

PROGRESS OF PHOTOGRAPHY

Novel and Valuable Development in the Use of Microscopic Lenses.

NEGATIVES ENLARGED BY NEW PROCESS

Contrast Between the New and the Old Methods of Magnification Secured—Examples of Projective Photography.

The microscope has become almost indispensable in many branches of modern science and microscopic photography is of great value in making scientific records.

The first is that the lines and markings shown by the microscope are often extremely indistinct and uncertain. On more than one occasion the lack of exact definition under the glass has led the observer to exercise his imagination with results that were little short of absurd.

In such circumstances scientists wishing to publish illustrations showing the results of microscopic investigation have sometimes resorted to line drawings from the plates, but even these have been unsatisfactory, because lines indicate altogether too much sharpness of outline.

Recently, however, a scientific photographer in New York has succeeded in making enlarged photographs of microscopic objects, in which many of the faults shown in microscopic photographs are avoided. A certain degree of sharpness has been lost, but rounded and other irregular surfaces are made to appear as they really are, and not flat, as the same surfaces would appear in photographs taken with a microscopic lens.

Professional photographers and many amateurs will understand his method when it is explained that "projective photography" is a modification of the methods used in a reducing and enlarging camera. To those not conversant with photography it may be explained that the same principle is employed in the magic lantern.

From this explanation it will be plain to all possessing even slight knowledge of photography that pictures showing high magnification of minute objects can be readily taken with a lens of comparatively low power. The chief difference between "projective photography" and ordinary enlargement work is this: In the latter the enlarged negative or print is produced by passing the light rays through a glass positive or negative exactly as they are passed through the slide in a magic lantern and "thrown up" on a sensitive plate or sensitized paper, while in "projective photography" the image of the object to be photographed is itself "thrown up."

If the object be transparent, as a section of the pia mater—the covering of the brain—or other transparent tissue, the light may be passed through it to show its structure. If the object be opaque, as an insect, the light is allowed to fall upon it exactly as in ordinary photography. The form of camera used virtually differs from the ordinary camera only in being deeper, so that the plate may be farther removed from the lens.

A fair idea of the different results obtained by microscopic and "projective" photography may be obtained from the contrasted representations of lung tissue accompanying this article. The larger picture is taken by the former method, the photograph, the smaller from a microscopic photograph.

Both are made from the same section of tissue. Not only is the "projective photograph" larger, but the detail and depth revealed are far more satisfactory. It should be added, though, that a microscopic photograph of an insect might be as large as the other is quite possible. But such a photograph would be almost worthless. It would be even flatter and show less definition than appears in the picture. On the other hand, the magnification in the "projective photograph" might be increased materially without serious effect.

Objects of much greater size may be magnified photographically by "projective" than by microscopic photography. A "projective" photograph magnifying 300 times has been taken of the toes of a mouse, in which every detail, even to the structure of each hair, is clearly shown. The field of the lens with which the mouse's toes were taken is almost a square inch, at the close range required, and the toes might have been enlarged 600 times as readily as 200. But a microscopic lens magnifying only twenty-five diameters covers a field only one-fifth of a square inch in extent, while a lens that will magnify 1,000 times covers only about 1,200th of a square inch.

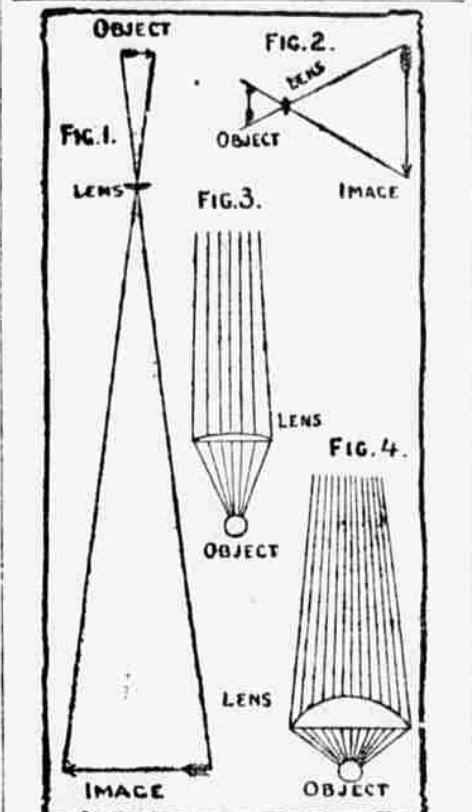
High and Low Power Lenses. The accompanying diagrams will make the difference between the high-power and the low-power lens clear. Figure 1 indi-

ates the passage of the rays from an object photographed by a low-power lens to the plate. Figure 2 shows the path of the rays when a lens of high power is used. The size of the object and of the image is assumed to be the same in both cases. The image produced by the low-power glass will show less detailed definition, but much greater penetration or depth of focus, while the image thrown by the lens of high power will present more details, more definition, but less depth of focus. The magnifying lens gets the details at the expense of depth or perspective, while the other lens, fitted in a deeper camera, allowing greater distance between lens and plate, will produce equal magnification, while the image will possess the "plastic" quality, so-called, in much greater degree and therefore will resemble the object far more closely.

