

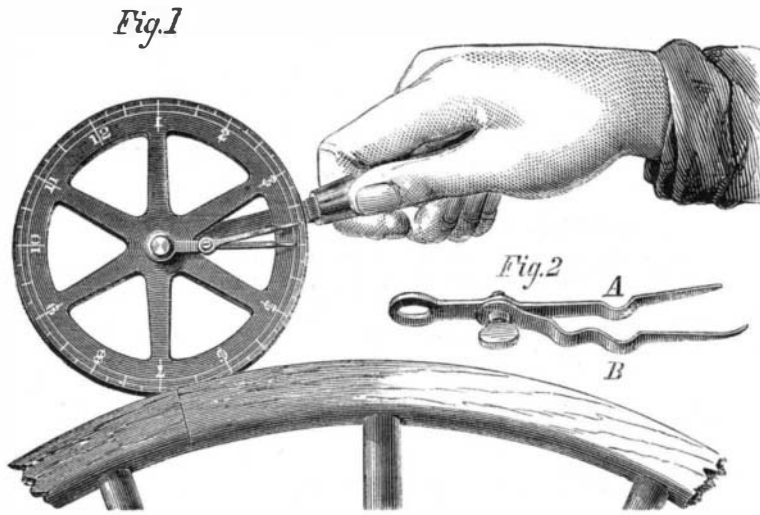
BLACKSMITH'S MEASURING WHEEL.

Mr. Thomas R. Way, of Springfield, Ohio, is the inventor of the device herewith illustrated, for measuring the circumference of wheels and the length of the iron from which tyres therefor are to be made. The peculiarity of the apparatus consists in an extra pointer pivoted to the hand which indicates the wheel measure, for the purpose of deducting from the latter the amount to be allowed for expansion of the metal.

The wheel shown revolves freely on its axle, to which, however, the hand, A, is rigidly affixed. The pointer, B, is secured to the hand, A, by a screw, as shown in Fig. 2, so that its end may be set at any desired distance from that of its support. The device is applied and carried around the wheel to be measured, as represented in Fig. 1, where the hand, A, indicates the length of circumference passed over. The pointer, B, is then fastened with its end at a distance to one side of the hand equal to the amount of expansion of the iron. The apparatus is afterward carried over the tyre, which is cut at the point indicated by B.

The invention may also be employed by coopers for measuring hoops, in which case the extra pointer may be used to indicate the allowance for lap.

placid white swan is probably the best known of all the species, and is certainly, when on the water, one of the most beautiful of birds. Virgil cited the black swan as a *rara avis*, and as the black variety is indigenous to Australia only, the Mantuan poet's acquaintance with it must have been ra-



BLACKSMITH'S MEASURING WHEEL.

thermythical. The black necked swan (*cygnus nigricollis*), of which we present an illustration, is a native of South America, and it rivals the European white bird in the color of its body and wings, while its neck and head are of a splendid black color. In the red color of its bill it also resembles the white swan. A pair of these birds were taken to England and placed in the zoological garden of the late Earl Derby, at Knowsley, near Liverpool; and when the collection was dispersed, at Earl Derby's death, the Zoological Society, of London, became the possessors. Specimens of the variety are also to be found in the gardens at Amsterdam and Cologne.

As shown in our engraving, the young birds are singularly undeveloped, their necks being especially at variance with those of the grown birds. But time adds to them not only their singularly graceful form and beautiful plumage, but also the prodigious strength for which the whole species is remarkable, instances being on record wherein men's limbs have been broken by the blows of the wings of infuriated swans, whose pugnacity at breeding time is notorious. The females lay from five to eight eggs, the period of incubation being six weeks.

The Year's Business at the Patent Office.

