mains for further investigation to determine whether the red dye, which is the principal constituent of the imported products examined, is of use in any connection.

Between forty and fifty samples of methylene blue have been examined. The great majority have proved to be of normal chemical type. In a number of instances, however, the presence of considerable quantities of dyes other than methylene blue was established. The spectrophotometric evidence indicated that such products were probably prepared from methylene blue by treatments similar in type but milder in degree than those employed in the manufacture of certain American methylene violets and azures. Since these products have proved to be excellent stains, the determination of the constitution of the component dyes and their preparation in a pure state will be undertaken as opportunity is afforded.

The most difficult phase of the work before the laboratory is the differentiation of products of normal type in which the minor variation involved is in respect to the subsidiary dyes produced by the side reactions which are unavoidable in the manufacturing processes. It remains to be demonstrated whether or not such minor variations affect the performance of stains appreciably.

Many samples of methylene blue, basic fuchsine, acid fuchsine, eosine and safranine and a few samples of methyl green, cresylecht violet and thionine have been examined. Of these over thirty have been of pre-war *Grübler* origin and about one hundred of recent American manufacture. The investigation has been sufficiently comprehensive, accordingly, to provide an adequate basis for a comparison of the chemical characteristics of pre-war stains and the corresponding products now marketed in this country.

In general, the American stains have contained from two to four times as much dye as the corresponding pre-war products. The commission has made a reasonably high dye content one of their specifications for stains which shall be suitable for their "certification." Apart from protecting the economic interests of purchasers, such specifications will promote uniformity in performance.

Although it has not been considered necessary to carry out a systematic determination of the insoluble matter in the stains examined, it has been noted repeatedly that pre-war stains contained quantities of insoluble residue (principally tarry material) which were abnormal, even if the deficiency in dye content was not taken into consideration.

Several pre-war stains contained dyes of types which precluded the possibility of natural origin in the manufacture of the stain, in quantities which were too large to have resulted from accidental contamination in mixing and grinding and too small to make it probable that they were added with the intention of modifying the staining characteristics of the stain. Since products of this type are of frequent occurrence in textile dyes, with which it is of the greatest importance to maintain precise standard shades, the conclusion that the stains in question were prepared from textile products appears warranted.

Large proportions of auramine were found in two pre-war safranines and large proportions of fluoresceine in two pre-war eosines. Several pre-war methylene blues were of the abnormal character to which reference has already been made. In each instance the labeling of these mixtures was identical with that of other pre-war products of normal chemical characteristics. The propriety of marketing mixtures of dyes may be questioned, unless their components are not available in relatively pure form. The label should invariably warn customers of the character of such products.

Many of the earliest stains of American origin were reasonably satisfactory, and the general improvement in the subsequent output has been marked. Most American manufacturers have given the commission active cooperation in its effort to develop superior products.

It is the aim of the commission to provide a certification of satisfactory stains (whether of American or foreign origin) which will insure products of relatively excellent and uniform chemical characteristics, as well as of tested performance. It is believed that such a certification will make feasible a corresponding standardization in technic and result in establishing biological staining on a more satisfactory basis.

JOSEPH A. AMBLER
WALTER C. HOLMES

COLOR LABORATORY,
BUREAU OF CHEMISTRY,
WASHINGTON, D. C.

SPECIAL ARTICLES

THE EFFECTS OF DISLOCATION OF THE EYE UPON THE ORIENTATION OF THE GOLDFISH

(Carassius Auratus)[1]

THE eye, the semicircular canals and the lateral line have been invoked by various biologists to explain the facile orientation of the fish. The following experiment was devised in order to determine, if possible, what part vision performs in this orientation. The eyes being normally in the lateral position, it was

[1] Preliminary Report from the Hull Physiological Laboratory of the University of Chicago.

thought that by placing them in different positions the orientation would be altered if indeed vision is an important factor.

Large goldfish (*Carassius auratus*) were chosen for the work because of their ready availability and unusual vigor. These animals were in excellent condition throughout the experiments.

