

tage of the albumen method consists in the ease and rapidity with which the picture is developed. Its disadvantage being, however, that the preparation of the albumen paper requires much time and trouble, and that only a few sheets can be prepared at a time, about enough for each day's use.

The white of eggs should be beaten until it resembles snow; allow it to stand awhile, and add the chrome salts. Frequently it happens that we have to throw away the solutions after the preparation of a few sheets, because neither the paper nor solution will adhere. There is another disadvantage which this method possesses, namely, that in developing the picture the surface of the soaked paper is easily rubbed off, thus spoiling the picture.

The gelatin papers can be prepared in great quantities, because the gelatin may be applied separately, and the prepared sheets can be sensitized in the chrome salt bath, which is capable of holding itself. This advantage of the gelatin process is greatly counteracted by the fact that the papers allow of no rapid and easy development of the picture, requiring several kinds of skilled treatment, especially the use of a paint roller to remove the superfluous paint. Whenever excellent results are produced, it is only by very skillful treatment. Whoever has tried to roll out a sheet of paper will appreciate this difficulty. In fact, skillful hands are requisite to discover the places where the color is to be removed or the shades require to be more or less opened. The development must be quickly accomplished, and only by means of a sponge. This is a simple process, and should enable amateurs, even when they understand nothing of drawing, to execute the operation skillfully.

Sometimes the picture is spoiled by an oily tone of the whites, which is hard to remove.

The photo-lithographic paper which I prepare embodies all the advantages and none of the disadvantages of these processes. There is nothing necessary but a constant chrome salt bath, which when required is to be carefully poured from the bottle without filtration, in which may be immersed the number of sheets required for each day's use, or the operation may be repeated several times in the day, as the drying of the paper requires only one and a half hours. The development of the picture is a fast and sure process, and the stroke and graining manner appears excellently. The reprinting is sure; the papers are not crushed, and there is no tone shown in the whites.

The advantages of this paper are security to work, especially such as those fine maps, reduced to one-third, which are executed by the Imperial Printing Office for the technical military committee and the topographical department of another imperial establishment at Vienna.—*Photogr. Notizen*.

#### PRIZES OFFERED BY THE VIENNA PHOTOGRAPHIC SOCIETY.

The Vienna Photographic Society offers the following prizes for the solution of various problems connected with photography:

##### a. VOIGTLANDER MEDALS.

1. A gold medal worth 140 ducats for a method of increasing the sensitiveness of wet plates.
2. A gold medal worth 140 ducats for a certain and rapid dry process of superior excellence.
3. A gold medal of 40 ducats for a thorough research into the asphalts.
4. A silver medal for a collection of natural history studies.
5. A silver medal for a collection of instantaneous pictures.
6. A silver medal for a collection of lantern transparencies, for illustrating science, art, or technical matters.
7. Medals in gold (of a value from 40 to 100 ducats), silver, and bronze, for scientific research, inventions, or improvements which are communicated to the society or to its organs.

##### b. SOCIETY MEDALS.

1. Gold medal of 140 ducats for the production of type blocks having half-tones.
2. A gold medal of 140 ducats for a critical study of the reactions of chrome acids and their salts upon albuminates, albuminoids, carbon hydrates, and resins, with particular reference to the different heliographic processes.
3. A silver medal for *genre* pictures.
4. A silver medal for carbon prints produced in Austro-Hungary.
5. A silver medal for a collection of monuments.
6. A silver medal for a collection of ethnological studies.
7. A silver medal for a collection of anthropological studies.

Competitors must qualify by becoming members of the society. Further particulars may be obtained by addressing the President, Dr. Hornig, Vienna III, Hauptstrasse 9.

#### MOUNTING PHOTOGRAPHS.

By WALTER B. WOODBURY.

Most amateurs, when mounting their photographs—say of the favorite cabinet form—have no doubt, been astonished to find that, although all the pictures had been cut with the same shape, leaving perhaps a margin of one-eighth of an inch at the top and sides, some of the prints nearly covered up the card in the length, while others had the opposite fault.

