

on. Traction is to be maintained during the hardening of the plaster. The latter takes place in about three minutes. Next the limb should be laid on a large soft pillow, the toes directed upward, and the knee a little bent. In the application of the bandage great caution should be observed that it is not drawn tightly anywhere, and that no one turn of the bandage is tighter than another. The support is to be equal everywhere. The two splints should not meet by about half an inch either down the front or back. The intervals are spanned by the dry porous muslin; at the sides the bandage is fixed to the splints by the plaster, which oozes into it from the outer layer of flannel. If it become necessary next day, or later, to ease the splints, or to inspect the limb at any spot, the bandage can be slit up with scissors along the middle line in front. One or both of the splints can then be eased from the limb and readjusted by the addition of another bandage. It is undesirable to wholly remove the splints. They are hinged together at the back by the muslin bandage which spans the interval there. The trimming of the apparatus may be done as soon as the plaster shall have hardened. Should the surgeon be short-handed with regard to assistance, he may apply the outside splint first, and lightly bandage that on; and, when that splint has nearly hardened, he may put on the inside one. As swelling subsides, and the splints become more or less loose, an additional bandage should be put on.

At the end of ten days, if the patient is convalescing, the outside bandage may be gummed, or a fresh gummed bandage rolled on. That apparatus will last until splints are no longer needed. At the end of a fortnight, or three weeks, as the case may be, the patient may leave the hospital for his own home.

This mode of treatment is admirably adapted to oblique fractures, accompanied by displacement of the tibia, to cases of Pott's fracture, and to comminuted fractures.

Immediate Use of the Apparatus.—The splints are to be put on when the surgeon is first called to the case. Swelling from contusion and subcutaneous laceration, uncomplicated with lesion of the vascular trunks, is not an objection to the immediate application of the apparatus. On the contrary, the support and enforced rest have a beneficial influence in controlling swelling and its consequent pain.

Covering the Seat of Fracture by Bandage and Splint.—I had never observed that any benefit had been derived from the old practice of leaving those parts exposed. On the contrary, I had thought that the swelling and vesication were aggravated by the omission to support those parts. I have experienced only good results from covering the parts. If the fracture has not been properly reduced, the compression of the skin by the bone and splint will probably cause a slough. My remarks apply to those cases in which the bones have been properly coapted. In these cases the pain is relieved, and the swelling is modified, by the equable support afforded by the splints and bandages. I have not hesitated to resort to them two and five days after the receipt of the injury, when swelling, and, indeed, vesication, had already occurred. I may particularly refer to two cases of Pott's fracture, in which the dislocation had not been thoroughly reduced. Those cases were dressed a week ago to-day, and are now under observation. In one of them the skin over the inner malleolus was already turning black. In the other the leg was swollen, red, and vesicated. The deformities were reduced and the fractures were set while the patients were under the influence of ether, and the plaster splints were fitted on, to the great comfort and welfare of the sufferers. The limbs had been previously treated on Liston's back splint.

I would here insist on the relief and other advantages which ensue when thoroughly equable light support is afforded to a broken limb. It assists to make and it maintains extension, it prevents the recurrence of dislocation, and it obviates the irregular spasmodic muscular movements which occur to an imperfectly supported broken limb. The old short inside and outside splints do not afford these advantages. The limb is unevenly squeezed between the two unyielding concave pieces of wood, or between one splint and a bandage. Similarly, when the limb is bandaged into Liston's back splint, it suffers compression between the two appliances. These splints are also not well adapted to maintain extension.

Plaster of Paris Bandages.—These are capable of insuring all the desiderata, but I do not employ them for the following reasons: First, that an inexperienced bandager may create uneven pressure by drawing one turn of the bandage tighter than another, or by crowding on the bandage and plaster more thickly at one part; secondly, that if the bandage is to be taken off, the whole thickness of the plaster and bandage must be tediously cut through; thirdly, that the bandage must be reapplied as a whole, and the limb therefore subjected to loss of support, remanipulation, and probably resetting.

The lateral splints, hinged together by muslin, present none, or as few as possible, of these risks and disadvantages. The softness and elasticity of the flannel obviate the risk from uneven bandaging, and the span of soft muslin between the front edges of the splints can be easily cut down with ordinary scissors, as I have already pointed out.

