such a black line as this would, if placed at ten inches distance, subtend an angle of

$\frac{1}{3}$ " very nearly (one ninth of a second).

Viewed with a power of 18, its angle would be
2 seconds.

With a power of 540 the visual angle would be raised to
60" or 1'

(more accurately $\frac{1}{9.2}$ second, which would give 21.75 instead of 18, and then the power would be 650 instead of 540).

If therefore the lines on Nobert's plate, 112,000 to the inch, were really simple black lines, they ought, with ordinary sight, to be easily distinguishable with a magnifying power of about 600 diameters, and this would make a visual angle thirty times greater than Mr. Broun's result above stated.

But these lines in general are grooves ploughed in glass of a prismatic, round, or irregular section; and since they can only be seen with extremely oblique illumination (looking as it were sideways) by means of the very wide-angled objective generally found necessary, it is probable that the available shadow may be much less than the supposed breadth of the line, and quite indeterminable.

In cutting lines on glass with a diamond, I have been occasionally much surprised with the beautiful little curls or ringlets cut cleanly out of the glass surface; but this only happened when the diamond-holder was rotated into one particular position, and inclined at one particular angle. When, therefore, we are looking at such fine "Nobert" grooves in glass, we are somewhat in the dark as to what kind of object or shadow we are really observing. For if different grooves be cut in glass, forming differently shaped channels in section, whether oval, circular, square, or triangular, a remarkable difference in appearance will be observed when viewed and illuminated obliquely with transmitted light. Nobert's grooves are, as it were, unknown objects, for we know not and never shall know the sectional shape of the hollow rulings that compose them.

UNDERGROUND TEMPERATURE.

Report of Committee read in Mathematical and Physical Science Section of the British Association, Glasgow Meeting.

PROFESSOR EVERETT submitted the report of the Underground Temperature Committee. He began by explaining some of the thermometers which had been used for particular purposes, and afterwards said that the subject which had been under the consideration of the committee was the convection of water in bores and of the means to prevent it. A great many experiments had been made, but they had been all rejected. They had, however, obtained some which were the best that had yet been got. There was an exceedingly deep bore at Sperenberg, about 20 miles from Berlin. It was 4052 Rhenish feet, or 4172 English feet deep, and the bore was almost entirely through rock salt, and full of water, and the temperature at the surface was 7.2 deg. Reamur; at 700 ft. the temperature was 17.2; and at 3390 ft., the deepest point at which reliable observations were obtained, the temperature was 37.2, and that gave 1 deg. Fahr. to 50 Rhenish feet. These observations showed that there was a decided decrease of the rate of increase as they went deeper. The next thing the committee had directed their attention to was flooding, and in that the most careful observations had been made to ascertain the effect of convection, and whether flooding was necessary. The first experiment was made to ascertain whether the water at the bottom of the bore had the normal temperature of the surrounding rock, because if the water at the bottom did not possess that qualification the water in other parts would not. The way in which it was tested was, that when the bore had gone to a certain depth an advance bore was made of smaller diameter; and into that advance bore a thermometer was let down, and the bore then plugged at the place where it communicated with the big bore. The thermometer on being taken out gave a temperature of something more than 36 deg., and the same thermometer let down without the bore being plugged gave a reading of 33 deg. Reamur. Another thermometer of a different construction gave readings similar to those of the other. The committee had under consideration the obtaining of a plug which would effectually separate the water of the bore below from that above, and at the same time be easy to let down and draw up. Great difficulty had been experienced in reference to that point, and that would now be the aim of the committee to secure such an appliance in order to get correct observations. Additional experiments had been made at a place called Swinderby, near Scarle, Lincoln, 2000 ft. deep, which he understood was the deepest bore in the east of England. At that depth the temperature was found to be 79 deg. Fahr., and deducting from that the temperature of the surface—50 deg.—gave a difference of 29 deg. Another observation at 1950 ft. gave a temperature of 78 deg. In addition to these, Mr. Symons had taken observations in a well at Kentish Town for the purpose of determining whether at a given depth—of say 1000 ft.—there was any change of temperature, but as the wire by which the thermometer had been let down had increased in length to an average over the two years of about 5 ft., there was really no reliable result obtained. Favorable observations had also been taken at Angers, in the North of France.

