illegible]

LOST—The person who took opera-glasses from phone of Madame Catherine's yesterday afternoon please return them, as they are [illegible]

LOST—Collie dog, white breast and feet; seven months old; answers name of Prince. Return to 1237 20th st. nw. and get reward. [illegible]

LOST—Pocketbook between Florida ave and U st. nw. Liberal reward if returned to 618 G st. nw. [illegible]

LOST—On October 8, an odd-shaped diamond pin, [illegible] Lafayette square [illegible] liberal reward [illegible]

LOST—Templar's charm; liberal reward. Return to 1740 F st. nw. [illegible]

FOUND.

ROYAL GLUE MENDS ANYTHING! Druggists, 10c.

ICE CREAM, 70c gallon, not made in a cellar, but clean and pure; delivered promptly and free from typhoid, diphtheria, etc.; mould, ice cream, etc. [illegible] LACEY'S is pure and delicious. 607 N. J. ave. 'Phone 2081. [illegible]

MISCELLANEOUS.

CARPET-LAYING, 5c yard; upholstering, cheap; drop postal. F. V. NIEDFELDT, 1325 7th st. nw. [illegible]

FURS [illegible] PRACTICAL FURRIER, 1443 [illegible]

MR. J. F. BUCKERT'S STUDIO, 1212 G st. NW. [illegible] piano, violin pupils; [illegible] liberal rates. [illegible]

PATENTED and unpatented inventions bought and sold [illegible] LUCAS & CO., St. Louis, Mo. [illegible]

ANTIQUE Oak Dining-room Suit and new $50 Drop-leaf Sideboard [illegible]

LACE CURTAIN LAUNDRY, formerly 616 5th st. nw. [illegible] drop postal. [illegible]

CHAIR-CANING—Drop postal. 455 K st. nw.; 641 H st. nw. MRS. L. JOHNSON, residence [illegible]

CHEAPEST, QUICKEST, BEST PRINTING in Washington [illegible] HAYS, 526 Eye st. [illegible]

CARPET LINING 3c, 5c, and 8c yard. J. T. WALKER SONS, 204 10th st. nw.; branch store 1205 N. J. ave. nw. 'Phone 741 Main. [illegible]

"WILLIAMS'" BOOK EXCHANGE, [illegible] branches [illegible] 6th st. nw. [illegible]

Hire your business teams, as well as your pleasure vehicles, [illegible] BLES, M. ENSHEIMER, Proprietor, rear 613 [illegible] st. nw. Rubber tired vehicles of all kinds; [illegible] and Dayton wagons always on hand. [illegible]

FOR SALE—HORSES AND VEHICLES.

FOR SALE—Twenty Virginia and Maryland horses. 314 13½ st. [illegible]

FOR SALE—Cheap; fine light brougham; in perfect condition; also one high-grade road wagon, [illegible] Stable, rear [illegible]

FOR SALE OR TRADE—A bay mare, eight years old, [illegible] WILLIAM WILDE, care [illegible] Stevens ave., Hillsdale, D. C. [illegible]

FOR SALE—A small platform furniture wagon, cheap. [illegible]

FOR SALE—One set of very fine surrey or trap harness and one set of elegant buggy harness. [illegible]

FOR SALE—Hollowell style wagons, carriages, [illegible] 1212 Ohio ave. [illegible]

FOR SALE—Buggies, two phaetons and other [illegible] NICHOLS PHARMACY, 1901 Pa. ave. nw. [illegible]

FOR SALE—Three medium sized perfectly sound horses, $35 each; also Pittsburg rockaway; bargain. 111 E st. nw. [illegible]

FOR SALE—Brick wagon; cheap. 992 3d st. sw. [illegible]

FOR SALE—One complete, one horse. SHAW'S STABLES, 1st and 9th sts. nw. [illegible]

FOR SALE—Top spring wagon; also double set harness; cheap. Apply 117 G st. sw. [illegible]

FOR SALE—Surry and harness; owner just moved in; [illegible] 505 Massachusetts ave. nw. [illegible]

FOR SALE—$25 to $90; have no further use; 20 horses and mares suitable for all purposes; [illegible] wagons, harness, utensils. Apply 483 Pa. ave. nw. [illegible]

FOR SALE OR RENT—HOUSES.

THOS. E. WAGGAMAN,

Real Estate Broker and Auctioneer, 917 F Street N. W.

FOR SALE—NORTHWEST.

