

Curiosities of Ocular Spectra.

Spectra are not only the concomitant sequences of color sensations, says W. Cave Thomas in *Art*, but of the sensations of black and white. A black spot will be succeeded by a white spectrum, a white spot by a black spectrum. Ocular spectra appear to change their places with relation to our bodies with every movement of the eyes, and, for an evident reason, are still seen in whatever direction we turn the retina.

The natural sequence of the ocular spectra after a momentary glance at any object would appear to be this: The original sensation persists as a spectrum for 0.32 to 0.35 of a second, as may be illustrated by the whirling of a light or other object. Then, if the original impression be not renewed, the reaction sets in; this first spectrum is doubtless followed by feebler librations or oscillations, which, although too delicate to be perceived by the open and excited eye, may, sometimes with closed eyes, be followed for a greater length of time.

If we view for a long time a black square on a white ground, and then divert our eyes slightly to the right or left of the square object, or rather look more directly at its margin, a portion of the spectrum which it has produced will appear free as a bright margin on a white ground; the remainder of the spectrum will overlap the true image and appear as a gray space, while a portion of the true image will be free and intensely black. We have then a free portion of the spectrum very bright, a middle portion, where the true image and the spectrum are coincident, gray, as if the two conditions of black and white were there balancing each other, and a free portion of the true image intensely black. The usual explanation of the phenomenon is this: The sensation of white in the part of the retina which was previously the seat of the black image is more intense, because that part of the seat of the retina was unexcited, hence the bright margin. The part of the image where the true image and spectrum are coincident remains unchanged, while the portion of the true image which is left free appears darker than before, because it now falls upon a part of the retina which had previously received rays from the white ground, and has consequently lost part of its excitability. This, however, is far from being the exact truth, the entire explanation; for if the eyes be closed to all external influence, a white spectrum will appear in the place of the black spot, showing that a reaction in the retina has set in, producing the sensation of light, and that it is this libration which is the cause of the two coincident portions of image and spectrum appearing gray, and those beyond darker and lighter.

Backing Up of Sewer Gases.

To prevent the backing up of sewer gases through the ordinary pipe traps into the apartments of dwellings, a remedy heretofore mentioned in our columns is to lead a gas escape pipe from the drain pipe to the kitchen chimney. The fire here generally kept burning produces an upward current favorable to the carrying off of the gases in question. A correspondent tells us of a case, within his own knowledge, where this method proved insufficient, as the pressure of sewer gas was so great that it found its way through the stove pipe holes in the chimney. It is of course necessary in all cases that the chimney shall be tight; and in those cases where the sewer gas pressure is very strong, the escape pipe should be extended to the roof of the building independent of the chimney. Some architects provide a small gas escape pipe leading from the top of the bend of the sewer pipe trap, to the water leader of the roof.

New Style of Photo Portraits.

The pictures are made upon the white ferrotype plate, which is now being manufactured largely, and which combines with great beauty the most simple manipulations, and all the advantages of the porcelain picture, without any of its defects.

The plate being of a very pure white and properly prepared, all that is necessary is to pour on the collodio-chloride, dry it by a gentle heat, expose it to vapor of ammonia

for a short time, and then print very slightly deeper than it is desired to be when finished. It is washed, toned, and fixed in a similar manner to the ordinary mode followed in making porcelain pictures. The result is a picture of exceeding delicacy and durability.

IRRIGATION IN COLORADO.

The system of irrigation now quite extensively adopted in Colorado has worked a great change in the character of the soil, and transformed the once almost barren country into a magnificent wheat-growing region. From the large rivers



IRRIGATION IN COLORADO—LETTING WATER INTO A SLUICE WAY.

and streams, such as the Arkansas, the Platte, and the Bear rivers, long canals are dug, branching into smaller ditches, through which the fertilizing waters are conducted in every direction to the fields. Our engraving, for which we are indebted to *Harpers' Weekly*, shows two farmers opening a sluice of a main canal to let the water into a side ditch. These ditches form a regular network, as shown in the diagram.



