Scientific American.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS.

One copy, one year - - - - - - - - $3 00
One copy, six months - - - - - - - 1 50
CLUB RATES { Ten copies, one year, each $2 50 — 25 00
Over ten copies, same rate, each — 2 50

VOL. XXVIII., No. 9. [NEW SERIES.] *Twenty-eighth Year.*

NEW YORK, SATURDAY, MARCH 1, 1873.

Contents:

(Illustrated articles are marked with an asterisk.)

SMALL POX.---OLD AND NEW REMEDIES.

Superficially considered, it appears singular that certain contagious diseases, especially small pox, spread more in the winter season (which, in other respects, is the healthiest time of the year) when the cold destroys the miasmata which flourish in tropical climes and, in hot summers, sometimes visit portions of the temperate zone. But in order to explain this apparent anomaly, we have only to consider that in winter a large number of the lower classes of people huddle together in ill ventilated rooms, in order to shelter themselves against the cold. Of course this is favorable to the growth of miasmata, which only need suitable conditions to propagate themselves. Microscopists have succeeded in tracing the origin of many contagions to parasitic growth, either vegetable or animal, and it is not improbable that this will ultimately be the case with all, the denial of many medical authorities notwithstanding. It should be kept in view that, formerly, equally high authorities used to deny most peremptorily, to several diseases, the origin which is now, beyond the shadow of a doubt, proved to be the true one, namely, the growth of animalculæ or vegetable parasites. It should also be considered that the fact of not finding such, in certain cases, is only a negative proof; they may be there and the investigator may have failed to find them; but other searchers in course of time and with instruments more perfect than we possess at present, or by help of an improved *modus operandi*, will undoubtedly discover them. Microscopic investigation has only just commenced to be applied in medicine, and the most advanced physicians know now that it is one of the most powerful helps in medical diagnosis.

Eruptive fevers are diseases of the blood; they probably originate in a kind of catalytic poison in the system, which may be a result of parasitic growth, as is the case with fermentation and many other chemical changes. However, the future will decide the question definitely; in the meantime we must observe, use our best judgment, and apply all the light, as far as the present state of science allows, to combat this class of diseases, among which small pox is one of the most virulent, loathsome and dangerous. In order to be fully convinced of this, one has only to visit a small pox hospital and see this interesting disease in all its stages.

In regard to the effectiveness of the protection afforded by vaccination, the statistics show that this discovery, made by Jenner more than a century ago, had the most startling influence in staying the small pox ravages of that time, and it kept the nations who accepted it comparatively free; the experience of the physicians of the present day tends in the same direction, and all doubt fostered by some in regard to its effectiveness proceeds solely from want of acquaintance with the facts, which are overwhelming in proof of its great value to the human race. As the health and longevity of vaccinated persons is on the general average equal to that of others who escape the small pox without vaccination, there can be no serious objection on that ground. The rule, laid down by some, that persons must be vaccinated every seven years is totally arbitrary and without any foundation whatsoever; different individuals will differ greatly in this respect, and, in order to be safe, it is well to try if vaccination will "take" in case any danger is apprehended, even if it has been applied only three or four years ago. If no epidemic is prevailing and the person is exposed to no danger, it is needless to revaccinate every seven years; ten years or more may elapse, and we have known individuals who undoubtedly, by a single effective vaccination in childhood, have been protected for their whole lives.

In regard to the treatment, it must be kept in view that here, as in all eruptive fevers, it must have its course, and cannot be cut short without robbing the patient entirely of his chance of escape. Careful guarding against taking cold, good nursing, the mildest possible diet, and abstinence from irritating food and remedial agents similarly objectionable are the first necessities of small pox cases.

The latest medical journals recommend two new remedies, which experience has proved to be beneficial. Dr. Revillod, of Geneva, recommends glycerin as an exterior application; this, through its soothing action, diminishes the intensity of the eruption. He mixes it with soap and some mercurial ointment. Dr. Carl Nagel, Royal Chancellor of Health in Berlin, recommends xylol; he has administered this internally in eighty cases, thirty-six of which had the small pox in its worst form, and only four died, which is a better result than that of any other remedy thus far known. When administered while the disease is but suspected, xylol does not prevent it, but greatly eases the patient and facilitates a speedy recovery.

