For a red tone add to the bath 30 grains of alum. Dry and rub with flannel and farina.

BRIGHT BROWN.

After putting the gloves on the wooden form, and brushing with soap and water, and finally with pure water, they are brushed over with 75 grains of tannin, dissolved in 35 fluid ounces of water. Next dissolve—

Aniline brown..... 75 grains.
White glue 45 "

in 1½ pint of water. Heat to 99° F., and apply it to the gloves with a brush.

If a heavier shade is wanted, the gloves are brushed again with the solution of 15 to 45 grains of methyl violet, in 1½ pint of water, at 99° F., and let dry.

They are finished with the same mixture of glycerine and yolk of egg as mentioned above.

For a redder shade, instead of aniline brown alone, a mixture of half aniline brown and half magenta may be taken.

CHOCOLATE.

The gloves are put on the form, and brushed three times with the clear solution of ¼ oz. catechu in 1½ pint of water, and then three times with the solution of ¾ oz. bichromate in 1½ pint of lukewarm water. If the shade is not deep enough, repeat the process, and use, if needful, also the decoction of ½ oz. of lima-wood, boiled with 75 grains of alum, in 1½ pint of water. This is applied with a brush till the shade is obtained, and the gloves are then dried. They are then finished with egg and glycerine, and rubbed off with starch.—*Teinturier Pratique.*

THE DAVY LAMP.

At a late meeting of the Manchester Geological Society, Mr. Joseph Dickinson, F.G.S. (Her Majesty's Inspector of Mines), the President of the Society, occupied the chair, and read a paper "On the Davy Lamp, and Blasting in Mines." He said: The Davy lamp is known to be safe only under certain circumstances. It may be put into an explosive or inflammable mixture, and if withdrawn quietly the gas flashes or burns inside the gauze, sometimes putting the light out and sometimes not, but without flame passing through the gauze. The standard mesh of the gauze is 784 apertures (28 by 28) to the square inch. With this the cooling property appears to be such as to prevent the ignition of gas externally until the gauze becomes red-hot, or unless there be some defect in the lamp or some easily firing or flaming substance on the gauze. I have on hundreds of occasions had to trust my life to this kind of lamp. The practice is to lift it up toward the roof. If held for a short time till it gets heated it apparently indicates better. Many prefer trying with a very small light, as the indication may then be seen best. Looking through blue glass is also now said to be an improvement. The usual indication is a blue cap on the flame, but the whiter it is the quicker it fires. If the cap begins to tail up or the flame to flutter, and there be time, it is best to lower the lamp without allowing it to fire, but always gently. When the top of the lamp touches the roof without showing gas, the practice in some districts, but which is reprobated in others, is to place the lamp sideways, in order to test the uppermost part, where fire-damp naturally lies. The gauze of the Davy as commonly used is about 5½ in. in length by 1½ in. in diameter, with a cap for the top. This, according to the experiments recorded (p. 39, vol. 17, North of England Institute of Engineers), admits of flame passing through, or of external ignition at a velocity of 1½ ft. per second or 690 ft. per minute. Should a person get into an explosive mixture where the lamp fills with flame and continues burning, notwithstanding that the wick be drawn down, and there is no escape, the special colliery rules of this district enjoin that he must smother it out. How that may best be done is left to his own discretion. If water were near he might probably dip it in, or if dust cover it, or put it into his woolen jacket. Under such circumstances there is some risk. In Scotland the Davy lamp is used by the firemen in trying places, but that used by the miners is called a gauze lamp. The principle of the two lamps is the same, the difference being that the gauze lamp is larger and gives better light. At a time like this, when the public mind has been excited by a very serious explosion, and when, as I am informed, the Coal Association are discussing the question of lighting and blasting in mines, it may be useful to review the regulations which are now in force. The rules under the Coal Mines Act are very strict, and the special rules of this district supply further conditions. The powder rule is very stringent. Powder may only be taken into a mine in canisters containing not more than 4 lbs. If fire-damp has been found in that part of the mine within the preceding three months the powder must be in cartridges, and the shots may also be fired under the supervision of a competent person appointed for the purpose. If the mine be very fiery, according to the test enjoined of showing indications of gas as it issues from the strata, notwithstanding adequate ventilation, shots may only be fired when the ordinary work-people are out of that panel of the mine. And, lastly, it may not be used at all unless it is safe. Further than this it appears impossible to go unless by total prohibition. The condition of the use of open lights is shown by the explosions at Blantyre, with 209 lives lost, and 114 at Cynmer, to be unreliable. But to forbid the use altogether would be to sacrifice the advantages given to science.

