PHOTOGRAPHIC NOTES.

Treatment of Mixed Hypo and Alum Baths.—At the convention of photographers held in Chicago, Ill., last August, President Cramer made the following interesting remarks about the development of dry plates in hot weather and the proper method of mixing the hypo and alum baths:

He says: "In preparing the developer, dilute the alkali solution with half its quantity of ice water, from an ice cooler. After the plate is developed, to prevent filling, do not wash it under a stream of water, but place it in a dish, then change the water a couple of times and press it to the hypo solution. All danger of filling can be avoided by using a strong dose of alum in the bath, as much alum as hypo. The alum will tan the gelatine until it is almost as hard as sole leather, after it is thoroughly fixed; so hard that you can barely scratch the film off the glass with your finger nail.

"Such a bath with a large amount of alum will naturally fix a little slower, but it will be an advantage to leave the plate in a little longer, because the film will be rendered more insoluble thereby. If the plate is left in long enough, you can take it out and wash as long as you please. It will be sufficiently tough and hard to stand the water in any climate, even in tropical countries."

Referring to the white precipitate which usually occurs when the two chemicals are mixed, he continues: "The precipitate is formed of sulphur and alum. This should be allowed to settle until the solution is clear, before the bath is used. An addition of bicarbonate of soda prevents further precipitation. For example, two pounds of hypo and half a pound of bicarbonate of soda are dissolved in one gallon of water, which is then mixed with another gallon of water having in it two pounds of powdered alum previously dissolved, making a total of two gallons of fixing solution.

"This addition of bicarbonate of soda seems to keep the solution clear for a long time."

Function of Sulphite of Soda in the Pyro Developer.—In regard to this, President Cramer said: "It has the beneficial effect of preserving the pyro from decomposition. Pyro is a substance that has great affinity for oxygen. An aqueous solution of pyro will soon decompose, as the pyro absorbs the oxygen which is contained in the air and water. The addition of sulphite of soda will retard this decomposition, because the sulphite has great affinity for oxygen.

"Besides this beneficial effect of preserving the pyro from decomposition, it also prevents the yellow color which would be produced if pyro and alkali were alone used. Pyro with sal soda or carbonate of potassium, without sulphite, will make negatives as yellow as a lemon. If you add sulphite, you will observe the yellow color decreases in the same proportion as you add more sulphite. If you add four parts of sulphite of soda to one part of carbonate of soda, you will have no yellow color to speak of, but a gray negative that resembles the collodion negative of former times.

"It is necessary to use pure sulphite of soda and to keep it in bottles tightly corked, as it is liable to become converted into sulphate of soda.

"Dry pyro is used by many operators, but the solution is more convenient and accurate. I have found from experience that sulphurous acid is the best preservative for pyro. I have prepared solutions of pyro in water, with the addition of several acids, to note their respective preservative qualities, and have put them on the shelf for a long time.

"After a couple of months, I found all solutions changed materially. The one with sulphurous acid kept best of all. I have found it is not easy to get sulphurous acid from any drug store. It had no odor at all. Sulphurous acid should have a very strong odor, the same as a burning match. I recommend the preparation of sulphurous acid by each individual. It is quite simple, and is performed as follows: If you add sulphuric acid to a solution of sulphite of soda, at first no odor will be perceptible, as sulphite of soda contains a small amount of carbonate which has first to be neutralized before any sulphurous acid is liberated, which manifests itself by the peculiar odor already described.

"I recommend the following solution: To six ounces of water add fifteen minims of sulphuric acid and one drachm of sulphite of soda in crystals. After dissolving, add one ounce of dry pyro."

New and Valuable Antiseptics.

Prof. Wm. Thomson, F.R.S. (Manchester), has contributed a paper to the British Association on the "Antiseptic Properties of Some Fluorine Compounds." He said that some time ago he was engaged in trying to find a substance which would act as a powerful antiseptic, etc., which was not volatile, and which was not destroyed by oxidation. He tried the effects on flour paste and on meat chopped into small pieces and mixed with water, of a very large number of chemical compounds, and found that those which had the most remarkable antiseptic properties were the compounds of fluorine, hydrofluoric acid, the acid and neutral fluorides of sodium, potassium, and ammonium, and the fluosilicates of those bases. Of these compounds, he found sodium fluosilicate to be the one which for its powerful antiseptic and unobjectionable properties was the one which for the general purpose of an antiseptic was perhaps the best suited.