A statement prepared by the Commissioner of Patents for the coming report of the Secretary of the Interior shows that, during the year ending September 30, 1873, there were

filed in the Patent Office 20,354 applications for patents, including reissues and designs; 283 applications for the extension of patents, and 519 applications for the registering of trade marks. Twelve thousand nine hundred and seventeen patents, including reissues and designs, were issued; 235 extended, and 955 allowed, but not issued by reason of non-payment of the final fee; 3,274 caveats were filed, and 476 trade marks registered. The fees received during the same period from all sources amounted to \$701,626.72, and the total expenditure to \$699,449.69, making the receipts \$2,177 in excess of the expenditures. The appropriation asked for the fiscal year ending June 30, 1875, is \$693,500. The expenditures included \$40,000 for the publication of the *Official Gazette*, \$40,000 for printing current drawings, and \$60,000 for the reproduction of old drawings. These items were unusual, and account for the absorption of most of the customary excess of receipts over expenditures. The cost of printing current drawings has heretofore been defrayed out of the government printing-office appropriations. In regard to the reproduction of old drawings, the Commissioner considers the amount expended for that purpose a good investment, not only with reference to the intelligent advancement of the manufacturing interests of the country, but financially, as they are now being sold at two or three times their actual cost. The Commissioner again invites earnest attention to the great want of additional room for the proper transaction of the business of the Office, stating that is utterly impossible to properly classify the work of the Office, in order to insure its being economically and well done, in the present crowded state of the files, records, and exhibits.

Effect of Artificial Addition of Phosphates to the Food of Lambs.

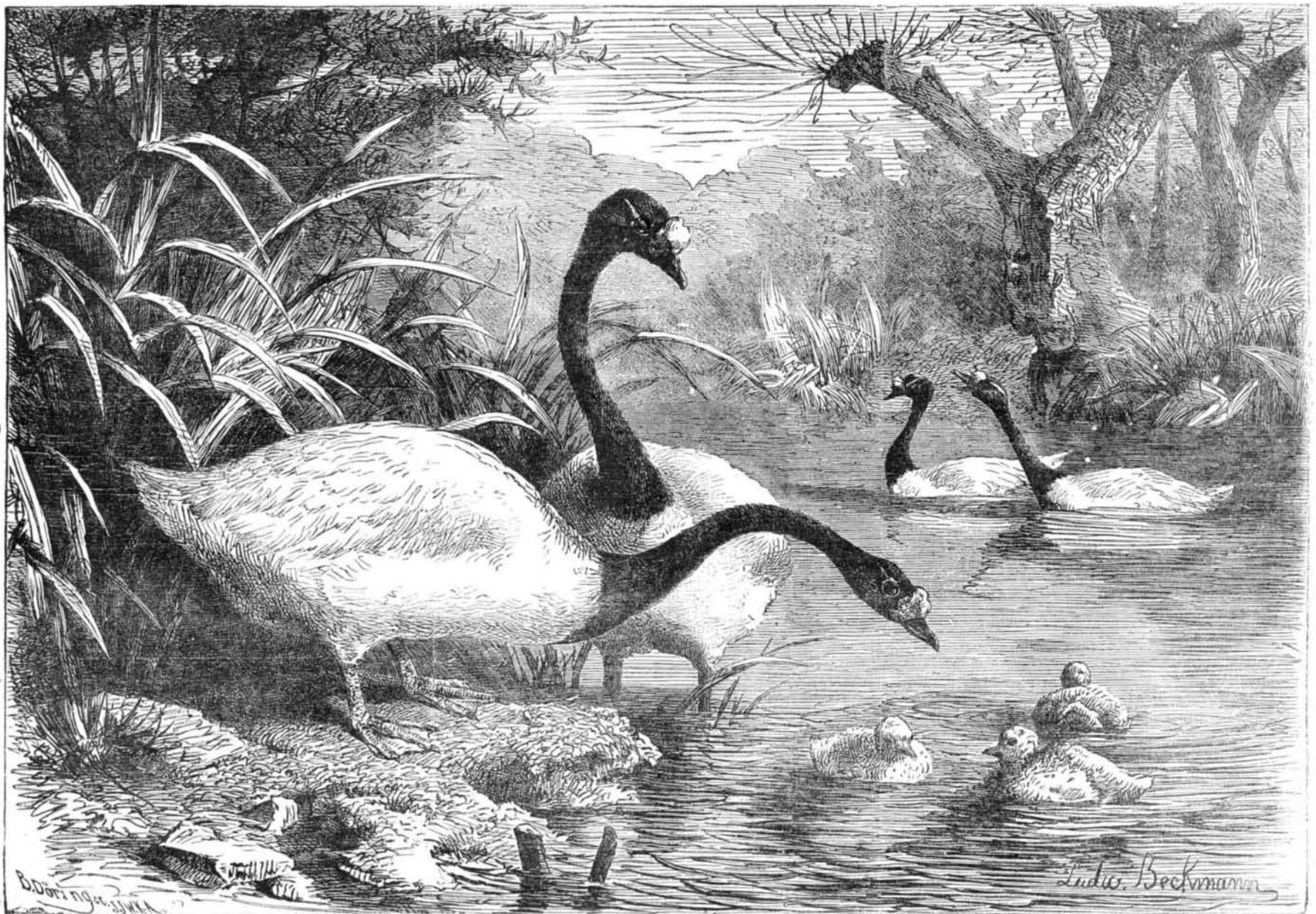
V. Hofmeister states that two lots, each consisting of three eight weeks old wether lambs, were fed from May to December on hay and potatoes, with a little salt, this diet being selected as characteristically poor in phosphates. One lot received precipitated tricalcic phosphate with its food, the other lot none. During the last 77 days most phosphate was given, the phosphatic diet then containing one fourth more phosphate than was supplied by the vegetable food. The lambs gained about 18 lbs. per head in the six months. Those receiving phosphate showed a distinctly better appetite and drank more water than the others, but their greater increase in weight was insignificant. When slaughtered the only difference between the two lots was a slightly larger weight of stomach, intestines, and lungs, in the case of the lambs receiving phosphate. Five bones of two lambs in each lot were carefully examined. The fresh bones of the