ACTION OF SALICYLIC ACID ON THE BONES.

At the meeting of the Niederrheinische Gesellschaft in Bonn on December 6th, 1875, Prof. Koster reported the results of his experiments on the action of salicylic acid on the osseous system. Pieces of spongy bone become soft as leather in a few days when placed in a half per cent solution of salicylic acid, while compact bone tissue is very slowly softened. The enamel of the teeth is very slightly affected by it, but the dentine where it is exposed by caries is rapidly destroyed. Dentists have already recognized the evil effects of salicylic acid on the teeth. The increased amount of the salts of lime in the urine soon after salicylic acid has been taken, shows that the acid deprives living as well as dead bone of its lime salts.

TAPE-WORM IN MEAT.

AN article taken from the *Abeille Medicale* points out the danger of eating meat in the half-raw condition, called by some persons "rare," as the ova of the tape-worm are only killed by thorough cooking. Those whose tastes lead them to select meat in this condition are recommended to eat the flesh of the horse, which is less infected by the *Tænia* than the ox, sheep, or pig.

PLASMA TUBES OF THE HUMAN SKIN.

AXEL KEY and GUSTAVE RETZIUS give a brief statement of the results of their researches on the plasma passages of the skin, especially of the superior extremities. A more complete account of their studies will be found in their work, now passing through the press, "On the Anatomy of the Nervous System and the Connective Tissue." They mention the fact that, besides the true efferent lymphatic vessels, they have discovered in the skin an extended system of large plasma passages communicating with the lymphatic vessels mentioned, and resembling those which they have mentioned and drawn in the last fasciculus of their work, as existing in the mucous membrane of the nose. In the deepest parts of the skin, the plasma passages around the constituent parts (sweat-glands, hair-bulbs, etc.) are relatively large and wide; in the external portions they become more slender but abundant, and they form a fine net-work in the papillæ. They are not limited by the epidermis, however, but cross the papillæ in many places and penetrate into the rete Malpighii. Our authors have, in fact, succeeded in injecting in the rete Malpighii a fine net-work of plasma tubes with compact meshes which fill the intervals between the various cellules in every direction as far as the corneous layer. The intercellular injection is arrested externally by the latter cell layer; but there is a system of passages at the surface of the skin which are so disposed that the injection penetrates the excretory ducts of the sudoriparous glands. With regard to the plasma passages of the rete Malpighii, our authors remark that M. Bizzozero endeavored, several years ago, to prove that the spines of the cells of the rete do not cross each other like the teeth of two wheels, but that these "stachels and riffs" from adjacent cells hang together by their points, leaving small spaces and passages between them. It is quite evident that it is these intervals which K. & R. have injected in the rete Malpighii, and which communicate with the plasma tubes of the dermis itself.—*Nordiskt Med. Arkiv.*

DEAFNESS AS AN INTRACRANIAL DISEASE.

At the recent meeting in Philadelphia of the Conference of Principals of Deaf-mute Institutions, Dr. Turnbull, of Philadelphia, was invited to speak, and entertained the Conference with illustrations of the external and internal ear. He believed that deafness (excluding cases manifestly due to disease of the apparatus of hearing) is a rare complication of intracranial disease. It is much less common than disease of the optic nerve, extending to the brain substance. One case he had recorded of abscess and tumor in the cerebellum with deafness of one ear. Dr. Jackson, of London, had recorded a tumor of the left cerebral hemisphere, where there was deafness of both ears.

These facts go to prove that the brain of the deaf and dumb is as capable of receiving and retaining any amount of intellectual knowledge as that of his hearing brother or sister, provided it is made available to him by the eye, not by the ear.

