ment Station, has been called to the University of Wisconsin to head the research investigations in animal husbandry, a position made vacant by the resignation of F. B. Morrison, assistant dean of the College of Agriculture, who recently accepted the directorship of the New York Agricultural Experiment Stations.

AT the University of California, E. O. Essig, associate professor of entomology and associate entomologist, has been appointed professor of entomology and entomologist at the experiment station. Dr. Edwin C. Van Dyke, associate professor of entomology, has been appointed professor of entomology.

DR. WALTER BARTKE has been appointed assistant professor in mathematical astronomy at the University of Chicago.

DR. F. R. DAVISON, who for the past two years has been head of the bacteriology and biochemical departments of the Wm. S. Merrell Company, has resigned to accept the position of assistant professor in biochemistry at Rutgers University.

DR. ISADORE D. BRONFIN, medical director of the national Jewish Hospital, Denver, has been appointed assistant professor of medicine at the University of Colorado School of Medicine, Denver.

P. C. RAIMENT, demonstrator in biochemistry at the University of Oxford, has been appointed to the chair of physiology in the State University of Egypt, at Cairo.

DR. STANISLAS LORIA, professor of theoretical physics at the University of Lwów, Poland, has been appointed professor of experimental physics and director of the physical laboratory at the university. Professor Loria spent two years, 1923 and 1925, in America working and lecturing as research associate at the California Institute of Technology.

DISCUSSION AND CORRESPONDENCE

WEIGHT AND TEMPERATURE

THERE is a recurrent myth to the effect that mass varies with temperature, hoary with age, familiar to most physicists and chemists. It has been investigated many times and reported as due to convection currents of heated air acting either on the hot object weighed or on the balance pan.

The apparent loss in weight of a heated object is perfectly definite and repeatable and is of the order of 50 milligrams for a platinum crucible or pyrex beaker having a surface of 100 square cm. when heated to 600 degrees. The balance pan is protected from rapid heating by a ring or gauze of highly oxidized metal and the heated object left on it but a few seconds, just long enough to get the direction of the first swing. The temperature curve so obtained is a smooth hyperbola. The effects of convection and of expansion of the balance arm are relatively sluggish in coming into play and are readily recognized and avoided by any one familiar with precise weighing.

The apparent loss in weight is roughly proportional to surface and not to mass. This was shown by comparing the effect on a thin platinum crucible with that on a platinum button. The curves of loss in weight per unit area, plotted against temperature, were nearly coincident for glass, platinum and sheet gold but lower for aluminum, copper and iron (polished wire, coiled). The change with temperature is large at the lower temperatures, becoming less and less until at 900° it is too small to measure.

Since hygroscopic materials change in weight on heating in the manner just described, the effect was at first attributed to loss of adsorbed water. A lump of gold was weighed, then rolled into sheet, weighed, then melted into a lump, alternately, six times, each time heated to 600° to remove grease but weighed cold. A film of moisture would cause the sheet to weigh more than the button. A consistent difference of 1.2 mg. was found, probably due to adsorbed moisture, whereas the loss of weight on heating was of the order of 40 mg. Hence that loss could not be due to driving off adsorbed water.

Next a platinum crucible and the sheet gold were suspended in a furnace and thus weighed at various temperatures. The only change in weight found was a slight gain (2 mg.) such as would be caused by the decreased density and buoyancy of the heated air within the furnace. This disposed of the hypothesis of adsorbed moisture driven off by heat.

Finally, a crucial experiment indicated the actual cause of the apparent change in weight. The effect was first carefully determined on a platinum crucible. Repeating with the crucible *inverted* showed precisely the same loss in weight. Then a second crucible, slightly larger than that heated, was used as a cover for the heated inverted crucible, completely enclosing it down to the balance pan and eliminating convection currents entirely. In this case also the loss in weight was the same as before. The three losses check to within less than 2 per cent.

Warm air in contact with a heated surface must be at the same pressure as the surrounding atmosphere but less dense and more viscous. If it be lightly held in position (weakly adsorbed) by the solid, it will in effect increase the volume of the solid and therefore enhance the buoyancy of the surrounding air. To produce the losses in weight observed, layers of fixed air 0.5 to 3 mm. deep would be required. This explanation is not entirely acceptable

but is apparently the only one in harmony with observed facts.