809 1st, b. h., 11r, bath; a m i; lot 24x100	$6,100
423 H, b. h., 14r, bath; a m i	5,700
1106 10th, b. h., 8r, lot 18x99 [illegible]	2,900
[illegible]	2,650
[illegible]	2,000
[illegible] sewer	2,000
2018 2d, f. h., 7r, bath; a m i	1,900
29 [illegible]	1,800
2026 2d, f. h., 6r, [illegible]	1,701
1837 5th st, f. h., 5r, lot 12.4x80	1,700
NORTHEAST.	
418 10th, b. h., 4r and back building [illegible]	$2,700
842 and 844 M, f. h., 5r, each, stable (both)	2,500
SOUTHEAST.	
856 8th, b. h., 8r, bath; a m i	$4,500
117 C, b. h., 8r, bath; a m i	4,250
712 I ave., f. h., 8r and bath; a m i	3,250
1010 H ave., b. h., [illegible]	2,500
727 10th st, b. h., 6r, a m i	2,800
[illegible]	1,550
1153 O, f. h., 5r, lot 22x82	1,250
SOUTHEAST.	
208 A, b. h., 11r, bath and a m i	$8,500
Improved [illegible] 74 sq. ft., with improvements rented for $42 per month	5,000
1112 N, f. h., 6r [illegible]	1,500
50 N J ave., [illegible]	1,500
1207 N. J. ave., f. h., lot 19x120	1,200
FOR RENT.	
No. 505 7th st., 7r and bath	$18 50
No. 1024 [illegible]	15 00
No. [illegible]	5 00
No. 211 Schott's Alley, 3r	5 00
No. [illegible]	15 00
No. 929 Va. ave., sw., 6r	7 00
No. 1212 [illegible]	15 30
No. [illegible]	15 30
No. [illegible]	13 80
No. [illegible]	13 80

Apply at Office for Weekly Bulletin.

FOREIGN MAILS.

WASHINGTON, D. C., POSTOFFICE NOTICE. Should be read daily, as changes may occur at any time.

FOREIGN MAILS are forwarded to the ports of sailing daily, and the schedule of closings is arranged on the presumption of their uninterrupted overland transit. For the week ending October 19, 1901, the last connecting closes will be made from the MAIN OFFICE as follows:

TRANS-ATLANTIC MAILS. MONDAY—(c) At 7:15 p. m. for EUROPE, per s. s. Columbia, from New York, via Plymouth, Cherbourg, and Hamburg. Mail for IRELAND must be directed "Per s. s. Columbia."

TUESDAY—(c) At 7:15 p. m. for IRELAND, per s. s. Oceanic, from New York, via Queenstown. Mail for other parts of EUROPE must be directed "Per s. s. Oceanic."

(b) At 7:15 p. m. for BELGIUM direct, per s. s. Vaderland, from New York. Mail must be directed "Per s. s. Vaderland."

WEDNESDAY—(c) At 9:15 p. m. for FRANCE, SWITZERLAND, ITALY, SPAIN, PORTUGAL, TURKEY, EGYPT, GREECE, BRITISH INDIA, AND LORENZO MARQUEZ, per s. s. La Bretagne, from New York, via Havre. Mail for other parts of EUROPE must be directed "Per s. s. La Bretagne."

FRIDAY—(c) At 7:15 p. m. for EUROPE, per s. s. Lucania, from New York, via Queenstown.

(c) At 7:15 p. m. for NETHERLANDS direct, per s. s. Staatendam, from New York. Mail must be directed "Per s. s. Staatendam."

(c) At 11:05 p. m. for SCOTLAND direct, per s. s. Astoria, from New York. Mail must be directed "Per s. s. Astoria."

*PRINTED MATTER, ETC.—This steamer takes Printed Matter, Commercial Papers, and Samples for GERMANY only. The same class of mail matter for other parts of EUROPE will not be sent by this ship unless specially directed by her.

Mails for South and Central America, West Indies, Etc.

SUNDAY—(f) At 12:05 m. for ST. PIERRE-MIQUELON, per steamer from North Sydney.

MONDAY—(d) At 11:05 p. m. for CENTRAL AMERICA (except Costa Rica) and SOUTH PACIFIC PORTS, per s. s. Finance, from New York, via Colon. Mail for GUATEMALA must be directed "Per s. s. Finance."

(c) At 11:05 p. m. for BRAZIL, per s. s. [illegible], from New York, via [illegible]. Mail for NORTHERN BRAZIL, ARGENTINA, URUGUAY, AND PARAGUAY must be directed "Per s. s. [illegible]."