DYSPEPTIC ASTHMA.

At a late meeting of the Berlin Medical Society, Prof. Henoch detailed the histories of several cases of this affection occurring among children, which had come under his observation. The symptoms were alarming dyspnea, with pallor of the face and lividity of the lips, coldness of the extremities, small and extremely frequent pulse, superficial, and very frequent respiration, and great mental apathy. The affection apparently depended upon disturbance of the digestive functions. There were in all of the cases some tumidity and tenderness in the epigastrium; but in spite of the threatening symptoms, not the least indication of cardiac or pulmonary disease could be found, on repeated and careful examinations. In one case, that of a child of nine months old, in whom there had been constipation and vomiting, great relief was afforded by the application of numerous dry cups to the chest, and recovery from the attack coincided with the eruption of an incisor tooth. The other patients were children of nine years, three months, and two years, respectively, and all were relieved by the action of an emetic or cathartic. Prof. H., although sceptical at first, ultimately came to agree with the opinion expressed by Traube, who saw the first case in consultation; namely, that the disturbance in the stomach excited a reflex vaso-motor spasm in the small arteries, whence followed the coldness of the extremities, imperceptible pulse, stasis in the venous system and right heart, cyanosis, accumulation of carbonic acid in the blood, and dyspnea. He therefore assigns the name *asthma dyspepticum* to the affection.—*Berl. klin. Woch.*

SUSPENSION IN SPINAL CURVATURES.

At the recent meeting of the American Medical Association, Dr. Benjamin Lee, of Philadelphia, introduced a little girl, twelve years of age, illustrating the safety and feasibility of suspension in the treatment of spinal curvatures. The apparatus shown was a strong frame-work, from the middle of which was suspended his "spinal swing," being a rope passing over a pulley, carrying at one end a steel bow, to which are attached straps, to support the chin and occiput, and at the other wooden ovals to serve as handles. The head straps being so adjusted as to make equal traction on the chin and occiput in the line of the spinal axis, the patient, taking hold of the handles, drew down upon the rope until her feet were lifted from the floor, and she swung freely, half the weight being supported by the neck, and half by the arms. She then drew herself up hand over hand until her head nearly touched the pulley, and then slowly let herself down again.

A NEW ADHESIVE PLASTER.

A MIXTURE of twenty parts of mucilage and one part of glycerine constitutes an excellent shining and supple plaster, far cheaper than the resin and diachylon, and lasting more than a year without deterioration. Three or four layers of the mixture require to be spread over each other on the linen or other stuff, allowing sufficient intervals for the successive layers to dry.

A VENETIAN surgeon, Dr. Minich, has published a brochure on the antiseptic cure of wounds, in which he advocates the employment of sulphate of soda in dressing of wounds (and also against erysipelas), in preference to phenic and salicylic acid. It is much cheaper, and not attended by the inconveniences of these acids. He uses one part of sulphate in nine parts of water, adding one part of glycerine. Dr. Minich shows that happy results have been obtained by this method in Venice in a large number of cases.

ON PREPARING SOME COLORED FIRES (BENGAL LIGHTS) USED IN PYROTECHNY.

By SERGIUS KERN, St. Petersburg.

IN preparing colored fires for fireworks by means of the usual formulæ given in many manuals of pyrotechny, it is often very necessary to know the quickness of burning of colored fires, so as in some cases, as decorations and lances, they must burn slowly, in other cases, as wheels, stars for rockets, and Roman candles, they must burn quicker. Working for some months with many compositions of such kind, I prepared three tables of colored fires (red, green, and violet), where every formula with a higher number burns quicker than a fire with a lower number. For instance, No. 5 burns quicker than No. 6 and slower than No. 4. These tables will, I think, be of much assistance in the preparation of fireworks.

Green-colored fires.