CURIOUS FACTS ABOUT THE TELEPHONE.

By WM. F. CHAENING.

In the *Journal* of November 1, you write me to describe the conditions under which the telephonic concerts performed in New York, for the benefit of audiences in Saratoga, Troy, and Albany, were overheard in Providence. The circumstances were these. During five evenings in the latter part of August and first part of September, performers stationed in the Western Union building in New York sang or played into an Edison musical telephone, actuated by a powerful battery, and connected with one or other of the cities above named by a No. 8 gauge wire, with return through the ground.

In Providence, on the evening of the first of these concerts (August 28th), Henry W. Vaughan, State Assayer, and the writer were conversing through Bell telephones over a shunt made by grounding one of the "American District Telegraph" wires in two places, about a quarter of a mile apart, through suitable resistance coils. At about half past eight o'clock we were surprised by hearing singing on the line, at first faint, but afterward becoming distinct and clear. At the same moment apparently, Clarence Rathbone, talking with a friend through Bell telephones, over a private line in Albany, was interrupted by the same sounds. Afterward, during that and subsequent concert evenings, various

airs were heard, sung by a tenor or soprano voice, or played on the cornet. The origin of these concerts remained a mystery for some time in Providence, and the lines were watched for music many evenings. The programmes heard proved to be precisely those of the Edison concerts performed in New York, the tenor singers being Signor Tagliapietro and D. W. McAneeny (baritone), and the soprano singer Madame Belle Cole.

The question how this music passed from the New York and Albany wire to a shunt of the "District" wire in Providence is of scientific importance. The Edison musical telephone consists of an instrument converting sound waves into galvanic waves at the transmitting station, and a different instrument reconverting galvanic into sound waves at the receiving station (using the word "wave" in its broadest sense). The battery used in sending the music from New York to Saratoga consisted of 125 cells (carbon bichromates, No. 1½), with from 1,000 to 3,000 ohms' resistance interposed between the battery and line connections in New York.

Mr Geo. B. Prescott, to whom I am indebted for these figures, informs me also that the wire used in these concerts extended from the Western Union building, corner of Broadway and Dey streets, through Park Row, Chatham Square, the Bowery and Third avenue to 130th street, and thence via the Harlem Railroad to Albany. On the same poles with this Albany wire, for sixteen miles, are supported no less than four wires running to Providence, three of them being on the same cross-arm, and one of them being Boston wire No. 55 east, via Hartford and Providence; also for eight miles a fifth wire, Boston wire No. 32 east, via New London and Providence. These wires, including the Albany wire, are understood all to have a common ground connection at New York, and to be strung at the usual distance apart, and with the ordinary insulation.

At the Providence end of the line, six New York and Boston wires, Nos. 55, 32, 2, 5, 27 and 28 east, run into the Western Union building, in company (on the same poles and brackets), for the last 975 feet, with an "American District" wire. This last runs especially near to wires 55 and 32, whose proximity to the Albany wire in New York has already been traced above. But here is a distinct feature. The "District" wire belongs to an exclusively air circuit of four and a half miles, having no ground connection. The New York and Albany and New York and Boston wires are or may be grounded at both ends. The "District" circuit referred to in Providence is geographically two circuits, but electrically one, both working through a single battery of fifteen cells. Mr. Vaughan and myself having "District" boxes, a quarter of a mile apart, on this circuit, made a shunt for telephonic communication by ground connection at each house, including several hundred ohms' resistance, so as not to impair the galvanic insulation of the line. The telephone talked through this perfectly, and the sounds of atmospheric electricity were heard in remarkable perfection.

It will be seen that the music from the Albany wire passed first to two or more parallel New York, Providence and Boston wires; second, from these to a parallel "District" wire in Providence; and third, through a shunt of that "District" circuit, before reaching the listeners there.