The nearest approach to the excellence of these splints is found in what is known as the "Bavarian" splint. It is, however, less easy to maintain efficient extension during the fixation of the latter splint than it is to do so during the same process with regard to the lateral splints; but the more serious objection is in the fact that the "Bavarian" splint must be taken off for the purpose of trimming. That step entails upon the patient remanipulation, perhaps resetting, and its attendant pains.

Starch, Water-glass, Glue, Gummed and Other Fixed Bandages.—These all have the objection that their drying, hardening, or stiffening is a slow process. Plaster of Paris hardens in about three minutes, less or more. Splints of this material possess as much durability as can be required, especially when they have been protected by the addition of a gummed bandage.

When the patient is convalescent, but still needs some support from splints, the side-splints can be taken off and trimmed, eyelet holes can be inserted along the front edges, and the splints can be laid on or removed at will. If the patient be restless, or become the subject of delirium tremens, the fractured limb, secure in its all-but-complete case, may be swung in the ordinary suspensory apparatus, or may even be left free to be jerked about without much, if any, harm. Fractures near the knee-joint, and fractures of any part of the shaft of the femur, have been successfully treated with the aid of this apparatus. The pain just above the heel, which so commonly plagues a patient whose leg has been imbedded in a Liston's back splint, is never complained of by those whose fractures are put up in these plaster splints.

Adaptability to Country and Private Practice.—These splints are characterized by their simplicity, stability, and economy, and therefore commend themselves strongly to the country practitioner. Instead of wooden or metallic splints, which may or may not fit, the surgeon can take out with him, to his case, a bag of plaster of Paris and the muslin bandages, and perhaps the flannel. The plaster, which should be good, but need not be the very best, must be dry, and therefore should be kept, when in store, in a dry warm place. House-flannel does not appear to require "shrinking." The surgeon should be cautious in using any flannel which has not been in some way shrunk. Ordinary new flannel might shrink on the limb and fail to yield to the swelling.—*Lancet*.

CHEMISTRY.

"Note on the Occurrence of Dioptase on Chrysocolla from Peru," by CHAS. A. BURGHARDT, Ph.D., of Owens College. A SHORT time ago Mr. W. M. Hutchings, F.C.S., of Birkenhead, sent me some specimens of chrysocolla ($\text{CuSiO}_3 + 2\text{H}_2\text{O}$), from Peru, accompanied with a statement that there were some minute crystals in a cavity in one or two of the specimens which might possibly prove to be the rare mineral dioptase ($\text{CuSiO}_3 + \text{H}_2\text{O}$). I proceeded to make a crystallographical and chemical examination of the crystals, and found that although extremely small, the forms could be recognized under the microscope. The chrysocolla mass is eaten into in one or two spots, cavities being produced, which are divided into numerous cells by the intersection of thin partitions of chrysocolla substance. The dioptase crystals occur particularly fine in small green tufts and sheaves attached to the partition-walls of the cells, while those crystals clothing the interior of the cells are not so well developed as the others. The measurements so far obtained have not been satisfactory, owing to the extreme smallness of the crystals, but the forms observed are those peculiarly characteristic of dioptase, viz., $\alpha\text{P}2-3\text{R}$; the rhombohedron being extremely well defined. No other forms were observed, but a great many fine acicular sub-individuals growing parallel with each other build up a large individual. Some of the crystals I carefully picked out and examined chemically with the following results, viz.: Heated before the blowpipe they were infusible and turned brown, not black, probably owing to one of two causes—either (1) the flame was not a pure oxidizing flame, and a little of the cupric oxide was reduced to cuprous oxide; or (2) there was a slight admixture of quartz with the dioptase crystals. The presence of copper was proved by dissolving a crystal in a drop of hydrochloric acid, evaporating off the latter, re-dissolving the residue in a drop of acetic acid and adding potassium ferrocyanide, when the characteristic copper reaction was very marked. There was not the slightest effervescence on dissolving the mineral in hydrochloric acid, but flocculent particles of silica separated out. Mr. Hutchings obtained identical results in a chemical examination of the crystals. From the above tests, the crystallographical examination, and the fine emerald-green color of the crystals, there can scarcely be a doubt that they are really those of dioptase. Colorless quartz crystals were also observed associated here and there with the dioptase, but $+R$ and $-R$ were both present, generally nearly in equilibrium, and the prism faces exhibited strongly the characteristic horizontal striation; therefore, coupling the marked difference in color and crystal form, a confusion of the two minerals could scarcely be possible.