The subject of expansion of the paper in one direction has lately been brought forward, as tending to give two different ideas of the same portrait; but the slight difference can hardly be perceptible except to a very critical observer.

When it is a question of mounting a number of photographs to a shade within a line, then the matter becomes serious, and it is an absolute necessity to have two different shapes, one for those prints cut across the paper and the other for those cut lengthwise. The former will have to be (for cabinet size) nearly one-sixteenth of an inch shorter, and the latter one-sixteenth longer.

It is best to mark the paper cut across the sheet before printing, so as to know which shape to use; but, in case this has been neglected, the two classes of prints may be easily separated by slightly warming them, the cross prints forming themselves into a short roll, and the others into a long one. They can then each be cut with their own shape, and when mounted will be found to occupy the same position on the mount.

In using an alcoholic solution of glue, where very little water is present, the stretching of the paper is reduced to

its minimum. This is best made as follows: Soak common gelatin (glue will answer) in as little water as will just dissolve it. While hot pour in gradually methylated spirit, stirring all the time until the spirit is in about the proportion of three to one of the gelatinous solutions. A species of precipitation takes place, which, however, redissolves on well stirring. A little glycerin or sugar can then be added.

Great care is necessary in mounting with this material, as if once the print is laid on the mount it is almost impossible to remove it.—*Br. Jour.*

#### HOW TO ENLARGE AND PHOTOGRAPH MICROSCOPIC OBJECTS.

By M. A. RUTOT.\*

VERY few have till now occupied themselves with micro-photography, notwithstanding the magnificent results which microscopists have obtained, and the obvious utility of productions of this kind. This abstention is due either to ignorance of photographic manipulations, or to an exaggerated fear of the difficulties which present themselves. Nevertheless, the difficulties are far from being so insurmountable as is generally believed, and in proof thereof I present the Society some micro-photographs of various kinds obtained in a very simple way by M. Hempel, member of the Belgian Photographic Association. I may remark, in the first place, that the examples are far from representing the best examples which M. Hempel has obtained; on the contrary, they are the first essays, made by an amateur which I place before your eyes. With a little more experience of photographic operations much better clichés will be obtained, I have no doubt, than those which are now laid before you.

The manner of operating is as follows: In any department into which the morning sun enters M. Hempel places his microscope upon a table. The instrument he employs is simply a small one of Hartnack's construction, upright, and bereft of its eyepiece. Above the microscope is fitted vertically, by the aid of a support, an ordinary camera (quarter-plate) capable of taking pictures nine by twelve centimeters, furnished with a focussing glass. The camera is in connection with the microscope by means of a little cone of black cloth, fixed to the photographic apparatus by the metal rim (where the lens fits in) and to the microscope by means of a rubber washer.

The object is put under the microscope in its proper place upon the object stand, and the sun's rays are directed upon it in the usual way by a mirror. The operator looks upon the focussing screen of the camera, and then, by the aid of the screw of the microscope, the enlarged image is focussed. If the image appears too small, it may be enlarged by gradually elongating the body of the camera; or if too big, the reverse operation is performed.

Having determined the size of the image, a diaphragm of very small aperture (about a quarter of a millimeter) is placed under the object, and a slight turn of the screw then furnishes the requisite amount of sharpness: the object may then be said to be focussed. In micro-photography the focussing should be rigorously exact, and a strong magnifier must be employed to view the image upon the ground glass; and to be able to judge the better of the half-tones, the operator should surround his head with a black cloth, to keep away the light. The focus properly adjusted, the operation of photographing may be commenced.