The Novel Steamer.

The saloon steamship designed by Mr. Bessemer, to make sea sickness impossible, is well under way at Hull, England. The framing is nearly complete, and a good part of the outer plating has been put on. The steamer is 350 feet long, 40 feet broad inside of her paddle boxes, and of 2,774 tons burthen. She will be driven by two sets of paddlewheel engines, acting upon a double set of paddlewheels, situated 100 feet apart, the aggregate power of the engines being no less than 4,600 horse power. The two ends of the ship are alike, and each will be furnished with a rudder. Her most characteristic feature is her saloon, which will be 70 feet long and 30 feet wide, and suspended upon massive pivots at the center and at the extremities. Thus supported, it will be brought under the control of powerful hydraulic gear, worked by the principal boilers of the ship. This gear will be so arranged that it is expected a man will be able to impart to the saloon a rolling motion in relation to the ship precisely the reverse of that which the ship herself receives. The engines, it is anticipated, will drive the vessel at a speed exceeding 20 miles an hour.

THE BLACK NECKED SWAN.

The swan, in one or another of its numerous varieties, is aboriginal in all parts of the globe. A large number are to be found in our beautiful Central Park. The proud and



SOUTH AMERICAN BLACK NECKED SWANS.

lambs fed with phosphate were on an average slightly the heavier; they had a mean specific gravity of 1.384, the specific gravity of the other lot being 1.350. Analysis showed that there was generally more water and less fat in the bones of the lambs fed with phosphate; the dry bones of these lambs also generally contained a slightly larger proportion of incombustible matter; but looking at the absolute quantities found in the bones of the two lots, there was no increase of incombustible matter by feeding with phosphate, but a small increase of phosphoric acid, coupled with a diminution of lime. The amount of fat in most of the bones was very high, reaching to 40 percent in the dry bone of the fore leg.

Experiments were made as to the digestibility of phosphates. The lambs fed on hay and potatoes (chiefly the latter) digested during six days 25.8 per cent of the phosphoric acid, and 46.0 per cent of the lime contained in their food; and in another experiment of four days, 40.9 per cent of phosphoric acid and 20.6 per cent of lime. In a further experiment of six days, with two year old sheep, on a similar diet, 43.3 per cent of the phosphoric acid and 43.0 per cent of lime in the food were digested. When the lambs received 6 grammes of precipitated phosphate per day, the whole of the extra phosphoric acid was taken up; but when the quantity was increased to 9 grammes, only about half the phosphoric acid was digested. In no case was all the lime of the phosphate taken up, but a greater proportion of the lime was taken up from the larger dose of phosphate. The old sheep received superphosphate. When 10 grammes were administered per day, the whole of the soluble phosphate was digested; but when the dose was increased to 20 grammes, only 64 per cent of the soluble phosphate was digested. As with the lambs, a greater proportion of lime was taken up from the larger dose of phosphate.—*Journal of Chemical Science.*

Photographs in Natural Colors.