This transfer of electric motion from one wire to another may have taken place by induction, by leakage, or, in the first instance, in New York, by a crowded ground conductor. In the transfer in Providence from the New York and Boston to the "District" wire there was no common ground connection, and it is difficult to suppose that sufficient leakage took place on the three brackets and three poles, which were common to the New York and the local wire, to account for the transfer in Providence. The Bell telephone has also proved itself abundantly capable of picking up signals in an adjoining wire by induction alone. Without rejecting wholly, therefore, the other modes of transfer, I should ascribe to induction the principal part in the transfer of the concerts from wire to wire between New York and Providence.

What proportion, then, of the electrical music, set in motion in New York, could have reached the listeners on the shunt in Providence? Whether induction, leakage, or crowded ground was concerned, will any electrician say that the New York and Providence wires, situated as described, could have robbed the Albany wire of one-tenth or even one-hundredth of its electrical force or motion? When this one-tenth or one-hundredth reached Providence, will any electrician say that the wires from New York in the course of 975 feet could have given up to the parallel "District" wire one-tenth or one-hundredth of their electrical wave motion? Lastly, when the District circuit had secured this minute fraction of the original music-bearing electric waves, will any electrician say that the shunt, as described (containing 500 ohms' resistance, while the shunted quarter of a mile of District wire contained only 5 ohms' resistance), could have diverted one-tenth of the electric motion from the District circuit?

The music heard plainly in Providence did not therefore require or use one ten-thousandth, hardly one hundred-thousandth, of the electro-motive force originally imparted to the Albany wire.

EXTRAORDINARY SENSITIVENESS OF THE TELEPHONE.

This startling conclusion suggests first the wonderful delicacy of the Bell telephone, on which point I shall venture to enlarge; and second, the as yet unimagined capacity of electricity to transport sound.

The Bell telephone is probably the most sensitive of electroscopes for galvanic, magneto-electric, and atmospheric or free electricity, and will be used extensively in science and the arts, in this capacity. In the French Academy, on the 6th of November, Mr. Breguet introduced the telephone as, of all known instruments, operating under the influence of the most feeble electrical currents. Prof. John Peirce of Providence, has ascertained the Bell telephone gives audible signals with considerably less than one hundred thousandth part of the current of a single Leclanché cell. In testing resistances with a Wheatstone bridge the telephone is more sensitive than the galvanometer. In ascertaining the continuity of fine wire coils, it gives the readiest answers. For all the different forms of atmospheric electrical discharge—and they are constant and various—the telephone has a language of its own, and opens to research a new field in meteorology.

A Bell telephone in Providence has been found, under very favorable conditions, to overhear the speech of another Bell telephone on a parallel wire. But it will be noticed that the music and Morse-operating so noisily overheard on other wires are not products of the Bell telephone, but of powerful galvanic currents. The delicate magneto-electric current of the Bell telephone is not generally exposed to eaves-dropping, unless different sets of wires actually come in contact.

Prof. Peirce has observed that if one screw-cup of a Bell telephone is connected with a ground wire, in use at the same time for Morse-operating, the Morse signals will be heard in the telephone, although the other screw cup is disconnected and there is no circuit. Here the coils of the telephone seem to be momentarily charged by the passing signals, on the principle of a condenser. A still more striking illustration of the electroscopic delicacy of the telephone is this: Prof. E. W. Blake, of Brown University, talked with a friend for some distance along a railroad, using the two lines of rails for the telephonic circuit. At the same time he heard the operating on the telegraph wires overhead, caught by the rails, probably by induction.

The absence of insulation in this experiment recalls another curious observation. The Bell telephone works better in some states of the atmosphere than in others. A northeast wind appears specially favorable. When a storm is approaching the sounds are sometimes weak; but the talking is often loud and excellent in the midst of a storm, when insulation is most defective. I have just verified this by talking over a short line where the wire is without insulation, and its only support between two houses the trunk of a tree, just now sheeted with water from falling rain. This apparent indifference to insulation in a telephonic which will overcome a resistance of eleven thousand ohms is not easily explained. This is only one of a multitude of paradoxes presented by the Bell telephone.

THE TELEPHONE OPERATED BY LIGHTNING.