Xylol, or xylen, is also called the hydride of xylenyl; it is one of the hydrocarbons obtained by the distillation of coal tar, wood tar, or Burmese petroleum. The coal tar contains little of this ingredient, but one pound of oil separated from crude wood spirit contains about one ounce of xylol. It is a liquid similar to benzol and toluol, but has the antiseptic properties of carbolic acid from coal, and of creosote from wood. It separates from the crude wood spirit by the addition of water, and is purified, like other cognate products, by sulphuric acid; the brown mixture, after standing, is washed with a solution of potash and then in water, dried over chloride of calcium or glacial phosphoric acid, and then subjected to a fractional distillation, when the xylol comes over as soon as the temperature has risen to between 258° and 266° Fahr.

It is well known that many derivatives of tar, creosote, carbolic acid, benzol, toluol, xylol, etc., are all poisons for small organic growths, either vegetable or animal; that they, for instance, at once destroy fermentation by killing the microscopic yeast plant; it is also known that mercurials are especially poisonous to parasites of all kinds, especially animal ones. These remedies now appear to be effective in small pox, and this raises the very natural question if it is not an argument for the probability of the theory that this disease also is due to a morbid organic growth, perhaps in the blood itself, which produces that violent fever, with the symptoms of pain, nausea, etc., and finally works itself out through the skin and mucous membrane by a copious eruption, which is often strong enough to destroy the skin like so many burns, and sometimes even so violent as to destroy the life of the patient, in the same way as an extensive scalding does, which is fatal by arresting the natural action of the skin, consequent to the annihilation of its organic structure.

In consideration of the excitement about the spread of small pox in this country, we believe the above details to be of general interest and utility to our readers.

A WORD WITH THE READER, THINKER, AND WRITER.

We believe that there is no portion of our journal of greater interest than the columns devoted to our correspondence, and we should be unappreciative did we undervalue the practical suggestions and information imparted by its writers. We would take the present opportunity of requesting from our readers even more frequent communications. Let us have all possible ideas. Criticise everything that appears open to criticism; and, if experience has taught you differently, give the public the benefit of your wisdom. The mere fact of your finding any difficulty in committing your knowledge to paper need be no drawback. We want ideas, not words; and if the brain work is there, we will put it into proper shape. Every week we publish a large number of questions on different subjects. Sometimes we are at a loss for a suitable reply which many of our readers can readily find; in such cases responses from our subscribers are appreciated both by the enquirer and ourselves.

The modern newspaper is the substitute for the ancient forum. Instead of a number of people meeting in some public place, as they used to do, and discussing various questions of interest, they now write to their paper and interchange their views through the medium of its printed pages.

Necessarily, among the multitude of communications which reach us, there are many agreeing on some single topic. In such case we exercise our discretion in the publication of such as we consider the most sound and suitable. There are others devoted to the discussion of questions which it is only a waste of time to consider. We allude to perpetual motion, quadrature of the circle, and all of that class. We would earnestly impress upon all who entertain such chimerical ideas to turn their minds and labor to more profitable pursuits.

We believe that there is no better way of acquiring and and disseminating knowledge than to establish a co-operation between those who read and those who write—to place the opinions of the practical man beside those of the theorist, the worker beside the thinker, and thus obtain views clearer, better, and more comprehensive on subjects interesting alike to all.

THE PHOTOMETER APPLIED TO ASTRONOMY.

In a recent article on the physical nature of the planet Jupiter (see page 400 of our volume XXVII), we described the important results deduced from photometric observations of that planet; and we may add to this that photometry has often been applied to the starry heavens, in order to determine the comparative luminosity of the heavenly bodies. It is evident, however, that the common methods as applied here on earth to compare the relative intensity of different flames, and of which one was described on page 83 of this volume, are entirely inapplicable; and therefore other modes must be applied, and photometers based on totally different principles must be resorted to.

The most perfect photometer adapted to measure and compare the light of the heavenly bodies is undoubtedly that invented by Zöllner, the famous astronomer and spectroscopist of Berlin; he invented it as early as 1860, but only recently has he applied it extensively to celestial photometry. It is based on the principle of the polarization of light; and in order to accomplish his purpose, he makes use of the property of the analyzer (see Tyndall's lecture, page 35 of our current volume) to transmit or obstruct the polarized ray in proportion as it is turned round an arc of 90°; for intermediate portions of the angle of rotation, a strong light may be gradually diminished till the transmitted rays are equal to the weaker light.