To explain a little further: Suppose a round body, a pearl, for instance, is to be photographed. Figure 3 shows how the light rays would pass from the object to the plate through a low power lens. Only a

small portion of the pearl would be shown in the figure—about 45 degrees—but it would appear as a curved surface, though with comparatively few details. Figure 4 shows the path of the light rays through a high power lens. In the figure about 100 degrees are taken in, but only a very small part of the pearl would be photographed, though every minutest speck and flaw would

be clearly apparent, and the picture would apparently be of a perfectly flat surface. If this lens were focused on the "axial point" of the pearl's surface a small circle would show sharply; if focused on a point further away, a ring would be defined, since all the nearer and farther parts of the pearl



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FEW NEW PLANTS ABROAD

Foreign Countries Have Little to Offer America in That Line.

IMPORTS DECREASE AND EXPORTS INCREASE

Prolonged Trials of Seeds Imported Prove Them Inferior to the Native Articles—Views of Eastern Experts.

The return of Prof. Swingle from his mission in Asia and northern Africa and the publication in the annual report of the Department of Agriculture of the results of his expedition in collecting desirable plants for acclimatization in this country have at-

tracted much attention in the seed and plant trade. How important this trade is in the United States, says the New York Tribune, few who are not connected with it are likely to be aware. It is not generally known, for instance, that one New York firm sends eucalyptus plants not only to various European countries, where they are in great demand for planting in swampy places, but even to Australia, where the trees are indigenous. The reason for this is that the eucalyptus seeds better in certain parts of this country than it does anywhere else. The same firm annually exports considerable quantities of tree seeds to the order of the Japanese government.

"The importation of foreign plants into this country," said an expert, "and the making of experiments to see which varieties will thrive here and which will not have really been going on much longer than is generally supposed. As an example of that, take the European chestnut, the nut of which, as you know, is much larger than the native American, though the American is sweeter. Between the increased importation and the increased cultivation of the foreign variety of late it has come to be regarded as something comparatively new in this country. As a matter of fact, the European chestnut was brought to America and planted at Bergen Point in 1799 by Dupont, who had a mission here from the French Academy of Sciences, and remained here to found a very well known Delaware family."

"The trade does not inspire to the reputation of purely patriotic motives in this work of introducing new, useful and ornamental plants. The manager of a famous and long established firm put the case frankly like this: 'The inducement to spend time and money in collecting valuable and little known plants from all over the world is advertisement. Here is a plant from which we have just taken seeds and introduced it in our catalogue for this year. The direct profit from the sale of those seeds will hardly pay for the expense of that colored plate of it. But the advertising we get from the coupling of our name with this new plant is worth all our outlay from first to last. In that way the competition between different firms in the United States and the competition between American and European firms, too, keeps us alive to every chance of a new variety.'"

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THE OLD-TIMERS

Rufus Larcom and wife of Beverly, Mass., celebrated their golden wedding on Wednesday, December 27. Mr. Larcom, owner of the Constantin, Hering building. He was one of the founders of Hahnemann college, Philadelphia.

The 100th anniversary of the birth of Dr. Constantin Hering was commemorated in Philadelphia recently by the dedication of the Constantin, Hering building. He was one of the founders of Hahnemann college, Philadelphia.

Verdi was said to have entirely given up work owing to his great age—85. The composer has lately been working hard for a new opera entitled "King Lear." An excellent libretto was long ago furnished him by Arrigo Boito.

Louise Michael, who has just returned here, has returned to Paris. She is a pianist and a singer. She has just returned from a tour of the United States, where she delivered two lectures at the Rodinere on "Concord Between Nations" and "The Traffic in White Slaves." Her voice was as resonant as an over.

Prof. Park of Andover, who was 81 years old on December 20, is in fairly good health and takes the liveliest interest in all affairs of the day, national and international. He was much touched by the death of Mr. Moody, whose course he has always watched with special interest.

General Longstreet, almost the only survivor in the first rank of southern generals of 1862-63, celebrated his 79th birthday recently in Washington. Colonel Ochtelove gave a dinner in his honor, which was attended by prominent men from all sections south and north.