The sound produced in the telephone by lightning, even when so distant that only the flash can be seen in the horizon and no thunder can be heard, is very characteristic, something like the quenching of a drop of melted metal in water, or the sound of a distant rocket. The most remarkable circumstance is that this sound is always heard just before the flash is seen—that is, there is a probable disturbance (inductive) of the electricity overhead, due to the distant concentration of electricity preceding the disruptive discharge. On Sunday, November 18, these sounds were heard and remarked upon in Providence the first time for several weeks. The papers on Monday morning explained it by the report of thunder storms in Massachusetts on the preceding day. Frequent sounds of electrical discharge similar to that of lightning, but much fainter, are almost always heard several hours before a thunder storm. This has just (Nov. 26) been exemplified in Providence.

SOUNDS PRODUCED BY THE AURORA.

The sounds produced in the Bell telephone by the auroral flashes or streamers were observed here by Prof. John Peirce in May or June.

THE EARTH'S MAGNETISM SPEAKS.

I will give one further illustration of the delicacy of the Bell telephone, this time in relation to magnetism. In June last Prof. E. W. Blake substituted for the magnet of the telephone a bar of soft iron free from magnetism. When this was held in the line of the dipping-needle, the telephone talked readily by the earth's magnetism. But when the telephone was swayed into a position at right angles with the line of the dipping-needle (in the same vertical plane) it was absolutely silent; and the voice increased or faded out in proportion as the telephone was directed toward or receded from the pole of the dipping-needle.

It remains only to speak of the quality of the concert music overheard in Providence. The rendering of the music was very perfect, but articulation was deficient or absent, both in the songs and in some sentences which are said to have been declaimed in New York for the amusement of the audiences in Saratoga and elsewhere. The papers of the day report that the words were undistinguishable in Saratoga. There is therefore no reason to suppose that the sounds lost anything in quality in the course of their indirect transmission to Providence.—*Journal of the Telegraph.*

THE ELECTRIC CANDLE.*

By WM. LUCIEN SCAIFE.

HAVING been requested to make inquiries in regard to the new process of electric illumination, I was invited to be present during some experiments at the extensive laboratory of the "Syndicat d'etudes d'eclairage électrique," situated No. 61 Avenue de Villiers, Paris.

Accordingly, last Thursday evening, I went to the above-mentioned address, and on presenting my entrance card was admitted to the large frame building which the Electric Light Company or Syndicate has lately erected in order to study and improve the already famous discovery of M. Jablochhoff, the probable precursor of the "light of the future."

As this invention has been in some cases erroneously described, we take the liberty of repeating its main features.

The electric candles, as sold at present, consist of two cylinders of carbon about ⅓ths of an inch in diameter, kept parallel and at a fixed distance (about ¼ inch) from each other by means of an insulating substance consisting of a mixture of kaolin and other materials added to improve the quality of the light. It is largely due to the latter that the original illuminating intensity of the candles, as stated in the accompanying circulars of the company, have been considerably increased.

These non-conducting and refractory substances are made into a paste and molded into slender parallelopipeds, whose long sides are slightly concave to facilitate the union with the carbon cylinders, or carbons, as we shall call them. The latter are held together at the top by a thin and narrow strip of asbestos, and at the bottom they are set into brass tubes or sockets about three inches long—the distance of insertion being about one-half inch. The tubes are separated by an insulating substance—either glass or asbestos, or both—the latter serving to keep the sockets in place.

The electric candles are, from their nature, brittle, a slight shock or fall being sufficient to break them. Moreover, as the carbons and kaolin are held together only in two points, the former have a tendency to separate from the latter, especially if shocked, when the ligature of asbestos has been burned—which takes place almost immediately after the candle is lighted. The candles of ordinary size are about 12 inches in length, including the brass sockets; the consumable portion is therefore about 9 inches long. It is probable that the difficulties just mentioned will prevent an increase of size, unless some other means of uniting the three parallel pieces is applied. The selling price of a candle varies from 15 to 25 cents, according to the diameter of the carbons. The candles burn from two to three hours, according to their size and the intensity of the current, which is admitted by the "candlestick"—a very simple combination of thumb screws and supports for the candles.

