tion, as also that of Messrs. Marsh Bros., who are represented by their famous swan studies, and other pictures of scarcely of less note. Mr. Baynham Jones has evidently not been idle lately; Lynmouth Harbour, with its picturesque sea wall and old fisher cottages (97), is a charming study; and another, "Old Gateway and Rectory House, Eversham" (328), a quaint relic of bygone days, is well worthy of their author; Mr. Gale's bijou series requires no further commendation on our part.

Mr. W. G. Coote exhibits "Pembroke Castle" (110); the old boats in the foreground are composed and limned with much taste, and form a vigorous contrast to the grey old castle opposite. Colonel Biggs, the President of the Society, makes good his position by an excellent display of Indian views, some of them treated in most masterly fashion. "The Idol-car, Bunsunkuree" (113), is one of the boldest of the series, while the "Ruins of Berjapoor" (119) will also find many admirers. Messrs. Day and Son show many of the good pictures they have shown before, together with one or two novelties, if we mistake not.

We now come to two names who have much to do with the success of the Exhibition, since they are those of gentlemen of high standing who have not previously exhibited this year. Bristol is, indeed, honoured by the magnificent collection of new pictures sent by Mr. William Bedford and Mr William England. What shall we say of "Guy's Tower, Warwick Castle (126), of Mr. Bedford? The sunlit trees, the rich foliage, the deep shadows, and the stately grey tower, make up a picture indeed. The sharp lines of the castle, rising from the placid moat, peep out between two leafy masses. Sang Mrs. Hemans—

> The stately homes of England,
> How beautiful they stand,
> Amidst their tall ancestral trees,
> O'er all the pleasant land.

One of the fairest scenes in all fair England is here, and, as you look and long, the sweet summer time comes back to you, the warm air is upon your cheek, and you can almost hear the hum of insects in the glowing sunshine. "Pont-y-pair" (127) is another summer scene of Mr. Bedford's, scarcely less enchanting.

Mr. England's pictures come from Switzerland. Look at the Pass of the Tête Noire (279). The pathway is but a narrow shelf cut in the rocky side of a steep mountain; as you stand here on the jutting prominence, the whole of the magnificent defile is before you—the pine-clad slopes—the lofty peaks towering to the clouds—the sheer precipices of cliff and crag. A clump of black firs in the foreground supply a contrast to the clear bright panorama beyond, and give a sense of the magnitude of the vast mountain ranges before you. Look, too, at the Matterhorn and the Riffel (285), two lofty pinnacles, the one a glitering spire of ice crystals—the other in the foreground a black pyramid that might be taken for the Matterhorn's shadow, it is so dark and gloomy. Mr. England has never shown a finer series of studies.

To be Continued.

The "At Home" next week will be "Mr. Harvey Barton at Bristol."

ABSTRACT OF DR. MORTON'S PAPER.*

IT is quite possible that in the remarks I purpose making this evening in connection with the photographic art I may mention topics and some details which are familiar to many present; but as chemistry and optical and physical phenomena enter largely into the theory and practice of photography, the field is so extensive that there is always something interesting and suggestive even in the rudiments, especially to those who are commencing their studies. Although this paper may be considered an introductory one, I don't wish to load it with any historical account, or describe the early methods of producing a light picture, but shall at once take for my subject the photographic image—what it is. And under this heading I must restrict myself to the collodion, silver, or wet process, leaving gelatine dry plates, collodio-chloride, platinum, carbontype, and the numerous other types which have sprung up in all directions, for future consideration. Now, in an ordinary pencil, pen-and-ink, or sepia sketch, we have a deposit of a dark non-reflecting substance which gives the outline of figure on a lighter background; the different gradation of shade is acquired by a more or less deposit of lead, ink, or sepia. In photography, at least in the ordinary silver process, the image is formed by a deposition of metallic silver or an organic oxide in a minute state of division, either upon glass, paper, or other suitable material. This is brought about by the action of light and certain re-agents. Light has long been recognised as a motive power comparable with heat or electricity. Its action upon the skin, fading of colours, its effect on the growth of vegetable and animal organisms, are well known, and although the exact molecular change in many instances is not clearly understood, yet certain salts of silver, iron, the alkaline dichromates, and some organic materials, as bitumen and gelatine, have been pretty well worked out.

It is a remarkable and well-known fact, that the chloride, iodide, and bromide of silver, called sensitive salts in photography, are not susceptible, at least only slowly, to change when exposed to the yellow, orange, and red rays, the longer wave lengths of the spectrum which you know form, with violet, indigo, blue, and green, white light. The diagram on the wall shows this dispersion and separation of the primitive colours. The yellow, orange, and red, are called technically non-actinic rays, and the others in their order become more actinic until the ultra violet is reached. The action of white light or rays excluding yellow, orange, and red, has the effect of converting silver chloride into a sub-chloride; it drives off one equivalent of chlorine. The iodide of silver in like manner is changed into a sub-iodide, but in the presence of water hydriodic acid is formed, unless an iodine absorbent be present.

It is important to bear this in mind, as one or other, frequently both iodide and bromide of silver, is the sensitive salt requisite or used in producing the invisible image.

The theory regarding these sensitive salts of silver is that, being very unstable—*i.e.*, ready to undergo a molecular change—the undulations produced in the ether which pervades all space by the potential action or moving power of light is sufficient to disturb their normal chemical composition. The undulations liberate some of the chlorine, iodine, or bromine as the case may be. This action of course applies to light from any source, the sun, electricity, or the brighter hydro-carbons, flame from gas or candle, whether it come direct as rays of white light, or be reflected from an object, and conducted through a lens as a distinct image upon the screen of a camera.

I have no time to speak on the subject of lenses, only just to mention that they are or ought to be achromatic, so as to transmit white light, and of perfect definition, and the amount of light passed through should be as much as possible consistent with a sharp image, at least when rapid exposure is attempted.

I shall touch very lightly on the manipulative part of photography, as that would be unnecessary; but a brief account of the chemicals in use is essential to a right appreciation of the theory of developing the image. In the first place, our object is to get a film of some suitable material coated with a thin layer of a sensitive salt of silver—say a bromo-iodide. By mixing certain proportions of ammonium iodide and cadmium bromide, or an iodide and bromide of cadmium, with collodion, which is pyroxyline, a kind of gun-cotton dissolved in ether and alcohol, a plate of glass is coated, and before being perfectly dry is immersed in the nitrate of silver bath. The silver nitrate solution, adhering and entering to a slight extent the surface of the collodion, becomes converted by an ordinary chemical action of affinity into silver iodide and bromide. The ammonium and cadmium play a secondary part in the process, and are not absolutely necessary in forming the image.

The plate is now extremely sensitive to light. When we have entered it into the dark slide and camera, and then exposed to light, the change I mentioned has taken place, and the film is transformed into different quantities of sub-iodide and sub-bromide of silver according to brilliancy of light. In addition, there is on the plate an amount of unchanged silver nitrate which comes in useful in the second stage, or development. The image is not seen as yet, being latent, and requires the well-known developing solution: sulphate of iron, acetic acid

*Read before the Sheffield Photographic Society.