TUESDAY—(c) At 11:05 p. m. for JAMAICA, per s. s. Admiral [illegible], from [illegible].

(c) At 11:05 p. m. for [illegible] AND HAITI, per s. s. Laurenburg, from New York.

(c) At 11:05 p. m. for NEWFOUNDLAND direct, per [illegible].

(c) At 11:05 p. m. for YUCATAN, per s. s. [illegible], from New York, via Progreso. Mail must be directed "Per s. s. [illegible]."

(c) At 11:05 p. m. for CAMPECHE, CHIAPAS, TABASCO, AND YUCATAN, per s. s. [illegible], from New York. Mail for other parts of MEXICO must be directed "Per s. s. Havana."

(c) At 11:05 p. m. for TURKS ISLAND AND DOMINICAN REPUBLIC, per s. s. [illegible], from New York.

WEDNESDAY—(c) At 11:05 p. m. for ST. THOMAS, ST. CROIX, LEEWARD AND WINDWARD ISLANDS, and BRITISH, DUTCH AND FRENCH GUIANA, per s. s. Madiana, from New York.

(c) At 11:05 p. m. for JAMAICA, per s. s. Admiral Schley, from Philadelphia.

(c) At 11:05 p. m. for BARBADOS AND NORTHERN BRAZIL, per s. s. Amanemense, from New York.

(c) At 11:05 p. m. for the PROVINCE OF SANTIAGO, CUBA, per s. s. Santiago de Cuba, from New York.

THURSDAY—(c) At 11:05 p. m. for NEWFOUNDLAND, per s. s. Silvia, from Philadelphia.

(c) At 11:05 p. m. for MEXICO, per s. s. Yucatan, from New York, via Tampico. Mail must be directed "Per s. s. Yucatan."

FRIDAY—(c) At 11:05 p. m. for PORTO RICO, CURACAO, AND VENEZUELA, per s. s. Caracas, from New York. Mail for SAVANILLA AND CARTAGENA must be directed "Per s. s. Caracas."

(c) At 11:05 p. m. for FORTUNE ISLAND, JAMAICA, SAVANILLA, AND CARTAGENA, per s. s. [illegible], from New York. Mail for COSTA RICA must be directed "Per s. s. [illegible]."

(c) At 11:05 p. m. for CAPE HAITI, PORT DE PAIX, GONAIVES, ST. MARC, JEREMIE, AND [illegible], per s. s. [illegible], from New York. Mail must be directed "Per s. s. Alps."

(c) At 11:05 p. m. for HAITI, per s. s. [illegible].

(c) At 11:05 p. m. for BRAZIL, per s. s. Coleridge, from New York. Mail for NORTHERN BRAZIL, ARGENTINA, URUGUAY, AND PARAGUAY must be directed "Per s. s. Coleridge."

(c) At 11:05 p. m. for HAITI, per s. s. Prins [illegible], from New York. Mail for CURACAO, VENEZUELA, TRINIDAD, BRITISH AND DUTCH GUIANA must be directed "Per s. s. Prins [illegible]."

(c) At 11:05 p. m. for MATANZAS, CAIBARIEN, NUEVITAS, GIBARA AND BARACOA, per s. s. [illegible] (ordinary mail only), which must be directed "Per s. s. [illegible]."

(c) At 11:05 p. m. for BERMUDA, per s. s. [illegible].

Mails for NEWFOUNDLAND, by rail to North Sydney, and thence via steamer, close here daily at 11:00 a. m. (d)

Mails for MIQUELON, by rail to Boston and thence via steamer, close here daily at 3:15 p. m. (a)

CUBA MAILS close here via Port Tampa, Fla., Mondays, Wednesdays, and Saturdays at 2:30 p. m. (f)

Mails for MEXICO overland, unless specially addressed for despatch by steamer, sailing from New York, close here daily at 7:10 a. m. and [illegible] p. m. (h)

Mails for BELIZE, PUERTO CORTEZ, AND GUATEMALA, by rail to New Orleans, and thence via steamer, close here daily at 10:30 a. m., the connecting closes for which being Mondays. (a)

Mails for COSTA RICA, by rail to New Orleans, and thence via steamer, close here daily at 10:30 a. m., the connecting closes for which being Tuesdays. (a)

Trans-Pacific Mails.