This body was not poisonous, possessed no smell, and was sparingly soluble in water. It had only a very slightly saline taste, and might be therefore employed in preserving food without communicating any taste to it. Many experiments had been made with it for surgical purposes. A saturated solution which contained 0·61 per cent of the salt was not irritating to wounds, while it possessed greater antiseptic power for animal tissues than 1 part of perchloride of mercury in 1,000 of water, which was a stronger solution than that which could be generally employed for surgical purposes without producing poisonous effects.

It was suggested that the antiseptic under consideration might be of great value in sewage irrigation, provided it had no injurious effect on vegetation. Prof. Thomson said his own experiments showed that sodium fluosilicate did not destroy grass so rapidly as common salt. He had been told that the substance removed unpleasant smells from the hands, and a solution of it would, therefore, be useful for medical men after performing objectionable operations. Sodium fluosilicate could not be obtained in a concentrated solution. It dissolved slowly, but the small quantity thus obtained was a powerful antiseptic and deodorizer.

Some Electrical Fishes.

A lecture on "Electrical Fishes" was delivered at the Royal Institution several weeks ago, by Dr. Burdon Sanderson, who has had the opportunity of studying the physiology of the "torpedo" fish during a recent visit to the shores of the Bay of Biscay. With a view of making his subject more interesting, the lecturer not only gave the results of his research, but also compared the physiological structure of the torpedo (*Torpedo vulgaris*) with those of *Malapterurus electricus* and *Gymnotus electricus*, while the Zoological Society had placed a fine living specimen of the latter fish at his disposal during the evening. It was with a fish of the latter type that Faraday experimented, and found that the strongest shocks were obtained by touching the fish simultaneously at the head and tail, while scarcely any effect was observed on touching each side at the same distance from the extremities. He calculated that at each medium discharge the animal emitted as great a force as the highest charge of a Leyden battery of fifteen jars exposing 3,500 square inches of coated surface.

The gymnotus, or electrical eel, is common in the tributaries of the Orinoco, and is generally captured by causing the fish to expend their shocks upon horses driven into the stream, until exhausted, when they become an easy prey. The electrical organs form more than half the body, and consist of four batteries, two on each side, one above the other, the uppermost or dorsal being the larger. These batteries consist of a series of parallel piles placed horizontally in a direction from head to tail, each layer consisting of protoplasm upon the upper and nerve upon the lower surface, and these are again subdivided by transverse sections.

In the malapterurus, a genus of fishes of the family *Siluridæ*, the whole animal is clad in a tegument of dense tissue, which in this case constitutes the electric organ and is connected with the nervous system by one large nerve. It is remarkable that the natives on the Congo use the same word for the name of both this fish and the telegraph. The torpedo, which is allied to the skate, and varieties of which are found in the Mediterranean, Atlantic, and Indian seas, differs from both of the former in possessing a special brain, or rather a special lobe of the brain, termed the "electrical lobe," which is situated behind the cerebellum, and has control over the electric organs of this fish. These organs are divided by means of a number of vertical columns, about five hundred in an ordinary specimen of the torpedo, although in the case of one caught off the coast of the United States, 5 feet in length and 12 stone in weight, one thousand of these columns were observed. The divisions between the columns are again subdivided into compartments presenting a honeycomb appearance, and to each of these compartments five nerves are attached, so that in a medium sized fish some twelve thousand nerves are employed in the electric organs.

Dr. Sanderson gave a very elaborate description of the arrangement of the nervous system in the torpedo, showing how the large nerves pass along the vertical columns, sending out branches to each of the cells on either side, the nerve invariably passing along the lower side of the cell wall. Throughout the lecture Dr. Sanderson illustrated his remarks by photographed sections of the parts under discussion thrown upon a screen, but at this stage some very fine microscopical slides were projected, the results of the lecturer's recent work. These slides not only illustrated the general arrangement of the nerves, but, descending into further detail, showed that the principal nerves were sheathed, while the smaller ramifications were not, while at the end of the nerve there was no complex structure observable, but a simple termination.