After many unsuccessful attempts, I have at last been fortunate enough to discover a method of producing, with great ease and certainty, heliographic prints whose colors are closely allied with those of nature. I have obtained by my method reproductions of colored glass and stamps. I can also obtain landscapes in the camera, but with colors rather weak in nature, the result, no doubt, being capable of improvement by having recourse to a better adapted apparatus.

My method of operating, at which I have arrived after numerous trials and experiments, I will now describe:

A sheet of paper, with as fine a grain as possible, is plunged into a silver bath made up as follows:

Nitrate of silver..... 20 parts.
Distilled water..... 20 "

are taken, and, as soon as a solution has been made, there is added:

Alcohol..... 100 parts.
Nitric acid..... 10 "

When the sheet has been thus treated and dried again, it is further plunged into a solution of

Hydrochloric acid..... 50 parts.
Alcohol..... 50 "
Nitrate of uranium..... 1 "

A little zinc white is dissolved into the hydrochloric acid beforehand.

After this double treatment, the sheet of paper is exposed to sunlight for a short time, until its surface has assumed a violet blue tint. It is then immersed again, after desiccation, in the silver, as also in the hydrochloric bath. These operations are repeated until a most intense blue has been obtained, this being the only way to secure very vigorous images.

Before the paper is altogether dry, it is put into another bath, made up by adding a few drops of a solution of mercury, dissolved in nitric acid, to some distilled water. The sheet is allowed to remain from five to ten minutes in this last named bath, and is then dried by contact with blotting paper.

The sheet thus sensitized is then exposed to light under colored glass—a colored magic lantern slide, for instance; and after a period of twenty to thirty seconds in the sunlight, an impression on a white ground is obtained, with all the colors of the model. The colors are more vivid, and the rapidity quite as great, if there is added, to the bath just mentioned,

Saturated solution of bichromate of potash or ammonia..... 2 parts.
Sulphuric acid..... 2 "
Chlorate of potash..... 1 "

To fix the prints in some degree, they are washed in plenty of water, and then immersed in

Ammonia..... 5 parts.
Alcohol..... 100 "

After again washing, the impression is put in a bath saturated with an alkaline chloride. Then, after a final washing, the image will be found to resist for a considerable time the action of diffused light.

ACTION OF COLORED GLASS.

1. Much greater rapidity is obtained if the chloride of silver paper is darkened under violet or blue glass.

2. If, on its exit from the nitrate of mercury bath, the sheet is exposed under a colored glass, and there are interspersed, between the sunlight and the glass, screens or glasses of different colors, it will be observed that the colors appear more rapidly under the yellow, green, and red screens, than under the blue and indigo ones.

COMPLEMENTARY COLORS.

The phenomenon of complementary colors, observed by M.

Bequ rel when plunging the impressions in ammonia, is exceedingly easy to produce with paper. To effect this, it is only necessary to put the print, after it comes out of the frame, into a solution of carbonate of soda, and then plunge it, after washing, in a solution of nitrate of lead, and expose it to sunlight in a bath of an alkaline chloride. The phenomenon may also be produced in several other ways.

To reproduce landscapes in the camera, it is necessary to prevent, as much as possible, the action of diffused light, and to do this a cone of cardboard of sufficient length is fixed in front of the lens. The time of exposure with a Darlot lens of about eight inches focal length is from fifteen minutes to an hour, operating with an open stop and in full sunlight.—*M. De St. Florent.*

THE DEEP INJECTION OF CHLOROFORM.

In a paper recently read before the Academy of Medicine, Professor Roberts Bartholow, M. D., says:

It is true that the injection of a few drops of chloroform into the gums for the relief of toothache has been practiced by others, and by myself, with success; but hitherto, as far as I am aware, no one has used the deep injection of chloroform for the cure of *tic douloureux*. Indeed, the hypodermic injection of chloroform has been regarded as improper, owing to the violent local inflammation which follows its introduction to the subcutaneous areolar tissue.