Mails for CHINA, JAPAN, HAWAII, AND PHILIPPINE ISLANDS, via San Francisco, close here daily at 6:40 p. m. up to October 18, inclusive, for despatch per s. s. America Maru. (d)

Mails for AUSTRALIA (except West Australia, which goes via Europe), NEW ZEALAND, FIJI, SAMOA, AND HAWAII, via San Francisco, close here daily at 6:40 p. m. up to October 19, inclusive, for despatch per s. s. [illegible]. (d)

Mails for CHINA AND JAPAN, via Seattle, close here daily at 6:40 p. m. up to October 25, inclusive, for despatch per s. s. Riojun Maru. Registered mail must be directed "Via Seattle."

Mails for CHINA, JAPAN, HAWAII, AND PHILIPPINE ISLANDS, via San Francisco, close here daily at 6:40 p. m. up to October 26, inclusive, for despatch per s. s. City of Peking. (d)

Mails for HAWAII, via San Francisco, close here daily at 6:40 p. m. up to October 28, inclusive, for despatch per s. s. [illegible]. (d)

Mails for CHINA AND JAPAN, via Vancouver, close here daily at 6:40 p. m. up to October 28, inclusive, for despatch per s. s. Empress of Japan. Registered mail must be directed "Via Vancouver." (d)

Mails for TAHITI AND MARQUESAS ISLANDS, via San Francisco, close here daily at 6:40 p. m. up to November 24, inclusive, for despatch per s. s. [illegible]. (d)

Mails for COCHIN CHINA are forwarded to New York for connection with European steamers.

PHILIPPINE ISLANDS (Military Mail), despatched to San Francisco at all closes for that port, to connect with Government transports, the schedule of which is uncertain.

REGISTERED MAILS close at the MAIN OFFICE as follows: (a) At 12 p. m. same day; (b) At 8:20 p. m. same day; (c) At 1 p. m. same day; (d) At 6 p. m. same day; (e) At 12 m. Saturday; (f) At 6 p. m. previous day.

JOHN A. MERRITT, Postmaster.

PERSONALS.

Dr. Young

Specialist, Cor. 12th and F Sts.

Oldest in age; longest located;

Regular graduate, two schools;

Authorized by the District Government

To treat all diseases of the Nose, Throat, and Lungs, Heart, Nerves, Brain, Blood, Skin, Stomach, Kidneys, and Bladder, Night Losses, Sexual Weakness, and all Special Diseases of either sex. Strictures, Varicocele, and Hydrocele cured without cutting or operation. No pain. No loss of time. Syphilis (any stage) cured for life without mercury or potash. No exposure.

Legal Guarantee to Cure or Refund money in full given in every case accepted for treatment.

Private Diseases Quickly Cured.

CHARGES LOW.

MEDICINES FURNISHED.

Daily Office Hours—10 to 1 and 3 to 6. Sunday, 10 to 12.

FREE CONSULTATION

Dr. Reed

Specialist 509 12th St.

21 YEARS' successful practice in the Cure of Chronic, Nervous, and Special Diseases of Men and Women.

Means Everything to You If You Suffer

from Catarrh, Obesity, Rheumatism, Constipation, Piles, Throat, Lung, Brain, Heart, Blood, and Skin Diseases, Gonorrhoea, Gleet, Stricture, Varicocele, and Hydrocele cured without detention from business. No painful instruments used.

Nervous and Sexual Debility, Loss by Dreams or in Urine, Syphilis, all stages, Blood Poison, and Ulcers cured for life by safe methods.

CHARGES LOW. PROMPT CURE GUARANTEED.

MEDICINES FURNISHED. CONSULTATION FREE.

Private Waiting Room for Ladies.

OFFICE HOURS: 10 to 1; 3 to 6. Sundays, 10 to 12.

DR. CZARRA,

317 6th St. N. W.

OLDEST GERMAN SPECIALIST.

X-RAYS for Examinations, Diagnosis, and Treatment in Skin and Blood Diseases, Cancer, Rheumatism, Piles, Stricture, &c.

RUPTURE CURED Without cutting or injection.

Private diseases and Vitality of both sexes in old and so-called incurable cases cured. Urine examined. Daily, from 10 to 6; Tues. and Satur. till 8 p. m.

DR. LEATHERMAN,

Washington's Leading Specialist

On Kidney, Bladder, Blood, Skin, and Private diseases. Syphilis (any stage) cured for life. Both sexes. Consultation free. Medicine furnished. Hours, 9 to 12 and 2 to 5. Also on Tues., Thurs., and Sat. eve., 7 to 8. Closed Sundays.

602 F ST. N. W.

DR. McKEEHAN,

516 12TH ST. N. W.