Having thus brought before his audience the least technical of his observations, Dr. Sanderson proceeded to discuss the origin and use of the electric organs in fishes. In most cases the initial development of the electric organs is similar to the development of muscle, but in the malapterurus it is not the muscular system which is transformed, but the skin, glands, and other parts connected with the skin.

The lecturer raised the question as to why fishes had been provided with such a weapon of attack or defense. In the case of the torpedo, has the torpedo degenerated into the skate through not making use of its electrical organs, or is the skate the original form of the torpedo? Both hypotheses seem unstable, as it hardly seems probable that a fish would cease to make use of such a useful adjunct as electricity in procuring food, or that it should by any circumstances develop an organ of which there is no sign in the original, although some naturalists assert that in the tail of the skate there is a development which may allow of such a possibility. Dr. Sanderson, however, thinks it quite as probable that the electric organ should be formed from the muscular system as the muscle formed from the electric organ, and prefers to consider that they both have their origin in a simpler element. If such be the case, by what steps have these organs progressed in their development from the original matter? The lecturer expressed an opinion that most probably an answer would be found to this question in an exhaustive microscopic examination of the nerve. Looking at it from the physiological side, the only difference between the muscles and the electric organs is that one is supplied with motor nerves, the other with electromotor nerves.

Another remarkable fact recently observed by Dr. Sanderson, to which he drew attention, is that two kinds of shocks are experienced in experimenting with electrical fish. Thus, when a fish is suddenly touched or attacked, a sharp explosive shock is felt, but the more normal effect is a prolonged series of smaller shocks of inferior intensity. The lecturer made this point very apparent to his audience by touching the specimen of gymnotus present simultaneously at the head and tail with two wires connected with an electro-magnet, when the shocks delivered were made perceptible by the movement of a paper lever, the shadow of which was thrown upon the screen. The chairman was even more favorably situated, as he was enabled, by means of a telephone, to hear the distinct shocks produced.

Dr. Sanderson also gave the results of a series of experiments conducted with regard to the measurement of the period of time elapsing between the "exhortation" of the fish and the delivery of its shock, and also concerning the duration of the shock. He found that after a sudden attack, one-hundredth of a second elapsed before the primary single response to the exhortation was obtained, the discharge reached its maximum power one five-hundredth of a minute after its commencement, and had a duration of about one-fourth of a second. On continued irritation, a number of smaller shocks were received, recurring at intervals of about one-fiftieth of a second.

Transplanting Nut Trees.

D. B. Weir, of Marshall, Ill., offers his own experience to disprove the theory that has been advanced by various writers for several years, to the effect that in raising nut-bearing trees they are liable to be lost by transplanting. He states that during the past twenty-four years he has transplanted thousands of black and white walnut trees, one, two, and three years old, with as little loss as he has met with in transplanting trees of any other hardwood variety. A year ago last spring, according to the *Northwest Lumberman*, he transplanted 10,000 one and two year black walnuts, late in the season, and in a careless manner, and though the following summer was quite dry, nearly every tree grew. Last spring he transplanted 3,000 trees two years old, also late, with as little labor as possible, in thick rows, and now, after one of the driest seasons ever known, nearly all are alive. Last spring, also, Mr. Weir sent some nursery stock, including 400 one year and 400 two year black walnuts, to Northwestern Iowa, where there has been scarcely any rain for two years. A report came back from the customer July 1, that the drought had killed all the trees except the 800 walnuts, every one of which was alive and growing nicely.

Flies as Disseminators of Tuberculosis.

A recent number of the *Gazette Hebdomadaire de Medecine et de Chirurgie* contains an abstract of an interesting communication to the French Academy of Sciences, on the dissemination of the tubercle bacillus by flies. They settle in great numbers upon the sputa of phthisical patients, become gorged with the bacillus, and then convey it to articles of food. The recommendation which the authors, Dr. Spillmann and Dr. Haushalter, found on these observations is that the sputa should be rapidly and thoroughly disinfected.