The ill effects produced by the injection of chloroform into the areolar tissue are these: vaporization of the chloroform and consequent gaseous distention of the surrounding parts, painful swelling, inflammation, and the formation of an abscess. The pain experienced by the patient at the moment of injection is also considerable; and as the needle is withdrawn, the chloroform acts with energy on the wounded skin. These are very serious and almost insuperable objections to the hypodermic injection of this agent. These objections do not hold against the deep injection of chloroform according to the method which I practice for the cure of *tic douloureux*. It is true considerable pain is experienced and swelling arises, but the pain quickly subsides, and no inflammation ensues and no abscess is produced.

The needle is inserted under the upper lip, which is raised, and passed so deeply that its point shall rest near the infra-orbital foramen. The chloroform is then slowly injected. When the needle is withdrawn, firm pressure from the cheek is made over the point of insertion of the needle, and is maintained for a time to insure the diffusion of the chloroform.

It is generally admitted that injection of the anodyne at the site of pain is not necessary to the relief of neuralgia. The curative effect is supposed to be due to the impression made by the anodyne on the center of consciousness. While this is undoubtedly true, there are many reasons for believing that the local influence of an anodyne on the end-organs, the seat of a painful impression, is very serviceable, for pain of peripheral origin is made of two factors, an irritation of the sensory nerves, a realization of this irritation by the centers of conscious impressions. Furthermore, there are good reasons for believing that improvement in the condition of nerves, the seat of a painful sensation, reacts beneficially on the center with which they are physiologically and pathologically connected, although the peripheral pain may be the reflection outwardly of a centric lesion.

It is a singular anatomical fact that the facial vein communicates with the pterygoid plexus and the cavernous sinus; hence an injection of chloroform into the part I suggested and practiced in this operation must reach the brain more directly than by any other route. The effect, hence, may be much more decided than when injection is practiced into remote parts.

Case 1.—Mr. M—, aged about fifty years, married, and by occupation a book keeper; a tall, rather spare man, of nervo-sanguine temperament. His hair and beard are freely sprinkled with gray. Although pursuing a sedentary occupation, he has had considerable outdoor exercise, and led a rather active life. Being in good circumstances, his hygienic surroundings have been favorable. He has lived freely and has always had a good appetite and vigorous digestion. He is accustomed to the daily use, in moderation, of whisky and tobacco.

About two years ago Mr. M. began to suffer with pain in the infra-orbital branch of the fifth nerve. The attacks appeared with more or less frequency during the ensuing eighteen months, and gradually increased in severity.

When he presented himself to me for treatment, he was in the following state: he was emaciated, and his countenance was anxious and worn. Owing to the extreme suffering which mastication induced, he had great difficulty in getting a sufficient supply of food. Every motion of the lip, the gentlest washing of the face, a touch of the cheek, induced a paroxysm of pain of horrible severity. The pain was on the right side of the face, and was experienced in the infra-orbital nerve and its terminal branches. During the paroxysm, the muscles of the face were convulsed, the eye injected, and profuse lachrymation occurred. There was great tenderness to pressure over the infra-orbital foramen, and a slight touch induced a paroxysm of pain. His teeth, although not very good, did not appear to be the seat of the irritation, for no pain was developed by pressure on or by striking them sharply. Raising of the upper lip always caused a severe paroxysm. In consequence of this, talking was painful, and the attempt to smile brought on an agony of suffering, so that he avoided seeing his friends. There were no evidences of intra-cranial disease except neuralgia, nor was there a history of specific infection.

I determined, as the patient was naturally most anxious to obtain relief, to inject chloroform. Charging the syringe

with half a drachm of Squibb's chloroform, I passed the needle deeply under the lip, according to the method which I have already described, and injected the chloroform in the neighborhood of the foramen. Mr. W. experienced a very severe paroxysm of pain at the moment: this was succeeded by burning pain at the site of the injection, numbness of the lip, giddiness and sopor, and swelling of the cheek. In rising to walk, he staggered and had difficulty in maintaining the vertical position. He went immediately home and laid down, in consequence of the continued vertigo and drowsiness. The giddiness did not entirely disappear for twenty-four hours or more. The pain ceased and has not since returned, a period of more than three months having now elapsed. The patient did not again present himself until three weeks, being desirous to ascertain, beyond peradventure, that his relief was permanent, a fact which he could scarcely realize after the protracted and agonizing suffering which he had endured. A remarkable improvement had occurred in general condition in this time. He had gained largely in weight, and his countenance wore a cheerful expression, instead of the anxious and suffering appearance which it had before presented.

