his neighbour with an elevation of the eyebrow and a shrug of the shoulder.

Photographs were often made available in the illustration of papers in the various sections, and in the able inaugural speech of the President, Professor Willis, the application of the art in connection with meteorological, magnetic, and astronomical observation was fully recognised. In speaking of the objects of the Association he thus refers to its employment of photography :—

An example of its peculiar functions is given in the very last report for 1861, when it appears that an instrument contrived by Professor William Thomson, of Glasgow, for the photographic registration of the electric state of the atmosphere has been constructed by Mr. Beckley in the workshop of the observatory, with mechanical arrangements devised by himself, and that it has been in constant and successful operation for some time. Those who have experienced the difficulty of procuring the actual construction of apparatus of this kind devised by themselves, and the still greater difficulty of carrying out the improvements and alterations required to perfect it when brought into use, will agree that the scientific importance and utility of an establishment cannot be overrated, in which, under one roof, are assembled highly skilled persons, not only capable of making and setting to work all kinds of instruments for philosophical research, but also of gradually altering and improving them as experience may dictate. The creation of this peculiar observatory must be regarded as one of the triumphs of the British Association. As far as the Association is concerned, its maintenance has absorbed between £5,000 and £6,000, and the annual sum allotted to it from our funds has for each of the last six years reached the amount of £500. The construction of the photoheliograph may be quoted as an example of the facilities given by this establishment for the developing and perfecting of new instruments of observation. A suggestion of Sir John Herschell in 1854 that daily photographs of the sun should be made has given birth to this remarkable instrument, which at first bore the name of the solar photographic telescope, but is now known as the Kew photoheliograph. It was first constructed, under the directions of Mr. De la Rue, by Mr. Ross, &c. The British Association aided in carrying out this work by assigning the dome of the Kew Observatory to the instrument, and by this completion in 1857 in their workshop by Mr. Beckley, the assistant; but the expense of its construction, amounting to £180, was supplied by Mr. Oliviera. On the occasion of the eclipse in 1860 this instrument was conveyed to Spain, under the care of Mr. De la Rue, who most successfuly accomplished the proposed object by its means, and was replaced at Kew on his return. But to carry on the daily operation to which it was constructed, requires the maintenance of an assistant, for which the funds of the Association are inadequate, although it has already supplied more than £200 for that purpose. Mr. De la Rue, in consequence of the presence of the heliograph at Kew being found to interfere with the ordinary work of the establishment, has kindly and generously consented to take charge for the present of the instrument at this observatory, and at his own observatory when celestial photography is carried on.

DESCRIPTION OF A RAPID DRY COLLODION PROCESS.

BY THOMAS SUTTON, B.A.*

THE problem which has most interested photographers of late years has been the discovery of a dry collodion process, by which plates can be prepared as sensitive as with wet collodion. In the wet process, the negative has to be taken and finished upon or near the spot from which the view is taken, and with wet collodion the tourist is, therefore, obliged to work in a van or tent, and carry a load of paraphernalia about with him, which is, of course, both expensive and inconvenient. To avoid this, he is compelled to work with dry plates, and hitherto no process has been published by which dry plates can be made as sensitive as wet ones. A rapid dry process has, therefore, been an important subject of investigation to photographers, because, during a long exposure of a plate, the shadows move, and figures sometimes alter their position. A man or horse, for instance, are likely to remain still for a few seconds, but not for ten minutes.

I have lately solved this problem of rapid dry collodion, and produced dry plates as sensitive as wet ones, which will, moreover, preserve their sensitiveness and good qualities for several weeks, and perhaps indefinitely. This process, and the principles upon which it is based, I will now shortly describe.

The rapidity of this dry process depends upon the accelerating effect of bromine in dry collodion, and in this respect an analogy exists between the Daguerreotype and dry collodion processes. In the former a silver plate, simply iodized, is extremely insensitive, but when submitted to the fumes of bromine its sensitiveness is increased a hundredfold, the same thing happens in those collodion processes, wet or dry, in which the free nitrate of silver is washed out of the film. A collodion film, simply iodized, and without free nitrate, is as insensitive as an iodized Daguerreotype plate, but a bromo-iodized collodion film without free nitrate may be rendered as sensitive as a bromo-iodized silver plate. In the wet collodion process the most exalted sensibility is conferred upon a simply iodized film by the presence of free nitrate of silver; but you cannot retain free nitrate in a dry collodion film because it not only crystalizes on drying, but by becoming concentrated as the water evaporates, dissolves the iodide of silver, and forms a curious and interesting double salt, the exact properties of which have not yet been fully investigated. You cannot even retain a perceptible trace of free nitrate entangled in a dry collodion film without introducing an element of instability, and consequent uncertainty in your work. The principle, therefore, of preparing a rapid dry collodion plate consists in using bromo-iodized collodion, and removing all the free nitrate, which is the element of instability.

But the image produced upon a bromo-iodized silver plate, developed with mercury, is extremely thin and superficial, as may be proved by transferring it to a sheet of gelatinized paper. And similarly, the image developed by pyrogallic acid upon a dry bromo-iodized collodion film is thin, and too transparent to yield a good printing negative. It is necessary, therefore, to apply to the film a coating of some organic substance, in order to give density to the dark parts of the negative. Many substances have been used for this purpose, viz., gelatine, metagelatine, albumen, various syrups, gum arabic, infusion of malt, tannin, &c., &c.; and experimenters have, almost without exception, exhausted their ingenuity in varying these preservative coatings, as they are called, instead of seeking in the use of bromide for the true accelerating agent. The preservatives named have not all the same effect, and besides affecting the sensitiveness of the film, they also determine the colour of the finished negative, gelatine and gum giving a black, tannin a red, and albumen a yellowish colour to the deposit in the dark parts. Much, therefore, depends upon the selection of a proper preservative, when the most exalted sensitiveness is required.

One more difficulty remained to be overcome, and it is this. When a collodion film has once been allowed to get dry, and is wetted a second time, it is very liable to split and leave the glass; or if a preservative has been applied to it, it is very liable to rise in blisters, which spoil the negative. But this may be prevented by giving the glass plate a preliminary coating of india-rubber dissolved in kerosolene.

The operations in the rapid dry process are, therefore, as follow :—

1. Clean the glass plate, dry it thoroughly, and apply to it a solution composed of 1 grain of india-rubber dissolved in an ounce of kerosolene.

2. Coat the plate thus prepared with bromo-iodized collodion, containing an equal number of atoms of iodine and bromine, added in combination with cadmium. There should be about 5 grains of mixed iodide and bromide of cadmium to the ounce of collodion.

* Read before the British Association.