I believe this is the first instance observed of dioptase occurring simultaneously with chrysocolla, and according to my knowledge the first time it has been found in Peru—in fact, out of Russia. The exact locality of the mine cannot unfortunately be ascertained. I am of opinion that the dioptase has been formed by the action of water upon the chrysocolla, the latter being a product of the decomposition of cuprite (which is always intimately associated with it) by a solution of silicic acid in water. Very fine botryoidal malachite sometimes occurs associated with chrysocolla and cuprite in the same locality in Peru. I hope shortly to obtain accurate measurements of the dioptase crystals.

"On Indigo-blue from Polygonum tinctorium and other Plants," by EDWARD SCHUNCK, Ph.D., F.R.S.

THE author after referring to his investigation of *Isatis tinctoria*, the common woad plant, the results of which were communicated to the Society many years ago (*Memoirs*, 2d series, xii., p. 177, and xiv., p. 181), proceeded to give an account of some experiments he had recently made with *Polygonum tinctorium*, a plant employed by the Chinese for the manufacture of indigo, his object being to ascertain whether the coloring matter is contained in this plant in the same form as in the *Isatis*, viz., as a glucoside. His experiments led to the conclusion that the leaves of *P. tinctorium* contain a substance which cannot be distinguished from the indican of the woad plant. It is amorphous, soluble in water, alcohol, and ether, and by the action of acids is decomposed into indigo-blue and a substance giving the reaction of glucose, probably indiglucone. When its watery solution is boiled or left to stand for some time, it undergoes a complete change, and then no longer yields indigo blue by decomposition with acids, but indigo-red and other products, indican, as formerly shown, undergoing a similar metamorphosis under the same circumstances.

The author recommends for the preparation of this substance the following process: The leaves of the plant having been carefully dried, are ground to powder and extracted with spirits of wine. The green alcoholic extract is evaporated at the ordinary temperature, a current of air being employed to assist evaporation. After evaporation of the alcohol there is left a brown watery liquid, which is filtered from the deposited chlorophyll and fatty matters, and mixed with acetate of lead solution. This gives a copious dirty yellow precipitate, which is filtered off. Basic lead acetate added to the filtrate produces a primrose yellow precipitate, which is filtered off, washed with water, then with alcohol, and then suspended in absolute alcohol. On passing a current of carbonic acid gas through the liquid the precipitate is decomposed, yielding lead carbonate, while the liquid acquires a yellow color. The filtrate is evaporated in a current of air, and water is added to the residue, which it dissolves for the most part. Sulphuretted hydrogen is passed through the filtrate to precipitate the lead in solution, and the liquid after filtration is again evaporated. The residue is treated with ether, which leaves a portion undissolved. The ethereal solution leaves on evaporation a yellow amorphous residue having all the properties of indican.

The author made some experiments with the fresh leaves of the plant, from which he concludes that the leaf-cells contain no ready-formed coloring matter with the exception of chlorophyll, and that the indigo-blue which is formed when the vitality of the cells is destroyed by extreme cold, organic lesion, or chemical re-agents is produced by the decomposition of indican, which commences as soon as the protecting influence of the living cell is removed.

It has long been known that some orchidaceous plants, such as *Bletia Tankervillei* and *Callanthe veratrifolia*, yield indigo-blue. The author examined the leaves of the former plant, and obtained a solution giving the reactions of indican, and he is consequently inclined to suppose that the latter will be found in all cases to be the source from which indigo-blue is derived.

The author mentions a fact which he thinks may be of interest not only to the chemist, but also to the physiologist. On one occasion an alcoholic extract of dried woad leaves, in which the indican had undergone partial decomposition by long standing, yielded on evaporation a quantity of a substance which, when purified, was found to have all the properties of tyrosine. Though it is possible that the tyrosine may have pre-existed in the plant, the author is inclined to think that, like the leucine previously discovered by him, it was a product of decomposition of indican under conditions of which he is at present ignorant, especially as some connection is supposed by chemists to exist between tyrosine and indigo-blue; and on the other hand, tyrosine and leucine so frequently occur together as products of decomposition of protein compounds.

"Note on the Action of Iodine Trichloride upon Carbon Bisulphide," by J. B. HANNAY, F.R.S.E., F.C.S.

