attain the best results until we take to the use of non-halation films, both negative and positive. It is also believed that the films now commonly used in the production of slide-film negatives are not the best for the purpose. It would be a great help if some practical method could be devised for treating these films so as to reduce to a minimum the scratching which under present conditions takes place rapidly. Needless to say there is a growing demand for slide-films in color.

Projection Problems.—As previously stated, it is the writer's belief that the development of slide-film work has been much retarded because of the size of the picture aperture chosen as standard by those who pioneered the work. The choice made was a natural one. Nevertheless it was undoubtedly a serious mistake so far as results are concerned. Those in the Department of Agriculture who have given this matter serious study are convinced, in the light of the disappointing results attained with present materials and equipment, that we can not hope to achieve the improvement desired until an aperture of larger size is established as standard. A larger width of film, such as 70 millimeters, might be the best solution, but in view of the fact that the Leica or Contax size (24 × 36 mm.) is now a standard miniature camera size the world over, that precision cameras of the highest order are now readily available, and that printers and projectors are also available, we are rather strongly inclined to believe that the Leica size of frame would be the most practical solution of the problem. A third choice might be a square picture aperture of the maximum size permissible on 35-mm. film, possibly unperforated. If the aperture were square, there would be no need of supplying the projector with a revolving front, which is an indispensable feature of any good projector for Leica slide-films. In considering this problem, however, the desirability of establishing the 2 × 2-inch glass slide as a substandard size should be kept in mind, as its development will be greatly influenced by the market supply of projectors adapted to its use. The size of the condenser that will cover a slide made on a 2 × 2-inch plate is also well suited for use in projecting 24 × 36-mm. slide-film frames.

DISCUSSION

MR. GREENE: What wattage lamp was used in Mr. Freimann's projector?

MR. FREIMANN: 200-watt, with the beaded screen.

MR. CRABTREE: Referring to Mr. Hanson's paper, I realize it must be difficult to obtain slide-films of uniform quality from submitted subject matter of varying quality. I understand that they are rephotographed or recopied in order to level up the contrast in the photographic film.

An alternate scheme would be to use duplicating positive film for the negative film in the copying camera. This film has properties such that by using either a yellow or a violet filter over the lens when copying, the contrast of the negative can be varied, even though all the images are developed for the same time. Those who are doing this kind of work may find this a very useful way of levelling up the contrasts without changing the time of development.

MR. MATTHEWS: Mention was made of scratches encountered in a good many of these slide-films after they have been used for some time, and I wonder whether varnishing the surfaces would not be worth considering as a means of overcoming that objection.

MR. MACHARG: There are several solutions on the market for that purpose.

One advantage of the single slide-film is that you do protect it, by reason of the fact that the positive is at the center of the film, which is 3 inches long and $1^3/_4$ inches wide, and you do not handle it. By making a little photopack envelope you can protect the single slide-film absolutely without interfering with its use. Varnishing is not satisfactory; I have tried it, but it does not work so well.

MR. GREENE: In the theatrical field we are still a long way from ideal conditions in handling film. It would seem that thorough attention to the design of slide-film projectors and equally thorough attention to handling the film would very markedly reduce the trouble due to cracking. If a slide-film is used, say, twice a month, that is not excessive, is it? Two hundred showings would mean 100 months, which gives the film a life of something like eight years.

Another thing that impressed me in the demonstrations was that in one of the slides a pillar in the foreground at the lower right-hand corner of the screen was in fairly good detail, while the right-hand background of the picture was practically invisible. A duplicate was placed upon the screen with the glass slide a few minutes later, and all detail in that part of the picture was visible. If they were duplicates, it would seem to show there was a very decided lack of illumination from the slide-film projector. There apparently seems to be an attempt by those who use them to try to use them in fields for which their limited beam power makes them unsuitable.

Another thing: Would it not be possible or feasible to design the slide-film projectors so that with the same mechanism the lenses might be interchangeable, and so that the high-grade, high-quality photographic lens in the camera might be inserted into the bayonet mount on the front of the projector; or would the heat of the beam prove detrimental to the lenses?

MR. COOK: The lenses can be cemented in such a way that the heat from the projector will not damage them in any way.

MR. FREIMANN: It might be remembered that sound slide-films are necessarily restricted to equipment, the price of which is a very definite consideration, and very seldom is the camera available with every sound slide-film or stereopticon projector. The lenses that are now used are the most practical, commercially, from the price and quality standpoint. You probably have observed that the pictures were quite effective with a 200-watt projector, and after all, the medium is intended for showings to comparatively small groups, and should not be compared to theatrical showings to audiences in excess of 500 persons.

MR. WOLF: Can someone tell us the extent to which the slide-film is being used in industry and in the schools.

MR. FREIMANN: I am not thoroughly familiar with the amount of film used in the educational field. However, the average commercial slide-film is from seven to fifteen feet long. Some of the motor companies are releasing programs twice a month, having circulations as great as 5000 to 7000 copies. That will furnish some idea of the extent to which the medium is used and the amount of film consumed.

MR. GREENE: As regards the high-grade lenses, a bayonet mount for the front of the projector could be made more cheaply than the lens could be made, and the great number who have their own miniature cameras could then purchase the projectors ready for use at a much lower price than if the product were already equipped with a lens.

MR. CRABTREE: Mr. Hanson, what is the maximum screen size that you recommend, and what is the maximum size of audience that usually views them with any degree of comfort? There is no question, judging from the samples shown, that the quality of the image from the standpoints of brightness and definition does not compare with that of the glass slide.

MR. HANSON: The average size of our audiences is about 50, and for such groups we seldom project pictures larger than 5 or 6 feet wide. With regard to lack of definition in a few of the Leica-size frames, that is due to the negatives being out of focus. Unfortunately, we found it impossible to have the slide-film remade before this meeting.

Nevertheless, I not only agree with Mr. Crabtree that the image of the glass slide is superior to that of the slide-film in both quality and brilliance, but confess to a personal preference for glass slides in my own work. Public service must, however, take precedence over personal preference. It is the duty of our office to make our illustrative material available in a form most acceptable and useful to our 7000 extension workers located in all the agricultural sections of the country. We are giving up glass slides only after having thoroughly tried them out for 25 years and found them not adapted to the needs of our country agents. As previously shown, the demand for our slide-films has grown by leaps and bounds. That explains why we are gradually dropping glass slides and giving our attention to slide-films. We realize quite fully the deficiencies of the slide-film, and that is why I recommend the adoption of a larger size of aperture, which, I am sure, will do much to increase materially the efficiency and usefulness of this very valuable visual aid.