

### ON THE CONSTITUTION OF THE DARKENED CHLORIDE OF SILVER.

BY JOHN SPILLER, F.C.S.

IN the course of some experiments on the action of phosphorus upon metallic solutions, I was incidentally led to observe a chemical reaction, which appears to throw some light upon the nature of the decomposition effected by the sun's rays on the white chloride of silver. If a current of phosphoretted hydrogen gas be conducted through an aqueous solution of chloride of mercury, there is formed an orange yellow precipitate of somewhat doubtful constitution, but containing the elements phosphorus, chlorine, and mercury, in the proportion required by the formula  $\text{PHg}_3\text{Cl}$ ; and described in Gmelin's "Handbook of Chemistry" under the name of "phospho-chloride of mercury." This product having been collected on a filter, and purified by washing, was transferred to a test tube, and acted upon by a neutral solution of nitrate of silver, when the compound immediately became white, and underwent a succession of changes in colour, exactly corresponding to those observed when the white chloride of silver is exposed to sunshine; and by varying the conditions of the experiment—using the silver in larger or smaller amount, and employing a gentle heat—it was possible to control the rapidity of the change, and to produce the slight variations of tint, violet, sometimes tinged with red, at other times with blue, which are constantly noticed in practical photography.

With regard to the chemical changes accompanying this alteration of colour, it is probable that the first action consists merely in the conversion of the chlorine in the yellow mercury compound into white chloride of silver, the mercury at the same time entering into solution; a moment later the reducing action of the phosphorus in the compound begins to be exerted upon the remaining nitrate of silver, the result of which is, that particles of metallic silver are formed, and gradually accumulate within and throughout the entire mass of the white chloride, and to the production of this metallic precipitate is attributed the darkening and general alteration of colour observed during the progress of the experiment. If this explanation of the phenomenon be correct, there is a well sustained analogy in regard to the constitution of the darkened chloride of silver, whether prepared under the reducing action of sunshine, or by the power of reduction originating in the phosphorus contained in the mercury salt employed. In confirmation of this view, it may be stated that the violet substance produced in the manner indicated becomes grey and metallic by treatment with ammonia, hyposulphite of soda, or cyanide of potassium; and with nitric acid and other chemical reagents behaves exactly like the product formerly examined by me, and described in a contribution to the *Philosophical Magazine* for March, 1860.

Royal Arsenal, Woolwich, October 28, 1862.

### The International Exhibition.

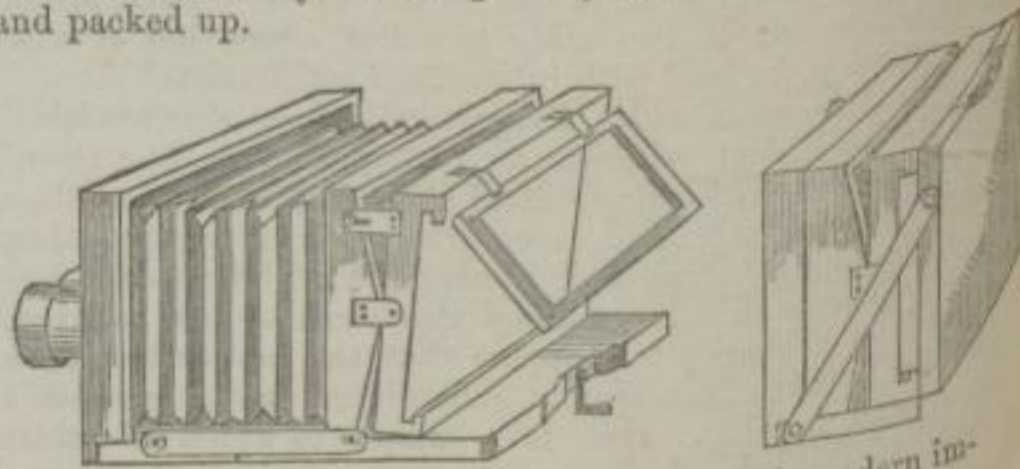
#### BRITISH PHOTOGRAPHIC DEPARTMENT.— APPARATUS.

WE find the last days of the Exhibition approaching before the amount of time and space at our disposal has allowed us to complete our notices. We now hasten to proceed with further brief remarks on the apparatus.

Messrs. M'Lean, Melhuish, & Co. (3,120), exhibit some excellent samples of the especial apparatus for which they are known, such as the Metal Camera, giving a maximum of rigidity, lightness, and durability; the Universal Objective, &c., &c. Especially deserving of notice is the "Simultaneous Camera," the conception we believe of Lieutenant-Colonel Shakspear. This is a square trunk camera, fitted with four lenses for card portraits. Its specialty consists,

however, in the use of a fifth lens which acts as a finder. By the use of such a lens the sensitive plate may be placed *in situ* with the slide drawn, and all ready for exposure at a moment's notice, the right time being ascertained by the aid of the finder, with which the focussing of moving objects is also effected; the finder having, of course, the same focus as the other lenses, and the camera being so arranged that the focussing of one regulates all. For instantaneous effects, and for portraits of children, &c., the use of this application will be manifest.

Mr. Meagher, Coppice Row, has a very well arranged display of photographic apparatus, chiefly consisting of cabinet-work. Mr. Meagher received his allotment of space at so late a moment that his name does not even find a place in the Catalogue; his contributions, begun and finished within a few days, were moreover placed immediately beneath the skylight, subjected to a heat which we hope apparatus has rarely to withstand even in the tropics. The perfect condition, however, of every article at the present moment illustrates their suitability for the Indian climate, for which a good deal of the apparatus exhibited is designed. A large trunk camera of Spanish mahogany, is a very handsome piece of cabinet work, and would be an ornament to any operating room. It has all the modern appliances of swing back, endless screw, &c., and having a focal range of from 6 inches to 30 inches, is available as an excellent copying camera. A new binocular stereo camera, manufactured by Mr. Meagher, and designed some time ago by ourselves, is exceedingly complete and convenient, and having now used for some time the first one made, we are well satisfied that it forms one of the most complete equipments possible for the amateur or professional photographer. It is arranged so as to be suitable for stereoscopic pictures, or views  $7\frac{1}{2}$  inches by 5 inches, having a moveable central partition and extra front. It extends from  $3\frac{1}{2}$  inches to 10 inches, admitting thus of the use of stereo lenses of short focus, and a single lens of longer focus for the larger views. In our own we use a Dallmeyer's, No. 1, triple, and a pair of his stereo lenses, which form a very complete equipment. The camera has a bellows body, and hinged tailboard, which folds up and reduces the camera to the smallest compass. It has also swing back, screw focussing adjustment, &c., stereo inner frames, and card portrait inner frames, &c., and when packed up with three double backs in the leather case provided for it, forms a convenient and very portable parcel for the hand. We subjoin an engraving of the camera extended and packed up.



Brass bound and other Kinnear cameras with modern improvements, a folding binocular stereo camera, which may easily be carried in the pocket, *carte de visite* cameras, revolving cabinet stereoscopes, various ornamental cases for stereoscopic slides, water tight baths, stands, printing frames, and various minor matters, complete a very handsome case of photographic cabinet work.

Messrs. Murray & Heath (3,128), have a fine display of apparatus of the very best quality, and designed with much judgment to meet the various wants of photographers. Prominent in their case is a noble copying and enlarging camera, with double bellows body, and extending several feet. It has a screw adjustment working from either end. A graduated scale is attached which enables perfect focus to be obtained for any degree of enlargement with absolute accuracy, without even looking at the ground glass. This