It is stated by Weber that when iodine trichloride is added to carbon bisulphide a new product is formed. Now I have examined the action of these two substances upon each other, and find it is according to the following equation: $2\text{CS}_2 + 3\text{ICl}_3 = \text{CCl}_4 + \text{CSCl}_2 + 3\text{SCl}_2 + 3\text{I}$.

On adding carbon bisulphide to pure iodine trichloride till it was all decomposed considerable heat was evolved, and on cooling iodine crystallized out. A qualitative examination of the liquid showed the presence of sulphur chloride in large quantities, and on decomposing this with water, the characteristic smell of the sulpho-chloride of carbon was observed. This was further recognized by its deportment with alkalis, and after its removal from the liquid the tetrachloride of carbon was easily recognized by its peculiar sweet smell, strongly reminding one of the smell of primrose leaves.

A weighed portion of the trichloride was heated with the requisite amount of carbon bisulphide to convert it into the above products, when it was found there was neither an excess of carbon bisulphide nor of the trichloride present. The liquid was allowed to cool, and when all the iodine had crystallized out it was passed through a small filter of asbestos, and washed with a few drops of carbon tetrachloride. The iodine on the filter was estimated, and gave only a little under the required amount. The filtrate was then treated with caustic potash, and the separated carbon tetrachloride weighed after transference to a tared bulb. The sulphur in the liquid, left after removal of the tetrachloride of carbon, was oxidized by means of potassium chlorate and strong nitric acid, and estimated as barium sulphate.

The following table gives the figures which were obtained on working with 10 grms. of iodine trichloride, and also those deduced from the above equation:

	Found.	Calculated.
CCl_4	2.05	2.198
SCCl_2	1.71	1.641
CS_2Cl_2	2.90	2.890
I.....	5.37	5.428

—Manchester Lit. and Phil. Soc., Chemical News.

ELECTRIC DISCHARGE IN TUBES CONTAINING RAREFIED GASES.

By MM. WARREN DE LA RUE and HUGO W. MÜLLER.

THE discharge in a tube of rarefied gas does not differ from that which takes place in air or other gases at the atmospheric pressure. It is not a current in the ordinary sense of the term, but a disruptive discharge, the gaseous molecules effecting a transport of electrization. The gases probably receive two impulses in opposite directions, that from the negative electrode being the more continuous. There are sometimes formed metallic spots upon the tubes, which leave a permanent trace of the intervals comprised between the strata.

SOLUTION OF PLATINUM IN SULPHURIC ACID.

By M. SCHEURER-KESTNER.

IN a former communication (*Comptes Rendus*, lxxxii., p. 892) the author has shown that during the industrial concentration of sulphuric acid in vessels of platinum the quantity of this metal dissolved in acid free from nitrous compounds increases with the concentration of the acid. New experiments undertaken for the purpose of preparing fuming sulphuric acid have induced him to continue his observations. The action upon the metal, so much promoted by concentration beyond 95 per cent., is still further intensified with the concentration of the monohydrated acid. On decomposing sodium bisulphate by heat in earthen retorts lined with platinum, 1 grm. of metal was dissolved for each kilo. of fuming acid produced. The metal is found in a soluble state mixed with the sodium sulphate.

ON VITREOUS MELTED SACCHAROSE.

By H. MORIN.

IF heated with water under certain conditions saccharose is transformed into a vitreous product, which preserves its transparency more or less according to the manner of cooling. If this has taken place gradually the product is translucent, but mixed with prismatic crystals. If the cooling is rapid this partial crystallization is avoided. It contains on an average 3.28 per cent. of water, and its sp. gr. at 14.5° is 1.966.

A NEW METHOD OF PREPARING PROPYL-GLYCOL.

By M. HANRIOT.

THE author employs aceto-brom-hydrine, which is easily prepared by the action of acetyl bromide upon glycerine. The product of the reaction is distilled in a vacuum, and passes over almost entirely about 175° under a pressure of 10 centimeters of mercury. The hydrogenization is conducted in a neutral liquid by means of Dr. Gladstone's coppered zinc, and is completed in about twenty-four hours. The product when hot is mixed with carbonate of potassa in excess, and the paste is exhausted with alcohol. The acetate of propyl-glycol, saponified by an alcoholic solution of potassa, yields isopropyl-glycol.