* American Manufacturer.

With these preliminary remarks I shall now give a brief account of the laboratory and experiments.

The main hall of the building or laboratory is about 60 feet long, 40 feet wide and 25 feet high. The walls and ceilings are white. From the latter were suspended three chandeliers, the central one having three "opalized" glass globes about 1½ feet in diameter—each surrounding an electric candle. It was raised and lowered by means of pulleys and windlass. The other two chandeliers were ordinary gas lusters, each with sixty bat-wing burners. The latter alone were lighted when I entered the hall, but they amply sufficed to illuminate it.

The room contained moreover a great variety of electrical and other apparatus which have served for the extensive researches made by the company. After a careful and experimental comparison of all the best existing sources of electrical currents, the company has found that the Alliance magneto-electric machine is best adapted for the production of the electric light. The latter has, however, two objectionable features, which are not, however, without remedy, viz., the cost (\$1,200 to \$1,400) and its bulkiness. The hall contained four of these Alliance machines, worked by a steam engine in an adjacent room, the transmission of motion taking place by means of a shaft, pulleys and belts.

Besides these there were also photometric apparatus and various other instruments of precision and measurement. The electric currents distributed in different parts of the hall were controlled by an assistant stationed on a raised platform. A single Alliance machine furnished the currents for all the experiments mentioned hereafter.

M. Jablochhoff, the inventor of the electric candle, M. Denayrouze, the director of the company, and several assistants were present, and all were very courteous and attentive to the visitors—about fifteen or twenty in number, and belonging to several nationalities.

M. Jablochhoff is a tall and well-built middle-aged gentleman, with blonde hair, beard and mustache. He is a Russian by birth, has an intelligent face, and speaks French with a foreign accent. In the course of the evening he described a simple and ingenious arrangement by which the light of an electric candle is kept constantly in the focus of a reflector, by producing total reflection with a prism. He also stated that considerable difficulty had been experienced in making photometric comparisons on account of the difficulty of eliminating the influence of heat when certain photometers are used. It seems that Mr. Crookes had brought his radiometer from London in order to test the light of the electric candles.

Toward nine o'clock the gas was suddenly turned off, and at almost the same instant six electric candles were lighted. Of these three were on the central chandelier, and the others placed on three pillars in different parts of the room. Although all these lights were surrounded by large "opalized" or "porcelainized" globes, yet the difference between the two illuminations was remarkable. These six candles gave a light much more intense and "whiter" than the 120 naked gas-jets. The eye experienced but little more fatigue in regarding the globes sifting the electric light, than it does in looking at the ground glass globes of single gas-burners.

The diffused electric light was not at all disagreeable or painful, but being brighter and clearer than the gaslight the change caused a slight sensation of fatigue at first, such as we notice in passing from a room illuminated with diffused light to the direct sunshine. It is probable that we should soon become accustomed to the electric light if properly diffused, especially if the walls of apartments were of a nature to absorb instead of reflecting the light, like the whitened walls and ceilings of the company's hall. Outside of the building, and near the entrance, were also two lighted globes, which even in the surrounding darkness were not very unpleasant to the eye. This remark is equally true of those in the "Place de l'Opera."

On one of the walls of the illuminated hall was a series of silk specimens of all colors and tints, some of the shades being very delicate. Near by was the notice: "The electric light does not alter colors." This statement seemed to be verified by the experiments. At any rate, the smallest differences of tints were easily distinguished.

The Electric Light Company claims that the candle gives a perfectly steady and invariable light. During the experiments, however, the electric candles burned with variable intensity from time to time, although much steadier than ordinary gas flames. For instance, before and after the globes were removed, the electric lights showed a tendency to swell and contract at short intervals, and three or four times during the evening they changed color (becoming purplish)—globules of melted kaolin falling at the same time from the candles. These are, however, minor considerations in the presence of the important fact that the production of the electric light has been brought to such a high degree of simplicity, and further experiments will doubtless not only remove these slight defects, but give to the candle other qualities.

After a time the gas was relighted, but notwithstanding its great brilliancy at first, its light now seemed quite feeble, and of a dirty yellow color, in the presence of the electric illumination.

