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Attention is called to the "Wants" column. It is invaluable to those who use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

THE CAPABILITIES OF PHOTOGRAPHY NOT UNLIMITED FOR ILLUSTRATING ALL CLASSES OF OBJECTS.

BY O. G. MASON, OFFICIAL PHOTOGRAPHER AT BELLEVUE HOSPITAL, NEW YORK CITY.

THE comparatively recent departure from old methods in various fields of scientific research, has called into action agencies for solving problems of initial progress and results not known or utilized by earlier workers. Discoveries within the last few years have so advanced the lines of study, and an active scientific press has scattered so broadcast the knowledge of progress made that, although the field is boundless, he who reads has little excuse for reworking ground from which all reachable fruit has been gathered. In eagerness for the new, a desire to find some hidden, shorter paths into the mysteries of nature, do we not often fail to recognize obstacles, or to sufficiently consider the best means for their removal? With pen and pencil our predecessors sought to leave a record of their work. What they thought and what they saw have been handed down to us through the best means at their command. For the physician, the botanist, mineralogist, and the geographer the artist sketched, elaborated, and finished illustrations having a more or less amount of truth, often obscured by some personality, which rendered them valueless or even misleading. In no class of objects have such defects been more conspicuous than that requiring the use of the microscope. Therefore, he who had used with dissatisfaction the hands of the draftsman was eager to utilize the means offered by photography. He had seen the results obtained in other fields, and, without knowing the difficulties in the way, believed it easy to obtain all desired brilliancy, detail, and amplification. It may be asked, Why have not these expectations been more fully realized? When we pause to consider that color is a most important feature in photographic work, and that a majority of objects studied under the microscope reflect or transmit the least actinic rays of light, red, orange, green, and yellow, we may well understand why we do not secure brilliancy. Again, when the microscopist studies his subject for detail, he mentally eliminates all those parts which do not belong to the special point under observation. A crystal, cell, or fibre which over- or underlies his object or forms a full or partial background in the field of the objective is left out in the mental summing up of his study. The laws of chemistry and optics do not permit such selection and elimination from the photographic image. A slight tremor conveyed to the microscope by a passing vehicle in the street, a step about the room or house, may be annoying to the observer, but does not prevent securing results by longer application. But when we consider the necessity of absolute immobility of the instrument, often for a considerrble length of time, in order to impress upon even the most sensitive plate the image of many-colored objects, we can well understand one of the greatest causes of failure to secure detail; and this obstacle of motion becomes far greater as the amplification increases It is plain that motion is multiplied equally with the diameter of the object; or, in other words, if we magnify an object one thousand diameters, a motion of that object to the extent of one-thousandth of an inch becomes in the amplified image a motion of one inch, which very readily shows why good results cannot be obtained under such conditions. When observing with the microscope, it is possible and quite feasible to focus the instrument above and below the general plane of the object, in order to study any projecting points which may be within or without the general plane. This feature is not possible with the photographic process, save in so far as diaphragming the lens and modifying the light may effect the result. *Over*estimation of the possibilities of photography and *under*estimation of the careful preparation of objects have occasioned much unnecessary labor and great disappointment by failure to produce results which should be sought through different channels. When the investigator contemplates the employment of photography for illustrating his work, let him consult his photographer before preparing his objects. No one human being has yet encompassed *all* that is known. When the anatomist takes to his photographer a *thick* section of muscular or ossified tissue and asks to have the individual striæ and cells isolated and delineated with distinct outlines and minute detail, he will fail to realize his expectation. When the mineralogist or geologist prepares his sections of crystallization or deposits, he must not calculate that *all* his various planes will be perfectly shown in one photograph, even if the specimen *be* translucent. Color, mass, and position are important factors in all photographic work. With orthochromatic plates many objects heretofore impossible of proper illustration may be quite successfully treated; but, with objects of this class, another factor, that of time of exposure, offers a barrier of limitation. The mobility of life, animal and vegetable, is a most important element which cannot be ignored in exposures of hours, or even minutes, and seconds. A vegetable fibre, when placed in concentrated light, may make one or more entire revolutions during the time of exposure necessary to properly impress its image upon an orthochromatic plate; and especially is this the case when a high-power objective is used. Thin sections devoid of the less actinic colors, red, orange, yellow, and green in their darker tints, or admixtures, may be easily treated. Circulating fluids or objects changing size or position are susceptible of instantaneous exposures only. When such objectionable features as motion and non-actinic color are present, the problem becomes far more complicated, and if the photographer fails in its clear and complete solution his patron sometimes looks upon such failure as a proof of incompetency or a lack of proper effort. Like her sister handmaids in the advance and illustration of scientific thought, photography stands ready to do her proper work. She has done much, and it is believed will do more to enlarge the field of human knowledge and gather the harvest; but we should not ask her to accomplish the impossible.

LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

Worms on the Brain of a Bird.

In the issue of *Science* for June 2, is a short account of my finding thread worms in the brain cavity of *Boturus mugitans*. The title of the article should have read "on" instead of "in," as they were not in the tissue of the brain but, as I state there, in the subarachnoid space.

Since writing the short article above referred to I have received a card from Professor J. W. P. Jenks of Providence, R. I., in which he gives an account of his investigation of a similar if not the same parasite on the brain of the Snake Bird (*Plotus anhingus*). To quote a little from his communication, he says:

"In 1874 I camped for 50 days near Lake Akechobee in south Florida, and shot dozens of the Snake Birds, and in 19 out of 20 mature birds found a bunch of 10 to 20 parasitic worms just beneath the arachnoid membrane, but in no instance extending