An artificial orbit was made for the left eye in the top of the cranium just to the left of the midline by the use of a large dental drill. A narrow canal was cut through the bone connecting it with the natural orbit through which the nervous and vascular connections passed when the eye was slipped into its new orbit. In this way the eye may be readily dislocated within a few minutes without obvious injury to it or its connections.

No detectable abnormalities in the animal's behavior could be noticed. Its orientation and locomotion were unchanged. The right eye was removed a week later. We were thus able to produce a real experimental cyclops. For the first week its behavior was quite as before. After about the tenth day, however, the animal was observed to orient itself tilted a little toward the left side whether swimming or at rest. The tilting increased constantly during the next four weeks after which time it assumed a position with its dorsoventral axis 45° to the left of the vertical. The vision of the animal was regularly tested during this period and found to be very good. If a small rod was slowly moved toward the eye the animal quickly turned aside and avoided it constantly.

A photograph was taken of the animal at this time and the eye replaced in its own orbit. The following day the fish was swimming quite vertical without any observable tendency to tilt toward either side. Its vision and orientation were observed the following two weeks and no abnormalities observed. At no time during the experiment did the animal show any abnormalities other than the tilting; circus movements, etc. being entirely absent.

We feel justified, therefore, in concluding that the visual function is an important element in the normal orientation of this species, visual impulses being apparently able to counteract the controlling influence of the labyrinth.

J. FRANK PEARCY,
THEODORE KOPPÁNYI
UNIVERSITY OF CHICAGO

THE DECOMPOSITION OF SALICYLIC ALDEHYDE BY SOIL ORGANISMS[1]

THIS aldehyde was obtained from several plants, *e.g.*, *Spirea ulmaria* and other species of Spirea by Pagenstecher[2] in 1835. It was reported in *Crepis foetida* by Wieke in 1856. It is formed by the oxidation of salicon which occurs in willow (Salix) and bridal-wreath (Spirea).

Salicylic aldehyde was first isolated by Shorey[3] from the garden soils of the Mount Vernon estate, and later found in widely separated soils by Schreiner and Skinner.[4] They found that this aldehyde is injurious to wheat plants. Ten parts per million in solution cultures caused a reduction of growth of 31 per cent. in the first six days. The plants were killed in solutions containing 50 parts per million. Other crops were affected similarly, though in some instances higher concentrations were necessary to cause injury. In soil cultures 25 parts per million of salicylic aldehyde was injurious to wheat seedlings.

In order to determine the ability of soil organisms to decompose salicylic aldehyde 27 pairs of cultures were prepared with the usual precautions. After incubating at room temperature for two weeks observations and tests were made. These showed a slight growth of bacteria in five different cultures, but decomposition of salicylic aldehyde in none of them.

Sub-cultures were made from each soil culture to make sure that there had been no mistake in observation. None of these yielded growth of bacteria, and none showed decomposition of salicylic aldehyde. In the growth of the bacteria in the few soil cultures mentioned above the bacteria doubtless used organic matter contained in the soils instead of salicylic aldehyde as the source of carbon.

WRIGHT A. GARDNER
ALABAMA POLYTECHNIC INSTITUTE,
AUBURN, ALABAMA

[1] Published with the permission of the director of the Alabama Experiment Station.

[2] Pagenstecher, Report, *Pharm.*, 49, 337, 51, 364.

[3] Shorey, E. C., "Some organic soil constituents," Bulletin 88, 13 pp., *Bureau of Soils*, 1913.

[4] Schreiner, O., and J. J. Skinner, "Occurrences of aldehydes in garden and field soils," *Journal Franklin Institute*, 329–343, September, 1914.

THE AMERICAN CHEMICAL SOCIETY

SECTION OF HISTORY OF CHEMISTRY

F. B. Dains, *chairman*

Lyman C. Newell, *secretary*

The one hundred and fiftieth anniversary of the discovery of oxygen: EDGAR F. SMITH. (Note: Dr. Smith was unavoidably absent. The secretary read Priestley's account of the discovery of oxygen from an original copy of "Experiments and Observations on Air," Vol. II, pages 33–35, and emphasized the importance of this discovery to American chemistry by reading an ex-