The supply of water can be regulated at will. Towns are supplied with water on the same plan. At the head of each street is a sluice box for a lateral ditch running the whole length of the street, from which branch smaller ditches used for garden irrigation.

An Evening at the Royal Microscopical Society.

At a recent meeting of the Royal Microscopical Society, held at King's College, an unusually interesting series of exhibits was shown, illustrating the progress of optical and mechanical ingenuity in the development of the instrument, which is rapidly becoming an indispensable article of furniture in homes where intellectual culture is promoted, all over

the world. One of the exhibits was a large microscope by R. and J. Beck, in solid silver, fitted with every conceivable piece of apparatus, all in silver. This luxurious work of art, intended for an American microscopist, and costing \$2,500, was of course the lion of the hour, and is perhaps the most costly microscope ever made. After mention of this, there is of course no further space to allude in detail to the numerous humble brass microscopes in the room. Fortunately it is the observer who utilizes it, rather than the instrument itself, who can claim the credit of a beautiful display, and to whom our advance in knowledge is due. So

here the attention was riveted by many objects of unusual interest, upon each of which a long theme might be discoursed. Conspicuous among these was the exhibition of insect dissections by Mr. Loy. They were perfect marvels. Several showed the complete muscular system in certain large lepidopterous larvæ. Various slides illustrated salivary glands and other wonders of insect anatomy. All the specimens were stained in various colors, mounted in fluid, in large cells, on slides 4 inches by 2. Mr. Guimarens had a very interesting series of preparations by Bourgogne, of Paris, illustrating the vine parasite in all its stages (*phylloxera vastator*). Near him Mr. Fitch was exhibiting a mounted slide containing a harvest spider (*phalangium*), upon the back of which, and attacking the eyes, was a red parasitic mite, probably a young *trombidium*. Dr. Gray had a very curious slide on view. It was a piece of skin from the neck of a domestic fowl from Ceylon, which was completely hidden from sight by a dense mass of fleas. The size of the specimen, only a small fragment of the original, was about one third of an inch square, and on it might be counted nearly one hundred fleas. Each of them had buried her lancets (I say *her*, because only one or two males were among the crowd of fleas) deep in the skin. A remarkable series of models and specimens illustrated in a beautiful manner the structure of the cochlea of the ear in various animals. Mr. H. Lee exhibited, with Moginie's

portable binocular, the larval form of the crayfish, from the Brighton Aquarium, a creature so unlike its parent that, till lately, it was considered a distinct species, and was known as the glass crab. It was a beautiful specimen. Among the vegetable preparations attracting notice was a charming slide of a fungus on wood, shown by Mr. Reeves, and named by him as a *stemonitis*. Curious deposits from solutions of silica were shown by Mr. Slack.

Sagacity of the Partridge.

Instances of the sagacity of the partridge, woodcock, and other birds have often been related. But the most singular illustration of the deception practiced by the first of those wily species to protect their young is given by Mr. Henshaw, of the Government Survey west of the one hundredth meridian. While riding through pine woods, a brood of partridges, containing the mother and eight or ten young of about a week old, was come upon so suddenly that the feet of the foremost mule almost trod on them. The young rose, flew a few yards, and, dropping down, were in an instant hid in the underbrush. The mother meanwhile began some very peculiar tactics. Rising up, she fell back again to the ground as if perfectly helpless, and imitated the actions of a wounded bird so successfully that for a moment it was thought she had really been trodden upon. Several of the men, completely deceived, attempted to catch her, but she fluttered away, keeping just out of reach of their hands until they had been enticed ten or twelve yards off, when she rose and was off like a bullet. Her tactics had successfully covered the retreat of her young.

COMPOSITION OF WOOL GREASE.—According to Schulze and Ulrich, the bulk of the natural wool grease of sheep consists of compound ethers. A part of alcohols and fatty acids are in a free condition

Of all metals known, silver is the best electrical conductor