percentages to be due to changes in external conditions, to which, perhaps, the forms are peculiarly responsive. The ease and certainty with which high germination percentages were secured in other families certainly lends support to the view.

The experiments are still in progress, as there are still many points to be worked out in detail. Among them are the effects of varying soil temperatures, of a wider range of soils, of progressive experiments for the determination of resting periods in the various forms, of duration of viability, of the effect of freezing, and others self-suggestive to the experimentalist. Until these are worked out in detail the question as to the causes of the relatively small distribution of any given composite form must remain open. So far as the experiments go they point to this limitation being due in a very large degree:

1. To a low germination percentage, largely due to an extreme sensitiveness on the part of the embryo to external conditions, to which should perhaps be added imperfect pollination, due to causes already given.

2. To an extreme sensitiveness of the seedlings to temperature and moisture changes, either in soil or atmosphere. This necessarily brings about a peculiar sensitiveness to direct sunlight.

When the habits of most of our native composites are considered it will be seen that this extreme sensitiveness in both achene and seedling proves an effectual limitation to their distribution. Other factors than these here emphasized enter, but none are of such general application.

Formalin as a Reagent in Blood Studies. By Ernest I. Kizer.

Among the most common reagents used in the demonstration of blood corpuscle structure, are found osmic acid, salt solutions, picric acid and acetic acid. But all of these cause distortions of the corpuscles, so they are imperfect fixing agents and preservatives. The method of drying blood on the coverslips is seldom successful in the hands of beginners.

Formalin has been found very useful in this connection, both as a fixing agent and as a preservative, because it produces no appreciable dis-

tortion of corpuscles, does not interfere with staining, is easily operated and preserves blood perfectly, at least, for several months.

The method consists of the following steps:

1. Mix one volume of perfectly fresh blood with three volumes of a two per cent. solution of formalin.

2. Allow the mixture to stand at least an hour; then draw a small quantity from the bottom of the vessel with a pipette, by which a drop is transferred to a clean coverslip; spread evenly over the coverslip and allow the liquid to evaporate. The method of pressing the coverslips together, as in sputum analysis, is to be preferred.

3. Pass the coverslips through the flame, films uppermost, in order to cement the corpuscles to the glass.

4. Dip into a five per cent. solution of acetic acid once or twice.

5. Remove the acid with water.

6. Stain. Perhaps the best stain for non-nucleated corpuscles is Gentian violet (a two per cent. solution; time of staining, about two or three minutes). For nucleated forms, contrast stains, as Methyl blue and Gentian violet, or Hæmatoxylin and Eosin, or Methyl green and Safraum, give very good results. Ehrlich's Triple stain may be used for human corpuscles.

7. Wash out excess of stain with water or alcohol as the stain requires.

8. Remove alcohol with clove oil or xylol, and

9. Mount in Canada Balsam.

This method proved very successful in the laboratory of Purdue University, and was used in studying five different forms of corpuscles. They were those of the cat, the ox, the pigeon, the chicken, and man. The human corpuscles were the only ones which resisted the stains, but this difficulty was overcome by the use of a weak solution of acetic acid. Besides making the stains effective, it also clears the films considerably. Although this method may be of no chemical value it promises to be successful for general laboratory purposes.