protein fractions were changed but slightly by the presence of calcium in the buffer. This change in mobility of the leading component can be explained by assuming that calcium combined with this component and thus changed the charge of the protein molecule. The result was a marked reduction in the mobility of component 1.

Previous evidence has shown that the rise in the nondiffusible calcium of chicken serum caused by the administration of diethylstilbestrol was paralleled by a rise in two of the electrophoretic components (*5*). This extra binding ability may be attributed to the leading, phosphorus-rich component. Utilizing buffer solutions containing Ca^{45} and an electrophoretic cell modified to determine its activity, we are now investigating the distribution of calcium in the various electrophoretic components of chicken blood serums. A more detailed discussion of this investigation is in preparation.

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Agglutinating Strains of Trypanosomes Obtained with Oxophenarsine

In the course of producing oxophenarsine-resistant strains of *Trypanosoma equiperdum*, we observed the development of strains with a marked tendency to agglutinate when infected blood containing them was diluted 1:100 with physiological saline in a red-cell-counting pipette at 20° to 30°C (*1*).

The agglutinated masses of trypanosomes, which varied in size up to clumps that contained hundreds of organisms, were so firmly bound together that individual cells did not break away, although they were actively motile. When they were first seen, it was thought that the smaller agglutinated masses represented a failure of cell division, but further observations of the trypanosomes in warm saline (38°C) and in stained, dried blood films proved that the clumps were formed *in vitro*. When warm saline was used and the pipette and counting chamber were warmed to 38°C, the agglutinating tendency was greatly weakened and reliable counts could be obtained, something quite impossible at room temperature. Furthermore, the clumps were dispersed when the pipette in which they were contained was warmed in an incubator at 38°C. This behavior is reminiscent of cold hemagglutination, and cold hemagglutinins have been observed in trypanosomiasis (*2*), but there was no evidence of hemagglutination with serums from mice containing our strains, even at 4°C.

The unmodified strain from which the agglutinating strains were derived was observed in saline at 4°C, and no evidence of agglutination was found. At room temperature the unmodified strain formed evenly dispersed suspensions that were easily counted in a hemocytometer and they showed no tendency to stick together.

All the agglutinating strains have appeared in mice treated with subcurative doses of oxophenarsine when the infection was at levels of 50,000 to 1 million trypanosomes per cubic millimeter of blood. The first strain was obtained on the second day after treatment was started, and other strains developed up to 2 mo after treatment was started. During this period the dose was increased until a strain with 80-fold increased resistance to oxophenarsine was obtained.

In the first strain the agglutinating characteristic persisted in a highly developed form through at least eight passages that were made at 2- to 3-day intervals in untreated mice, but between the 8th and the 17th passages it almost disappeared, being replaced by a predominately nonagglutinating strain. It was possible, however, to recover partially the agglutinating characteristic by centrifuging diluted, infected blood and using the sediment to infect other mice.

On two out of two trials the agglutinating component was destroyed by treating infected mice with somewhat larger doses than the ones that were given just before the strains appeared; their relapse strains were nonagglutinating. Blood obtained from a mouse carrying an agglutinating strain but cleared of trypanosomes by treatment with oxophenarsine did not agglutinate the normal strain. An agglutinating strain was passed to rats, and the characteristic remained well developed in this species.

Although the agglutinating tendency seemed to be related to drug treatment, it was not difficult to obtain highly resistant strains that were completely free of the characteristic by always maintaining several substrains; this was because the incidence of the agglutinating characteristic was relatively low. Most of the mice were treated repeatedly, some as many as 10 times, without inducing any change other than a gradual increase in oxophenarsine resistance.

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Science, Population, and Arid Lands

It is becoming increasingly clear as world population soars to new heights that population pressure aggravates the struggle to maintain high living standards. The outcome of this struggle will depend not alone on available resources but also on the race between population increase and the research that makes resources more usable.

The world population is estimated to have doubled from 100 million to 200 million in the first 1000 years A.D., more than doubled from 500 million to 1200 million in the 200 years from 1650 to 1850, and again doubled from 1200 million to 2400 million in the century from 1850 to 1950. The curve of increase has been rapidly climbing, and if it is projected into the future it promises still higher increase rates.

With such increases, population pressures within densely populated areas are certain to push people into marginal, less densely populated areas. These are mainly the arid lands of the world, where lack of water is the critical factor in making them marginal or less usable in character.

It was shown at the Arid Lands Meeting in New Mexico in late April 1955 that arid zones occupy nearly one-third (32 percent) of the land surface of the earth, and that about 14 percent of the Americas was included. These lands are arid from a variety of causes but mainly because of the planetary wind patterns of the earth, which bring prevailingly dry winds to certain areas. Others lie in the rain shadow of mountains.

Rainfall on arid lands is usually inadequate to produce runoff (except quick heavy showers); hence, most water available in deserts comes in streams from distant mountains or regions of heavier precipitation. Such water, concentrated