No.	Potassium Chlorate. Per cent.	Barium Nitrate. Per cent.	Sulphur. Per cent.
1.	36	40	24
2.	29	48	23
3.	24	53	23
4.	21	57	22
5.	18	60	22
6.	16	62	22
7.	14	64	22
8.	13	66	21
9.	12	67	21
10.	11	68	21
11.	10	69	21
12.	9.5	69.5	21
13.	9	70	21
14.	8.5	70.5	21
15.	8	71	21

Red-colored fires.

No.	Potassium Chlorate. Per cent.	Strontium Nitrate. Per cent.	Sulphur. Per cent.	Carbon Powder. Per cent.
1.	40	39	18	3
2.	32	46	19	2
3.	27	51	20	2
4.	23	55	20	2
5.	20	58	20.5	1.5
6.	18	60	21	1
7.	16	61.6	21.2	1.2
8.	15	63	21	1
9.	13	64	22	1
10.	12	65	22	1
11.	11	66	22	1
12.	10	67	22	1
13.	10	67.25	22	0.75
14.	9.25	68	22	0.75
15.	9	68.35	22	0.65

Violet-colored fires.

No.	Potassium Chlorate. Per cent.	Calcium Carbonate. Per cent.	Malachite powdered. Per cent.	Sulphur. Per cent.
1.	52	29	4	15
2.	52	28	5	15
3.	52	26	7	15
4.	52	24	9	15
5.	52	23	10	15
6.	52	21	13	15
7.	51	20	14	15
8.	51	18	16	15
9.	51	16	18	15
10.	51	15	19	15
11.	51	13	21	15
12.	51	11	23	15
13.	51	10	24	15
14.	51	8	26	15
15.	51	6	28	15

—*Chemical News.*

DETERMINATION OF GOLD IN PYRITES.

By M. H. SCHWARZ.

THE author melts 100 grms. pyrites with 46.6 grms. fine iron turnings under a layer of common salt. The mono-sulphide formed is powdered, and attacked with dilute sulphuric acid in a gas apparatus, the sulphuretted hydrogen being received in ammonia. The matter insoluble in acid is collected, washed, dried, and roasted. It is then mixed with borax and about 2 grms. granulated lead, and the mixture melted in a muffle until the lead collects in a single globule floating in ferruginous scoriae. This globule is detached, and submitted to cupellation.

CEMENT FOR GLYCERINE MOUNTING.

MR. KITTON, whose authority on this subject is admitted, gives the following piece of advice in a recent number of *Science Gossip*: White lead in powder, red ditto in ditto, litharge in ditto—equal parts of each. These are ground together with a little turpentine until thoroughly incorporated, then mix with gold size. The mixture should be sufficiently thin to work with the brush; it is perhaps scarcely necessary to say that the edge of cover and slide should be free from moisture before applying the cement, and the first coat allowed to dry before putting on a second. The last can be applied somewhat thickly, or, as the Japanese say, floated on. No more of the cement should be made than is required for present use, as it soon sets and becomes unworkable. To save the trouble of grinding, a stock of the mixture can be kept ready ground in a bottle.

SALICYLIC COTTON WADDING.

FOR this purpose a white wadding completely freed from fat by sodium carbonate is necessary. E. Rennard saturates in a porcelain mortar 10 parts of this wadding with a solution of 2 parts salicylic acid in 15 of alcohol, and 35 of water of 25 to 30° C. (77° to 86° F.). After the solution has been completely absorbed, and uniformly distributed through the cotton, the latter is subjected to pressure until 25 parts of the solution are recovered, which may be used for wetting a fresh portion of cotton. If it is desired to avoid expression, only one part of salicylic acid is employed, but the full quantity of liquid mentioned above, which is about the smallest quantity with which a uniform moistening of the cotton can be effected. The wadding is then dried at ordinary temperature, since a higher heat causes a reddish color. Thiersch has recommended the addition of some glycerine, in order to fix the acid more permanently upon the cotton; but Rennard states