The three candles of the central chandelier were next extinguished, and the globes removed from the other three. Although the difference was now less complete, yet the quantity of light seemed to be nearly as great as in the preceding case.

The changes of the flame became more evident, but only when the candles were regarded directly; that which I could do for several minutes in succession without too great a strain on the eyes; thus showing that the electric candle-light is much less concentrated than that of the ordinary electric lamp, whose arc can be supported by the naked eye for only a few seconds.

The voltaic arc of the candle cannot be recognized, being drowned by the incandescent kaolin. When the flame is seen through a colored glass, its size becomes much smaller than a candle flame, whereas to the naked eye it appears two or three times as large. The shadows produced by the candles, even when the globes were removed, were not striking, probably owing to the judicious arrangement of the luminous centers.

Finally, two electric candles, placed on a small plank or candlestick easily held in one hand, were lighted in the usual manner, viz., by laying bits of plumbago between the carbons and allowing the currents to pass. The arc appeared almost instantaneously. The electric light was not visibly affected by the position or motion of these candles, whether erect or inverted, blown or shaken, nor when carried on a run to a distance of a couple of hundred feet. This simple and easy manipulation of a light equal in intensity to 100 Carcel burners, or 700 stearine candles, will suggest various important applications for naval and other purposes.

I shall not dwell on the different kinds of electric candlesticks, nor on the methods of lighting several candles in succession, but would refer for these and other interesting points to the accompanying explanatory documents and price list, which will be furnished, together with estimates, to any one applying to the company, whose address is given above.

M. Jablochhoff calculates that in the most unfavorable cases his electrical illumination costs from ¼ to ½ the price of gas for equal quantities of light—each candle giving an intensity of about 50 Carcel burners; he states, moreover, that in works possessing the necessary motive power, this relative cost may be reduced to one-tenth and even less. In these estimates the first cost of electrical apparatus is supposed to be balanced by that of gas fixtures—although the latter is probably greater in most cases than the former.

The electric light is most economical when but few and powerful luminous centers are used. On account of its intensity, it cannot be employed with advantage for small apartments, and hence there is no danger of its replacing gas in ordinary house illumination, until some means have been discovered for dividing it to a still greater extent than even M. Jablochhoff has done. However, it is probable that the electric candle will find no favor for street illumination, until it has been made to burn longer than at present without the devices actually used for the purpose, and until the process of lighting has been still further simplified.

The invention of M. Jablochhoff may however be advantageously employed in large halls and stores, railway stations, etc. Here in Paris it is at present used in the well-known "Magasins du Louvre," in one or more extensive manufactories, and in the large square in front of the Grand Opera.

Finally, before leaving the interesting laboratory of the Electric Light Company, I witnessed several experiments which showed conclusively that the electric candle does not radiate any more heat than an ordinary tallow dip. This is due to the fact that the intense heat of the voltaic arc is used for volatilizing the refractory kaolin, and thus for increasing the size and intensity of the flame.

A REMEDY FOR INDUCTION DISTURBANCES IN TELEPHONES.

THE induction disturbance from neighboring wires at work, which Mr. Preece likened to the pattering of rain, and which has since been compared to the less poetical phenomenon of fat crackling in a frying pan, has been successfully overcome by a plan of Dr. Muirhead's. This consists in coating the line wire with a thin insulator, and winding a thin conductor, such as tinfoil or copper strip, round the outside of the insulator. This strip is connected to earth, and acts as an induction screen for the line wire; but it need not be so closely applied as to cause any serious retardation in the line currents.—*The Telegraphic Journal*.

TRANSMISSION OF THE PRESIDENT'S MESSAGE.

No special effort was made to accomplish the transmission of the annual message of the President from Washington to New York this year with unusual speed, but very good time was made notwithstanding. On the Western Union lines it was sent on 10 wires, 11,369 words being transmitted, time being 42½ minutes. The copy was delivered in good shape, properly capitalized and punctuated. On the Atlantic and Pacific Company's lines 7,269 words were transmitted. Two Morse wires were used, on which about half the total was transmitted, the other half being perforated and transmitted automatically upon a third wire, which was also used for signaling and for general business. Copies were dropped at Baltimore and Philadelphia. The time occupied was one hour and thirty-five minutes, and the copy was delivered in good shape and satisfactorily to the press.

