

Photographic Irradiation

As the question of whether irradiation is due to the imperfection of the instruments, or to an action taking place within the thickness of the collodion film, is a matter of considerable importance in all cases in which photography is made use of for the purposes of accurate measurement, I have repeated and somewhat varied the experiments which have lately been described in NATURE, vol. x. pp. 205, 223, by Mr. Ranyard. I therefore laid on a uranium dry plate a piece of platinum foil, and with full aperture of lens took, with an exposure of twenty-five minutes, a photograph of a piece of cardboard, in which were four parallel slits, hung against a background of bright sky. In spite of the long exposure, the images of the slits are sharply cut off at the place occupied by the edge of the platinum foil, though at the same time there are very marked traces of the outer hazy irradiation arising from reflection from the back of the plate. I then took with the same exposure, and under what seemed to be similar conditions of illumination, a photograph of the same cardboard sheet, on an extra-sensitive Liverpool plate, and again found that the images of the slits were sharply cut off. This seems to me to decisively show that the irradiation cannot be due to a spreading within the film, caused by the light dispersed from the highly illuminated particles in the collodion, as suggested by Mr. Aitken; and I feel inclined to agree with Lord Lindsay and Mr. Ranyard that it must be due to some cause that has its seat of action in front of the collodion film.

Bedford

W. C. CROFTS

Feathering in Flint Weapons

It is now some years since I first noticed the fact that in a number of flint weapon heads in my possession a distinct spiral could be traced in the form, this being evidently due in part to the direction of the line of fracture in the flint, but also in part to an exaggeration of this by the hand of the workman. In the last number of the *Scientific American* is depicted an arrow-head with the edges very distinctly feathered, so that if the weapon with which it was armed was propelled with any great rapidity, its revolution would be a matter of necessity and would result in a greater steadiness in its line of trajectory.

After having ascertained that my own weapons were all twisted, I examined a number of others with the view of ascertaining if the same spiral existed in them, and in all I found that there was something like it, and the more finish they presented the more twisted they were.

A very simple method enabled me to show the twist well. I pressed a flint between two pieces of greased pipeclay, then removed it carefully and filled its place with liquid plaster of Paris. Cross-sections of this cast in various directions showed the twist to perfection, and I found that the two wings of the flint were twisted in opposite directions though identical in relation to the axis of rotation), and that the curvatures were identical with those seen in the iron arrow-heads provided with wings which are used in many savage countries to this day, and were till lately, if indeed they are not still, made in large quantities in Birmingham. The most perfectly twisted stone arrow-head which I have yet seen is one made of quartz, where the line of fracture could not help the manufacturer in the least, and where it must have been the result of deliberate workmanship. It was an American weapon. The line of fracture of flint always gives a more or less pronounced spiral, and this may be one of the many reasons for its having been almost universally selected as the material for arrow-heads when it could be got. In fact, it is a difficult thing to find a flint flake of any size which has not a very evident spiral form, and I have a photograph in my possession of two weapons which I have examined and which are almost identical, one found without its shaft near Bridlington, in Yorkshire, and one with its shaft found in the hands of a native of New Zealand; and it would be impossible to tell, from the style of manufacture, which weapon belonged to which country. It is impossible to regard this as mere coincidence, but we must look on it, in each case, as an independent discovery of the principle of the rotation of the rifled projectile.

LAWSON TAIT

LOCALISATION OF FUNCTIONS IN THE BRAIN

AT one of the last meetings of the Royal Society, Dr. Burdon-Sanderson related the results of experiments he had recently made with a view to the further investigation of the important discovery of Hitzig and

Fritsch, that there are certain spots on the surface of the cerebral hemispheres by the excitation of which the muscles of the opposite side of the body can be thrown into combined action.

It is well known that Dr. Ferrier, of King's College, who has studied the topographical distribution and limitation of these active spots or areas with great minuteness on a considerable variety of animals, has founded upon his experiments a theory that these spots correspond to organs situated at or near the surface of the hemispheres, and that it is the function of these organs to originate combined voluntary movements. Dr. Ferrier has accordingly proposed to call them "motor centres."

As, however, the facts appeared to Dr. Sanderson to be quite as consistent with the view previously entertained by physiologists that the function of co-ordinating voluntary movements is localised lower down in the cerebro-spinal centres, he thought it necessary to ascertain, with reference to some of the most characteristic combined movements produced by stimulation of the surface of the brain, by the interrupted voltaic current (Hitzig and Fritsch), or by induced currents (Ferrier), whether the very same combinations of movements could not be produced after ablation of the grey substance in which the "centres" for their production were supposed to be contained. If it could be shown that after complete removal of the "centres," the effects to the production of which they were supposed to be essential could still be observed, this would go far to prove that the facts had been misinterpreted; and if it could be further shown, not only that the phenomena might present themselves in animals deprived of the centres from which they were supposed to originate, but that they could be produced in such animals by the same methods and under the same circumstances as in normal animals, this would go far to negative the existence of any organs at the surface of the brain to which the term "motor centre" could with any propriety or accuracy be applied.

In accordance with these considerations, Dr. Sanderson planned experiments, in some of which the superficial convolutions containing "centres" were removed, while in others the whole of the anterior part of the left hemisphere as far down as the outer portion of the *corpus striatum* was taken away with the aid of a sharpened spoon. In each case it was found (1) that when after the removal of the cortical grey substance, the cut surface of white substance is excited by induced currents, movements of the opposite side of the body are produced, which are of the same character as those which result from excitation of the natural surface; (2) that the excitability is limited to certain spots, which can be as sharply defined as those demonstrable on the natural surface; and (3) that the relative positions of the active spots on the cut and natural surfaces respectively correspond closely with each other.

Simultaneously with the publication of Dr. Sanderson's communication, a paper appeared in Eckhardt's *Beiträge*, in which an account was given of very similar experiments, of which the results, though incomplete, corresponded, so far as theory went, with those above related. We learn also that Prof. Hermann of Zürich has also made experiments which have led him to reject in the most unequivocal manner the conclusions of Hitzig and Fritsch.

THE FORM OF COMETS*

II.

LET us see what ideas, what explanations have been suggested by the aspect of these monstrous phenomena, so evidently subject to the influence of the sun.

On examining comets, the first idea which is pre-

* Continued from p. 229.