Letters to the Editor.

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Pinholes in Photographic Negatives.

PINHOLES are a serious problem in the case of some photographs. For example, a number of pinholes in a delicate cloud photograph will quite spoil the effect, unless they are carefully spotted out. Spotting out may be easy for a professional, but the ordinary amateur finds a considerable difficulty in doing it properly, and if lantern slides are to be made the technique is still more difficult.

The common cause of pinholes is that small particles get on the face of the plate and during exposure they cause shadows, which on the resulting negative appear as clear patches. Particles may get on to the plate at various stages of its history, but the plate makers never, or scarcely ever, admit that any particles can be on the plates before they are taken out of their wrappings. My own experience, however, is against this supposition. My procedure, up to quite recently, has always been the same; I have dusted out the dark slides, opened the packets of plates very carefully, and very carefully put the plates into the dark slides; but pinholes sometimes occur and sometimes do not, and the occurrence or non-occurrence of pinholes coincides with the use of a new box of plates. With all the plates from one box I may get many pinholes, with all the plates from another I get very few; the inference is that the particles that cause them are on the plates as they come from the makers. Moreover, I have opened plates in the light and have found minute particles on their faces. Quite recently I have heard indirectly from a leading firm of plate makers that it is almost impossible to prevent small fragments of glass from the cut edges of the plates from getting on to the sensitised surface; this agrees with my experience that the pinholes are worse round the edges of a plate than near the centre. The above observations were made on plates that had not been carried about in a dark slide. Of course, if this is done, pinholes must be expected even on plates which were the most immaculate when they left the maker.

Since apparently plates can, and do, leave the makers with foreign particles on their faces, it would appear to be necessary to remove the particles before the plate is put into the dark slide. Thirty years ago or so the amateur used to be told to dust his plates; more recently, however, he has been told on no account to do this; it has also been stated, and often repeated, that dusting plates electrifies them and causes small particles to be attracted. No one who has so written can have tried the experiment; at ordinary room temperature and humidity I find that it is not possible to electrify a plate even by a very vigorous rubbing of the coated side. When, however, the plates are made very hot, and therefore dry, they can be electrified by fairly moderate rubbing; if, however, they are left for half an hour or so, they are found to have returned to their original condition. Backed plates are still more difficult to electrify by rubbing, though different makes differ in this respect; some backed Ilford Special Rapid Panchromatic and Wellington Spectrum plates showed no electrification when rubbed vigorously, even when heated to such a temperature that they could scarcely be touched by the hand; some backed Imperial Panchromatic plates, however, were easily electrified by rubbing, when made very hot. The Ilford and Wellington plates could be electrified by rubbing if the backing was removed and if they were heated. Thus in the ordinary way, at room temperatures, there is no danger of electrification even if the plates are rubbed quite vigorously. I now wipe the sensitised surface of the plate with a pad of velvet, and have found a very considerable diminution of pinholes as a consequence; a single sweep of the velvet across the plate is sufficient.

Probably a professional finds little difficulty in spotting out pinholes, but, as I have said, the amateur finds a good deal of difficulty. When using watercolour, for example, if there is too much colour on the brush, or if it is too watery, the colour leaves the pinhole and collects in a circle round it, thereby aggravating the evil; if one uses the brush very nearly dry it entails taking fresh colour for nearly every pinhole, and the process becomes very laborious. I have lately, however, taken to using ink supplied by the Cambridge Instrument Co. for their recording apparatus; this ink consists of colouring matter dissolved in nearly equal proportions of glycerine and water with a small admixture of gum arabic. This used with a fine brush makes the best medium I know of for spotting out pinholes; it takes longer to dry than, say, water-colour, but this disadvantage is far outweighed by its ease of application.

C. J. P. CAVE.

Stoner Hill,
Petersfield, Hants, May 25.

The Polymorphism of Higher Fatty Acids.

IN continuation of former work, I have extended the study of the polymorphism of such substances (Piper, Malkin, and Austin, *Jour. Chem. Soc.*, 1926, 2310; J. Thibaud, *Comptes-rendus*, **184**, 24 and 96, 1927; de Boer, NATURE, Jan. 8, 1927) to the even and odd series of saturated acids of higher molecular weight. Thin films are prepared on a glass slip either by melting or by evaporating from a solution in ether, or better in carbon disulphide, and examined with respect to the $K\alpha$ rays of copper by the turning crystal method. The result is as follows: the long spacing measured for an evaporated film differs from that obtained from a melted acid, the latter being smaller than the former. This property is quite general: for every acid which contains more than 16 carbon atoms in the molecule, the magnitude of the long spacing depends on its manner of preparation and the two kinds thus possible both seem very durable. For stearic acid I have been able to obtain upon one and the same evaporated film, two coexistent crystalline modifications.

The following table summarises the data obtained with the even and odd series of saturated acids:

Acid.		Spacing (Å.U.) of the Modification.	
		Evaporated.	Melted.
Myristic . .	$C_{14}H_{28}O_2$	31·2	31·2
Palmitic . .	$C_{16}H_{32}O_2$	38·8	35·4
Daturic . .	$C_{17}H_{34}O_2$	43·2	41·4
Stearic . .	$C_{18}H_{36}O_2$	43·95	39·9
Arachidic . .	$C_{24}H_{48}O_2$?	59·0	53·4
Cerotic . .	$C_{27}H_{54}O_2$	69·0	64·2
Melissic . .	$C_{31}H_{62}O_2$	80·4	73·5
Lacceroic . .	$C_{32}H_{64}O_2$	82·0	73
Sebacic . .	$C_{10}H_{18}O_4$	11·4	11·4