THE STATE OF THE GASTRIC JUICE IN TYPHOID FEVER.

THE *Berliner Klinische Wochenschrift* gives the history of a case in Professor Kussmaul's clinique at Strassburg, which tends to show that during the dyspeptic stage in typhoid fever the gastric juice contains no free hydrochloric acid, though pepsine is abundantly present, as has been already proved by Hoppe-Seyler and Parry. If the juice shows acid reaction, this is due to either acetic or lactic acid, but it may, as Kussmaul's case shows, become alkaline from the presence of bile or pancreatic juice after retching or vomiting. The absence of hydrochloric acid lasted as long as the fever and up to the eighth day after its disappearance, proving the old maxim by which typhoid convalescents are forbidden solid food for that period. As Professor Kussmaul's assistant points out, the great advantage of giving hydrochloric acid in fevers is confirmed by this case. He also mentions the experiments made on dogs by Manassein in Hoppe-Seyler's laboratory, in which, by injecting putrid liquids into their veins and creating fever, the quantity of free hydrochloric acid in proportion to the pepsine became diminished. Some old notes, made of similar experiments in Hoppe's laboratory at Berlin nearly twenty years ago, confirm this as far as the reaction of acidity by test paper goes. The gastric juice of dogs is normally always strongly acid, and this acidity is mainly due to a normally high proportion of hydrochloric acid. As Rabuteau stated only a few years ago, in the *Comptes rendus*, it amounts, on an average, to 4 per mille, or 0.4 per cent.

PHYSIOLOGY.

THE REGENERATION OF VISION—PURPLE OUTSIDE THE BODY.—The retina of the frog, after it is removed from the eyeball, deprived of every vestige of black pigment, and bleached in direct sunlight, still has power to regain its original color, though not in its original intensity. In a few hours, if kept in the dark, it will turn, first yellow, then buff-colored, and, lastly, rose-red. This succession of changes may be repeated several times over in one and the same specimen. When the retina has been bleached in the living animal before its removal from the eye-ball it is no longer able to resume its original red hue. Solutions of retina-purple in purified bile, free from ether, are also capable of regaining their color after they have been robbed of it by exposure to light. Similar solutions of the retinal epithelium (apart from the rods), freed by mechanical means from suspended particles of black pigment, likewise exhibit the above property. In the dark they

are rose colored; they are bleached by light; they regain their rosy hue once more when the light is shut off from them. This power of regeneration is most strikingly exhibited by mixed solutions of the rods and retinal epithelium.—Ewald and Kühne, *Centralblatt f. d. med. Wiss.*

THE GENESIS OF RED CORPUSCLES.—M. G. Pouchet has brought a communication on this subject before the Société de Biologie (*Gazette Méd. de Paris*). He believes the most direct method of attacking the question to consist in an examination of the blood and the intimate structure of the spleen in the Selachian fishes. By following this plan he arrived at the conclusion that in *Scyllium catula*, and probably in most vertebrates, the blood invariably contains corpuscular elements which cannot be distinguished from those which make up the splenic parenchyma. These elements are smaller than ordinary leucocytes; they exhibit a peculiar pearly luster by transmitted light; their surface presents smooth protrusions of sarcode matter; they contain a voluminous nucleus which turns slightly brown under the influence of osmic acid. These elements pass, through a series of intermediate stages, into fully formed red corpuscles; they increase in size, lose their sarcode properties to assume a regular figure, their nuclei shrink, and haemoglobin makes its appearance in their interior.—*Academy*.

VARIATIONS OF BLOOD-PRESSURE IN THE AORTIC SYSTEM.