Thomas Kite, the old pulch clerk of Shakespeare's church at Stratford-on-Avon, who died recently, was 91 years of age and succeeded his father and grandfather half a century ago. Among those whom he conducted by Shakespeare's tomb were Sir Walter Scott, Washington Irving, Dickens, Emerson, Booth, Keen and Nathaniel Hawthorne.

Sir Charles Nicholson, the sole surviving member of the first Australian Parliament, has just entered on his 92nd year. He was graduated as an M. D. from the University of Edinburgh, where Queen Victoria was a little girl in short frocks and went to Australia to practice in 1841. Oxford has made him a D. D. in recognition of his gifts to the University of Sydney.

From the Tien-Tsin club, in the city of Heaven's Gate, in far off China, comes a pleasant anecdote of Colonel Bowman, of Kentucky, who was formerly consul at that post. He was very domestic and in the evening entertained his many friends with quiet whist parties, the prizes in which, according to English custom, are devoted to charity. The colonel had a model Chinese servant who had been charmed by his urbanity and had come to regard his master as a superior being. One afternoon the Chinese boy seemed anxious and nervous.

"What's the matter, John?" asked the consul with real curiosity.

"Your excellency," he replied, "may I talk with you and say to you some things?"

"Certainly."

"Well, your excellency, you play those cards too much, too. You let me teach you how to play too much good and in five months you win all of the money of the foreign devils in Tien-Tsin."

It is needless to say that John's offer was declined.

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NO LYING ABOUT

The merit of CASCARETS. Millions use them and tell their friends how good they are. We want to give back the purchase price to anyone who fails to get satisfaction from the use of

CANDY CATHARTIC
Cascarets
WORK WHILE YOU SLEEP

Now that sounds like a liberal offer, but these single 10c sales alone don't count for success. It's your cure and your good word for Cascarets that will make them famous in the future as in the past. Start with a box today. 10c, 25c, 50c, all druggists. Free sample and booklet. Address Sterling Remedy Co., Chgo. or N.Y.

Best for the Bowels

FREE ONE TRIAL FREE
BOTTLE

This Offer Almost Surpasses Belief.
An External Tonic Applied to the Skin
Beautifies it as by Magic.
THE DISCOVERY OF THE AGE
A Woman Was the Inventor.

Thousands have tried from time immemorial to discover some efficacious remedy for wrinkles and other imperfections of the complexion, but none had yet succeeded until the Misses Bell, the now famous Complexion Specialists, of 78 Fifth Avenue, New York City, offered the public their wonderful Complexion Tonic. The reason so many failed to make this discovery before is plain, because they have not followed the right principle. Balms, Creams, Lotions, etc., never have a tonic effect upon the skin, hence the failure.

The MISSES BELL'S COMPLEXION TONIC has a most exhilarating effect upon the cuticle, absorbing and carrying off all impurities, which the blood by its natural action is constantly forcing to the surface of the skin. It is to the skin what a vitalizing tonic is to the blood and nerves, a kind of new life that immediately exhilarates and strengthens wherever applied. Its tonic effect is felt almost immediately and it speedily banishes forever from the skin freckles, pimples, blackheads, moth patches, wrinkles, liver spots, roughness, oiliness, eruptions and discolorations of any kind.

In order that all may be benefited by their Great Discovery the Misses Bell will during the present month give to all callers at

THE MISSES BELL, 78 Fifth Ave., New York City.
The Misses Bell's Toilet Preparations are for sale in this city by
KUHN & COMPANY,
The Reliable Prescription Pharmacists,
Sole Agents, 15th and Douglas Streets.

LADIES' FRIEND
TURKISH T. & P. PILLS brings monthly menstruation sure to freedom—never disappoints you \$1.00, 2 boxes with help in any case. By mail, Hahn's Drug Store, 18th & Farnam, Omaha, Neb.

Advertisement for Cascarets, Misses Bell's Complexion Tonic, and Ladies' Friend. Includes text about the benefits of Cascarets for the bowels, a free trial offer for the complexion tonic, and details for purchasing Ladies' Friend pills.

NATURE'S REMEDY FOR WOMEN.

McElree's Wine of Cardui is made from herbs that the Creator intended for the cure of female diseases. It is not a strong medicine, may be taken by a child without detriment, and is a most astonishing tonic for women. It cures scanty, suppressed, too frequent, irregular and painful menstruation, falling of the womb, whites or flooding. It is helpful during pregnancy, after child-birth and miscarriage. It acts as a tonic on the generative organs of either sex, and frequently brings a dear baby to homes that have been barren for years. It is nature's regulator of the menstrual function. Thousands of women are enjoying better health than ever before in their lives by taking a dose of Wine of Cardui every morning. Every drug store in the city has Wine of Cardui.