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INFLUENCE OF POLARIZED LIGHT ON PHOTOCHEMICAL REACTIONS

I HAVE read with keen interest and great delight the article by Dr. S. S. Bhatnagar appearing in SCIENCE for October 14, entitled the "Selective Effects of Polarized Radiations on certain Photochemical Reactions." In this article the author announced his findings concerning the remarkable acceleration of chemical reaction between the amalgams of the alkali metals and water produced by exposure to polarized radiations. In the interest of historical accuracy and scientific priority I beg to submit for publication the following information which may not be known to scientists at large. Our esteemed Hindu colleague states in his paper that "As far as the author knows, this is the first purely chemical reaction as distinguished from the biochemical reactions studied by previous investigators which has definitely been shown to be selectively affected by polarized radiations." It is evident that owing to the slow communication between the United States and India he was not aware of the fact that on April 12, 1927, I and Dr. W. T. Anderson, Jr., read a paper before the American Chemical Society at the Richmond meeting entitled "The Effect of Polarized Light on the Pharmacological Properties of Some Drugs." In that paper which was published in the *Journal* of the American Chemical Society for August 5, 1927, and which was broadcast by "Science News," we have described our findings concerning the effects of polarized light on the pharmacological and chemical reactions of certain drugs. The profound changes produced by polarized radiations on the substances studied were certainly due to photochemical changes produced in their chemical structure because the chemicals were first irradiated and only subsequently tested. This was demonstrated not only by pharmacological means but also in the case of cocain by purely physical chemical tests, namely, changes in hydrogen-ion concentration, and in the case of quinin tartrate by the changes produced in its optical rotation. It is hardly necessary to state that the drawing of distinctions between biochemical and other chemical reactions is mere academic quibbling. I wish to call attention furthermore to the fact that a preliminary paper concerning the effects of polarized light on the reactions of certain drugs was published by me and John C. Krantz, Jr., in the *Journal* of the American Pharmaceutical Association for March, 1927.

In the present communication I wish to announce briefly the results of certain other experiments performed by me which I mentioned at the above meeting of the Chemical Society, but which were reserved for publication in a later paper. I have studied the effects of polarized light on five groups of optically active alkaloids. These were the following: Cocain, Epinephrin, Hyoscyamin, Scopolamine (Hyoscin) and Physostygmin. Solutions of each of these alkaloids after irradiation with polarized light were found to have undergone photochemical changes as evidenced by numerous pharmacological tests. An examination of various stereo-isomers in this connection revealed the remarkable fact *that the laevo variety in every case was the one most profoundly affected by polarized light.* These experiments have been in progress for a long time and would have been published at an earlier date had it not been for the unusually unsympathetic attitude towards our investigations on the part of certain American scientists, which fortunately did not discourage us in our work but which did compel us to repeat unnecessarily a large number of experiments otherwise quite clear cut, flawless and fool-proof. It is but fair to add in this place that the whole investigation could not have been conveniently carried out had it not been for the encouragement and facilities extended to us by two private industrial laboratories, namely, the Pharmacological Research Laboratory, Hynson, Westcott and Dunning, of Baltimore, and the Physico-chemical Research Laboratory of the Hanovia Company, Newark.

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FLOOD EROSION AT CAVENDISH, VERMONT

ONE of the tragic but geologically most interesting happenings connected with the recent Vermont flood occurred at Cavendish village, which is located on the east slope of the Green Mountains some fourteen miles from Summit Station on the Rutland Railroad.

Here, during the early morning of November 4, after some twenty-four hours of heavy rain, part of a highway leading from the village down the valley was suddenly engulfed, carrying with it seven houses, numerous barns, garages and their contents. Happily no lives were lost, but the unfortunate people, with almost no warning, witnessed the total destruction of their property and even of the land upon which it stood. The loss is estimated at from $35,000 to $40,000.

The draining away of the waters revealed, where once the road had been, a yawning gully some forty feet deep, two hundred feet wide at the bottom and