The first thing Zöllner had to do was to determine how far the angle would serve as a measure for the intensity of light. Mathematical theory teaches that the amount of light transmitted does not increase as the angles themselves, but as the squares of their sines. Zöllner found this law perfectly verified by practical experiment, in testing this photometer in many different ways. By attaching such a polarizing photometer to an astronomical telescope, he has been enabled to determine the comparative luminosity of divers heavenly bodies with greater accuracy than had previously been possible; and the results obtained will especially be most interesting to posterity, who will be able to determine what changes have taken place in the course of time, changes which are sometimes very great and of the utmost importance to the extension of our knowledge of the nature of the heavenly bodies.

As a standard of comparison, he uses the light of a lamp shining through a pin hole; and in order to be independent of the perhaps variable light of this lamp, which may differ on different nights, he compares two stars with the lamp, and only notices the difference between the stars. If, for instance, the planet Jupiter has to be compared with Venus, he directs the telescope to Jupiter and turns the analyzer till its luminosity is equal to that of the lamp shining through the pinhole, and finds it was turned, say, 10°; then he directs the telescope to Venus, and finds that he must turn it 25° in order to diminish its light till it is equal to the lamp light. The relative luminosity will then be as the square of the sines of these angles, that is, as $0{\cdot}0174^2$ is to $0{\cdot}0389^2$, or as 0·00030276 is to 0·00151321, or, approximately, as 3 to 15 or 1 to 5.

Among the results thus obtained by Zöllner are the following:

COMPARISON OF PLANETS.

The fixed star *Capella* as compared to Mars is as 1 to 7; to Jupiter, as 1 to 10; to Venus, as 1 to 50; to Saturn, as 1 to 0·4; to Uranus, as 1 to 0·0066; to Neptune, as 1 to 0·0007.

COMPARISON OF FIXED STARS.

The same star *Capella* as compared to *Sirius* is as 1 to 5; to *Vega*, as 1 to 1·2; to *Betelgeuse*, as 1 to 0·5; to *Regulus*, as 1 to 0·4; to *Pollux*, as 1 to 0·3.

THE MOON COMPARED TO THE PLANETS.

The full moon as compared to Venus, when full, is as 150 to 1; to Jupiter, as 700 to 1; to Mars as 1,000 to 1; to Saturn, as 18,000 to 1; to Uranus, as 1,159,000 to 1; to Neptune, as 10,000,000 to 1.

The sun as compared to the moon is as 700,000 to 1. Consequently the light of the sun surpasses that of the most distant planet, Neptune, 7,000,000,000,000 times.

DISCOVERIES OF TIN IN QUEENSLAND.

The most recent reports substantiate the fact that tin fields of unexampled richness have been discovered in the English colony of Queensland, Eastern Australia, the presence of the metal being detected over an area of 550 square miles. Mr. T. F. Gregory, the mineral land commissioner, states that, at the present time, only about 225 square miles of this area have hitherto been found sufficiently rich for working, but there are many instances of tin being found in paying quantities beyond these limits. The physical and geological character of nearly the whole of the area described is that of an elevated granite table land, intersected by ranges of abrupt hills, the highest limits of which are about 8,000 feet above the sea, its eastern escarpment forming the water shed of the Clarence river, the northern that of the Condamine, and the southwestern, the Severn and McIntyre rivers. The portion of the district over which the deposits of tin ore are distributed is that comprised by the water shed of the Severn river. The richest deposits have been found in the stream beds and fluvial flats, the paying ground varying from a few yards to five chains in width, occasionally broken by rocky bars; but even in these instances large deposits are frequently lodged in the pockets and crevices between the granite boulders.

The probable yield of ore is stated at ten tuns per lineal chain of the beds on the various creeks. In some instances, this has been found to extend to thirty tuns per chain. Regarding the mineralogical character of the rocks, it is stated that the ore is associated only with granite which is invariably red. The granite generally is coarse grained and seems to disintegrate rapidly under atmospheric influence. There are numerous bands of loosely aggregated rock, granitoid in in character, highly micaceous and traversed by bands and veins of quartz in all directions, in which the crystals of tin are abundant. No tin floors, as at the Elsmore mine in New South Wales, have yet been discovered.

As the lodes and veins have as yet been but very partially tested, it would be premature to give any decided opinion upon them. It is probable that they will prove a source of great wealth, and perhaps render Australia one of the first tin producing countries in the world.