

### Reproduction of Scales by Electric Discharge to a Photographic Plate.

It is a known effect that when a coin is placed on the film side of a photographic plate which rests on a sheet of tin-foil, and the coin and tin-foil are connected to the secondary of an induction coil, an image of the details of the coin is obtained on developing the plate after discharge. The effect appears to be due to the light of a brush discharge from the coin, the intensity of which depends in a somewhat complex way on the contour of the coin, and the distance of its parts from the plate.

I have found this method suitable for the accurate reproduction on glass of metal scales, for there is no uncertainty, as with a camera, about the magnification. The steel rule, carefully washed with benzene or alcohol to remove grease, was laid on the film, an even pressure being applied along the rule by weighting it. After these operations, which were performed in a red light, a discharge was passed between the rule and tin-foil, and the plate developed. In this way the scales were sharply reproduced—even the 1/100th inch divisions—as seen under a microscope (Fig. 1).

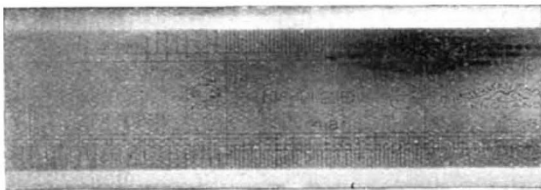


FIG. 1.

A trial with a half-tone copper block, such as is used for magazines, showed that much fineness of detail is attainable with the method, for a good reproduction was obtained in spite of the minute depth of etching. The method was also found applicable for the examination of the structure of coke, the specimen being ground to a plane face for the purpose.

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### Excavations at Gough's Caves, Cheddar.

DURING the past winter months, the authorities now in charge of the caves, usually known as Gough's Caves, at Cheddar decided to widen the entrance way in order to cope with the increased tourist traffic. It will be recalled that discoveries of flint implements and the bones of living and extinct animals were made in the course of the excavations necessary to open up the cave to the public, and further, that in the early years of the present century, portions—the remainder is still *in situ*—of a human skeleton of upper palaeolithic date were found.

Therefore, in view of these important discoveries, those now responsible for the cave determined to carry out the work of path widening in a scientific manner. Mr. R. F. Parry personally superintended the work and kept very careful records. Under his direction the floor material of limestone blocks, gravels, and red cave earth was removed in six inch layers, sorted, and the remains given their layer number.

This detailed labour was well rewarded by the discovery of more than one thousand flint implements and flakes, many of these being carefully worked and of typical late palaeolithic form. In addition to these a fine *bâton de commandement* decorated with incised lines, some small bone points, and a number of teeth perforated for suspension, were found. This is only the second *bâton* to be found in England, the former incomplete one also coming from this cave.

Numerous remains of animals were found, and parts

of two human skulls, one of a child and one of an adult. These, according to Sir Arthur Keith, compare very well with the skull of the original skeleton and with those from Aveline's Hole, Burrington Combe. The latter are also of late palaeolithic date.

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### Can the Hand be thrust in Molten Lead without Injury?

At p. 201 of "The Memoirs and Correspondence of Lyon Playfair," by Wemyss Reid (1899), an account is given of the Prince of Wales (afterwards King Edward VII.) having put his hand into boiling lead. This account appears to have been copied by Sir Sidney Lee at p. 73 of volume 1 of his "King Edward VII." I have often heard it stated that a finger or hand can be put into molten lead, and have had many opportunities of putting the matter to a practical test—but have not taken them! Hence I am writing to inquire whether this feat may be safely done, and if so, what is the explanation.

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### Wave-length Shifts in Scattered Light.

(By Cable, through Science Service, Washington, D.C.)

PROF. RAMAN'S brilliant and surprising discovery that transparent substances illuminated by very intense monochromatic light scatter radiations of modified wave-length, and that frequency difference between emitted radiation and one exciting medium is identical with frequency of infra-red absorption bands, opens up wholly new field in study of molecular structure. I have verified his discovery in every particular, using improved apparatus which makes it possible to photograph strongest lines in few minutes. Anti-Stokes' terms of intensity nearly equal that of lines of wave-length greater than exciting line obtained chloroform, carbon tetrachloride, latter giving triplet each side 4046, 4358, 5461 lines mercury arc. Raman reported no trace modified lines excited latter line, but are strong with carbon tetrachloride. Triplets short wave-length sides exciting lines appear mirror images those long wave-length side, considering exciting line mirror. Crystalline quartz gives strong line identified as  $20\mu$  absorption band, and fainter line very close exciting line corresponds infra-red absorption about  $75\mu$ . Raman's discovery thus makes possible investigation remote infra-red regions hitherto little explored owing experimental difficulties. As yet I have found no line corresponding more generally known band quartz (eight and half  $\mu$ ). This expected as small energy exchanges between impinging light quanta and molecules more probable than large; these correspond absorption bands very long wave-length.

Many lines discovered Raman found double account very efficient method of illumination employed; considerable resolving power possible. Now preparing for spectrum photograph forty foot focus prism spectrograph. Certain lines are distinctly banded: structure, sharp intense red side, shaded off on violet; strength anti-Stokes' terms in case carbon tetrachloride in marked contrast with their faintness in case benzene and toluene, no trace appearing except after long exposures.

It appears to me that this very beautiful discovery, which resulted from Raman's long and patient study of phenomena of light scattering, is one of most convincing proofs quantum theory of light which we have at present time.

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