Before going any further, I may here call attention to a grave difficulty which may possibly occur; it is possible that the image may be perfectly sharp upon the ground glass, and yet when the collodion film is substituted there is a lack of sharpness and detail. In this case the operator has to do with a lens in which the chemical focus does not coincide with its optical focus. Nevertheless, the evil is not an irreparable one, and a series of experiments properly undertaken will soon show how much the screw of the microscope should be turned to yield a good result. I may, however, state that I am convinced that defective lenses of this kind are much less frequently met with than is supposed to be the case, and good achromatic lenses always give good images. At the same time, in the case of colorless objects, or such as are of a monotone, like the diatoms, polycystines, and a large number of other organisms, the employment of very achromatic lenses is not indispensable.

In support of what I have just advanced, I may mention that the microscope which M. Hempel makes use of was not chosen for any special purpose, and gives with each of its true lenses pictures which have not the least trace of chemical defect.

The image of the object having been focussed, the latter is covered with a small piece of black cardboard; the ground glass is removed and there is substituted for it the dark slide with the prepared plate. The slide is withdrawn, and by stooping down it is easy to direct upon the diaphragm the little luminous circle formed by the concentration of solar rays by the mirror then, without loss of time, the piece of cardboard is removed from the object for a short time, and again replaced without hesitation. This brief period suffices to impress an image upon the collodion film; the dark slide is drawn, and the plate carried into the dark room to be developed, washed, and intensified if necessary, and finally fixed. From this negative may now be printed an indefinite number of positive forms.

So far as concerns the disposition of the apparatus, I would remark that I do not recommend the vertical arrangement, which M. Hempel is compelled to have recourse to because his microscope is a vertical one. It is better to work with an inclined microscope, which allows one to place the camera in a horizontal position, by which means all the operations are considerably facilitated, and the whole affair assumes a proper stability.

In regard to objects to be reproduced in the micro-camera, two points have to be considered, their thickness and color. As in the case of looking at an object under the microscope, the difficulty is to focus an object in every part, for some portions are sharp, while others are blurred, from the fact that they are not all in the same plane. Nevertheless, the photographic process offers many resources, and it is possible to obtain very extensive enlargements, even with very feeble lenses. To do this, the exposure in the camera should be lengthened, the object, whether opaque or transparent, being always well lighted.

So far as regards color, it is well known that certain of them—such as yellow, red, and green—do not reproduce themselves in photography according to their intensity, and that the prints appear with much darker tones than the originals appear to the eye. In cases where the objects present

non-photogenic tints, they should be very powerfully illuminated, but with a very small diaphragm, polarized light being employed with advantage. Many organic substances of brown and yellow color may have their tints reversed, or their outline lighted upon a black ground, by using polarized light.

The photographic process employed in micro-photography should be a very rapid one, and for this reason wet plates are the best; but now that dry-collodion processes, and especially the so-called emulsion methods, have been so much improved in England, these should be particularly applicable to micro-photography. By employing such a process, the operator might prepare in advance a whole series of plates, and these he would merely have to slip into the micro-scope one after another, in order to secure twenty, thirty, or as many even as fifty photographs of different subjects in one morning.

**BUTTERFLY COLOR.**—It has long been supposed that the colors of the butterfly's wings suffer from exposure to concentrated light, and, according to the *Institut*, M. Capronnier has recently been making experiments with a view to ascertaining what sort of light bleaches most strongly. The result arrived at is that, as in photography, after the white light the blue light is the most actinic.

**PURPURIN.**—Dr. Vogel gives a few details with regard to the sensitiveness to light of purpurin, which has been so much talked of recently in connection with the sight purpurin of the eye and the recent experiments of Kuhne with the eyes of oxen, rabbits, etc. Purpurin—a dyestuff found along with alizarin in madder—gives a solution which, in the presence of a little alkali, is extraordinarily sensitive to light. Other solutions of dyestuffs, themselves actually more sensitive to light—such as fuchsin, alcarina red, and santalin—do not lose their color after several days' exposure to light. In clear weather a wine-red colored solution of purpurin becomes colorless in about ten minutes; and even by lamp-light, at a distance of twenty centimetres from the lamp, in about half an hour it will be distinctly apparent that the color has begun to fade. Dr. Vogel's former experiments show that in this bleaching its power of absorbing yellow rays plays an important part. An alkaline solution of carmine is also sensitive to light in the same way, though not to the same extent, as the alkaline purpurin solution. Schunk and Römer found that alkaline purpurin also lost its color in the dark, and that when deprived of air it did not bleach either in the light or the dark. It follows from their experiments that oxygen is necessary to the bleaching of purpurin. Any one can, however, convince himself by a simple experiment that purpurin is much more readily bleached in the light than in the dark.