—The peculiar undulations, synchronous with the respiratory movements, which are exhibited by kymographic tracings of arterial blood-pressure have been hitherto ascribed partly to variations of intra-thoracic pressure, partly to rhythmic stimulation of the cardio-inhibitory and vaso-motor centers in the medulla oblongata. These causes, however, are not really adequate to explain all the observed phenomena. Some of them undoubtedly operate under one set of conditions, some under another; what is wanted, however, is a general principle capable of accounting, either alone or in connection with other accessory factors, for the respiratory variations of blood-pressure under all the different conditions to which the functions of breathing and of circulation can be experimentally subjected—in artificial as in natural respiration; when the thorax has been laid open and when it is closed; when the cardiac nerves have been cut and when they are intact, etc. A general principle of this kind Funke and Latschenberger believe themselves to have discovered (*Pflüger's Archiv*, xv., 8 and 9) in the varying flow of blood through the pulmonary capillaries, determined by the varying expansion of the lungs. Every inspiratory expansion of these organs, whether it be attended by a plus or minus degree of intrathoracic pressure, must, by stretching the walls of the air cells, lengthen and narrow the individual capillaries and thus diminish their collective capacity. Conversely, the expiratory collapse of the air cells must widen the capillaries and augment their capacity. These changes must influence not merely the flow of blood between the two sides of the heart, but the tension in the aorta likewise. The primary effect of inspiration will be to raise the latter by squeezing the blood out of the lungs in the direction of least resistance—into the left auricle—and thus feeding the left ventricle with more blood. Its secondary effect will be to lower arterial tension by checking the current of blood through the lungs. Expiration will primarily lower arterial tension by lessening the supply of blood to the left auricle; its secondary effect will be to raise it by facilitating the flow through the pulmonary capillaries. These *a priori* considerations were put to the test of experiment, and a long account of the investigation is given in the original memoir. Its results confirmed the anticipations of the authors in every particular. They conclude that the essential cause of the respiratory variations of arterial pressure is always to be sought in the varying capacity of the pulmonary capillaries due to the alternate expansion and contraction of the lungs. In artificial as in natural breathing, the inspiratory rise of tension is owing to the blood being squeezed out of the lungs into the left heart; the expiratory fall, to the retention of blood in the dilated pulmonary capillaries. In natural breathing, the respiratory variations of intrathoracic pressure of course contribute—but only as accessory elements—to the general result; the same may be said of variations in the rate of the heart's action.

ON TISSUE-METABOLISM IN BLOODLESS FROGS.—It is well known that a healthy and vigorous frog will live for days after the whole of its blood has been withdrawn from the vessels and replaced by a 0.75 per cent. solution of common salt. Oertmann has recently availed himself of this fact in order to obtain a direct answer to the question whether oxidation takes place in the blood, in the tissues, or in both together (*Pflüger's Archiv*). He compares the amount of oxygen consumed and the amount of carbonic acid given off by normal frogs with the corresponding values in the case of "salt" frogs. A series of comparative experiments, carried out with all needful precautions against error, showed conclusively that in the frog the processes of oxidation are in no way affected by complete removal of the blood, the tissue-metabolism of the bloodless frog being maintained at the normal level. From this it follows that oxidation must go on in the tissues, not in the blood. Of course the salt water cannot take the place of the blood for any length of time; the "salt" frogs only lived for a period varying from one to three days; but during the first ten or twenty hours of this period the energy of their metabolic processes was not in any degree reduced.

ON THE BEHAVIOR OF GLYCOGEN WHEN INTRODUCED INTO THE CIRCULATION.—Existing statements on this subject are in conflict with one another. Pavy, for instance, found the injection of glycogen into the vessels of a living animal to be followed by the appearance of sugar in its blood, and—when the quantity injected was considerable—in its urine likewise. Schiff altogether failed to discover sugar either in the blood or in the urine. Böhm and Hoffmann (*Archiv für exper. Pathol. und Pharmacologie*, vii., 6) have investigated the matter afresh. They find that if from three to ten grammes of pure glycogen be introduced into the jugular vein of a cat, the urine is more copiously secreted, and assumes a reddish tinge owing to the presence of dissolved haemoglobin. It contains no red disks. Glycogen, therefore, resembles a glycerine and many other substances in exerting a solvent action on the colored elements of the blood. On examining the urine by the polariscope, and testing it with Fehling's solution, they found, to their surprise, that the indications furnished by the two methods did not agree, the former indicating the presence of from five to ten times as much sugar as the latter. Further inquiry showed that only a part of the glycogen is transformed into a compound able to reduce the copper solution—probably glucose; another part being converted into a carbo-hydrate which agrees in all its properties with the achroodextrin of Brücke and Nasse.