ONLY SPECIALIST IN DISEASES OF MEN. Longest established; largest experience; best equipment. Consultation free. Office hours—10 a.m. to 5 p.m.; Wed. and Sat. to 8 p.m.; Sundays closed. se18-1mo

H. K. FULTON'S

Loan Office,

314 Ninth Street N. W.

Money Loaned on Watches, Diamonds, Jewelry, Etc.

OLD GOLD AND SILVER BOUGHT.

Business strictly confidential. No connection with any other Loan Office in the city.

LADIES NEEDING ADVICE AND TREATMENT

Consult

MRS. M. RENNER.

PRIVATE SANITARIUM to treat woman's ills, complaints, and irregularities. Home comforts for cases before and during confinement. Trained nurse and expert physician in attendance at our sanitarium. Office hours from 10 a. m. to 6 p. m. City Office, 402 6th st. nw., Rooms 101-102. 'Phone east 786.

MME. THEO,

Medium and Card Reader; Washington's most famous clairvoyant and palmist. Consult her on business, love and family affairs; reunites the separated, removes spells, causes speedy marriages, and gives luck. Open daily. German spoken. 25c and 50c. 929 H st. nw. m8-7

MR. L. M. NORRIS

Baltimore's talented Spiritualistic Medium can be consulted daily from 10 to 5. Parlors 730 9th st. Seance every Sunday night at Maccabee Temple, 513 9th nw. Good music. Silver collection. m10-4

MADAM CATHERINE,

PALMIST AND CARD READER,

508 5th st. nw., between E and F.

Gives luck; removes spells. Bring this with you. e13-3

Mme. Jones, 619 F St. N. W.

Scientific Palmistry, 25c.; card reading, 15c. Hours, 9 to 9. m10-3

ERVING MILLON,

CLAIRVOYANT AND PALMIST.

1451 Corcoran st. nw.

He tells all names, dates, and figures in detail, the object of visit, and anything you wish to know. Your future and everything revealed. 9 to 9, daily. m1

DANCING—Miss Leonardo, Premiere Danseuse, Academies, 1223 12th st. nw., Confederate Veteran's Hall, 11th st., and Wimodaughsis Club, New York ave. Private academy, 12th st. Miss Leonardo is the only representative "National Association Masters of Dancing." Protect yourself from incompetents. m13-3

MME. LARETTA, the celebrated Eastern Palmist, can be consulted at her rooms, 728 10th st.; hours from 8 to 12, 1 to 5, from 6 to 9. m13-6

HANDSOME AMERICAN LADY, independently rich, wants good, honest husband. Address ERIE, 193 Washington st., Chicago, Ill. m1

VITALITY low, debilitated or exhausted cured by Dr. Kline's Invigorating Tonic; free $1 trial bottle, containing 2 weeks' treatment. DR. KLINE'S INSTITUTE, 931 Arch st., Philadelphia. Founded 1871. oc6,13,20,27

SYLVIA—467 G St. N. W.,

Reads cards, 25c; truthful and reliable. 9 a. m. to 8 p. m. m9-7

AN ADVANTAGE to workingmen for the following reasons: We furnish you with the very best at one-third less than cheap new stuff. All of our fine suits and overcoats are made by merchant tailors, and are scarcely used; everything marked in plain figures; strictly American and one price. Look for the Old Porch. JUSTH'S OLD STAND, 619 D st. m8-7

ORIGINAL Gypsy Palmist, 419 K st. nw.; 15c past, future; spells removed by hand; wet; foot reading specialty; open Sunday. e1-7

WALL PAPER.

WHILE the paperhangers' strike is on hand, remember that F. G. NOLTE, at 824 9th st. nw., "The Old Reliable," has first-class workmen on hand, and is ready to do your wall papering at $2 and upward for rooms. m15-tf

FOR SALE—PIANOS.

Pianos $1 Weekly.

Give the girls and boys a musical education while they are young. Good, square pianos suitable for practice, $25 up, on $1 weekly payments. F. G. SMITH, 1225 Pa. ave. e9-tf

SPECIAL PIANO SALE!

Twenty Upright Pianos, including such makes as the Stieff, Marshall & Wendell, Baumeister, etc., at very low prices. These pianos must be sold to make room for our Fall stock. Prices range from $150.00 up. Terms on same as low as $5.00 per month. Every piano guaranteed. STIEFF PIANO WAREROOMS, 521 11th st. nw. J. C. Conliff, Mgr. m22

PAINE'S CELERY COMPOUND