Mix with ten cubic centimetres of distilled water about ten drops of a saturated tincture of purpurin and one drop of ammonia; divide the beautiful rose-colored fluid so obtained into two equal parts, and put each part into a test-tube. Cover one of the test-tubes with black paper, and place both in the window. After the lapse of ten minutes compare the two glasses, when, even if there be only daylight without sunlight, the liquid in the uncovered one will be found to be a good deal bleached, while that in the protected tube will scarcely be changed at the end of a couple of hours.

THE *Mittheilungen* contains Herr Goltz's third article on the advantages of reviving stereoscopic pictures, this one being devoted to stereoscopic portraits. The same number also contains a statistical account of the number of photographic establishments in Germany—estimated at a little over three thousand—and of the quantities of chemicals they consume, an average of three pounds per establishment being allowed as the consumption of nitrate of silver, and its cost being estimated at about £27,900 sterling. Of this large quantity it is supposed that about sixty per cent., or the value of £16,400, is annually lost in one form or another as waste. The value of the gold salts used is estimated at a quarter or, at most, a third of the sum allowed for silver, that is, at about £9,000. Owing to the quantities of albuminized paper exported through dealers, and of French mounts imported, it has been found almost impossible to assign figures to these last two items. The number of frames made in Berlin—of which, however, only a portion is used in Germany—is stated at an annual product representing £7,500.

#### BEET ROOT AND BEET ROOT SUGAR.

By EDW. LEFROY CULL.

A MODIFICATION of the diffusion process might, we think, be advantageously used by the farmer as follows. It has never been tried, that the author knows of, but it is a matter of common sense, and, as such, one person can form as good an opinion on it as another: When the ground root is thoroughly pulped mix it with a sufficient proportion of wheat or oat chaff, or clean chopped straw; put in a high tub, possibly six feet deep; sprinkle water on the top, which, percolating through the mass, would, from the well-known laws which govern diffusion of all substances, take out the sweet and other matters from the pulp, and pass off at the bottom of the tub quite as strong or but very little weaker than the juice itself. There must, of course, be a false bottom in the tub, pierced with holes, the juice being allowed to run freely off from the bottom into the boiler. It would come off quite fine and clear. A good arrangement of this plan would be to have a series of tubs, say two feet deep each, the bottoms being all pierced with holes, the tubs just fitting into each other. The number should be six. In the first place fill them all with the mashed root and chaff or cut straw; then pile them up one on the top of the other. The lower one must, of course, stand in a tray. Continue your leaching until the liquor begins to get weak; then, by a convenient arrangement, remove the top vessel, which by this time will be entirely exhausted. Raise the pile of vessels and add a newly-charged tub to the bottom and proceed as before.

This arrangement would save the press, the pressing and the cloths, and be entirely within the farmer's own means. I do not pretend to say that it could be done on the very largest scale, although I am sure it could be done on a small scale with great effect. The spent pulp and chaffed straw might be used a second or even a third time in Winter. It could be used over and over again, until there was a fear that souring or fermentation would commence. The pulp and chaffed straw would be in the most favorable state possible for feeding purposes.

The principle of diffusion is this, in short: When water is mixed with a substance, such as pulp or chopped beet root, which contains a heavy, thick strong juice, the

\* Bulletin de la Société Française.