Case 2.—Mr. E. V. W—, farmer by occupation, aged about fifty-six, a man of medium height, compactly built, and of bilio-nervo-sanguinous temperament. He always had enjoyed good health and led an active outdoor life. About five years ago, he began to experience decided pain in the infra-orbital division of the right fifth nerve. The paroxysms occurred at first at long intervals; within the past year they have rapidly increased, and during the last three months have been almost continuous. During this time, the lightest touch on the surface of cheek, a current of air, washing the face, raising the lower lip, and especially the mastication of food, have given rise to horrible paroxysms. Lately he has found it necessary to eat alone. The frightful contortion of the muscles of the face, and the rolling of tears down his cheek during mastication, have excited so much apprehension in his family and friends as to render this isolation necessary.

As is usual in these cases of *tic douloureux*, the countenance of this patient expressed great suffering. He looked worn and anxious. When giving me his history, he had repeated paroxysms, during which the muscles on that side of the face became convulsed, the tears rolled down his cheeks, he ceased to speak, and his countenance wore an expression of great agony. He described the pains as of two kinds: a sensation of painful vibration in the face, eye, and forehead, and sudden darting pain, of intense severity, shooting up through the jaw to the eye and head. When I lifted up the lip to examine the mouth he had an atrocious attack, and begged me to desist until the paroxysm ceased. There was no disease of the teeth. Beside the neuralgia, he had no symptom of cerebral disease. His functions were otherwise normal. The loss of flesh was plainly due to the difficulty experienced in taking in a sufficient supply of food.

I injected, in the way already described, thirty minims of chloroform. This brought on a severe paroxysm of pain, which continued for a few minutes, but was succeeded by a feeling of relief, numbness of the face and lip, some drowsiness and swelling of the cheek. The relief to the pain lasted nearly twenty-four hours, when a light paroxysm ensued and the injection was repeated. In all, four injections were made in space of a week, but no pain was experienced after the second injection. At the expiration of two weeks, having had, meanwhile, no recurrence of his old malady, he called to say he was perfectly well. As he has not since presented himself, I have no doubt that he continues free from any return of the disease.

EMBALMING THE DEAD.—In the Vienna Exposition there were several specimens of the embalming of parts of the human body. Those exhibited by Dr. Marini, of Naples, were particularly to be noted. One of these was a large round table made of muscles, sinews, etc., of a dark brown color, with a handsome polish. Among his other exploits he petrified Thalberg, the deceased pianist, and the widow is said to keep the corpse in her drawing room. He also embalmed Mazzini, and so well that some of the more economical admirers of that statesman urged that the body should be set up in Rome as a statue, and thus save expense.

SAGACITY OF BIRDS.—Certain facts render it probable that birds, in some manner, become aware of cholera infection in the air. Recent European journals state that at Munich, where several cases of cholera have occurred, the rooks and crows, which flew about the steeples and through the trees of the public promenades, have all emigrated; and the same thing happened during the cholera seasons of 1836 and 1854. According to Sir Samuel W. Baker, the same phenomena occurred at Mauritius, where the martins, which exist in immense numbers the year round, wholly disappeared during the prevalence of the cholera.

QUALITATIVE ANALYSIS OF BENZINE.—Commercial benzine often contains quite a large proportion of petroleum, which leaves a disagreeable odor when the benzine is employed for the removal of grease. A small piece of pitch is placed in a test tube and the suspected liquid poured upon it. Pure benzine will readily dissolve the pitch, forming a tarry mass, while adulterated benzine will be less and less colored in proportion to the amount of petroleum contained in it. Coal tar will dissolve easily in pure benzine, but forms distinct layers when impure material is employed for the solution.