The water precipitated during the day of the storm, as reported by the weather bureau, was 0.66 in. A spot sample of snow collected on the campus showed 2.98 g of dust per liter of water. This gives an average amount of dust of 128.8 tons/mi^2. Even reducing this number to 50 tons because of the possibility of uneven distribution of dust, it would amount to a minimum of 75,000 tons of dust falling on the basic Twin City area—about 1500 mi^2.

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References

1. For example: A. E. Alexander, *Monthly Weather Rev.* **62**, 15 (1934); I. F. Hand, *ibid.* **62**, 156 (1934); L. R. Page and R. W. Chapman, *Am. J. Sci.* **28**, 288 (1934); A. N. Winchell and E. R. Miller, *ibid.* **46**, 599 (1918); **3**, 349 (1922); and *J. Agr. Research* **29**, 443 (1924).

14 June 1954.

On the Fluorometric Determination of N^1-Methylnicotinamide

Huff and Perlzweig (*1*) developed a fluorometric method for the estimation of N^1-methylnicotinamide based on the condensation of it with acetone under alkaline conditions. Huff (*2*) has shown the condensation product to be a highly fluorescent napthyridine derivative. More recently, Kato *et al.* (*3*) have reported that the intensity of fluorescence may be increased when samples of N^1-methylnicotinamide are treated with alkaline hydrogen peroxide before the analytic procedure is applied. We have found that pretreatment of samples with alkaline or neutral hydrogen peroxide may completely destroy N^1-methylnicotinamide, depending on the concentration and on length of time in which the samples are in contact with peroxide (*4*). Huff and Perlzweig have previously mentioned the rapid destruction of N^1-methylnicotinamide in alkaline solution.

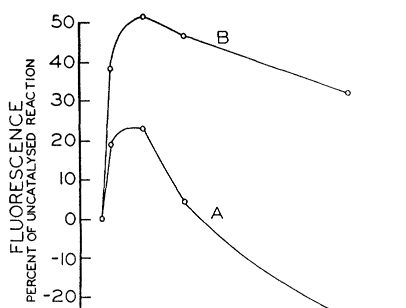

Fig. 1. Effect of hydrogen peroxide on the fluorescence of N^1-methylnicotinamide condensed with alkaline acetone: *A*, N^1-methylnicotinamide samples pretreated with neutral hydrogen peroxide; *B*, N^1-methylnicotinamide samples treated with hydrogen peroxide after the addition of acetone and alkali. Data obtained by the analytic procedure of Huff and Perlzweig (*1*) using 0.8 μg. N^1-methylnicotinamide in a final volume of 10 ml. The fluorescence of the uncatalyzed reaction was arbitrarily taken as zero.

Hydrogen peroxide, however, is effective in catalyzing the reaction when the peroxide is added to the reaction mixture after the acetone and alkali additions (Fig. 1). A plot of peroxide concentration versus the change in fluorescence from that of the uncatalyzed reaction demonstrates the concentration of peroxide necessary to obtain maximum fluorescence. At concentrations greater than the optimum, N^1-methylnicotinamide may be destroyed. Pretreatment of the samples with neutral hydrogen peroxide, immediately before application of the analytic procedure, resulted in a lower fluorescence response at the optimum concentration of peroxide and in greater destruction of N^1-methylnicotinamide at high concentrations of peroxide.

The data also indicate the necessity for rigid control of peroxide concentrations in order to obtain reproducible results.

In a study of the factors affecting the analytic procedure, we have found that a large number of inorganic elements catalyze the formation of a fluorescent derivative. Iridium and cerium salts have the greatest activity at concentrations of 5×10^{-6} and 8×10^{-6} M, respectively. These salts are almost 1000 times more active than hydrogen peroxide at optimum concentrations. A complete report of the factors affecting the formation of the napthyridine derivative is in preparation and will be published elsewhere.

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References and Notes

1. J. W. Huff and W. A. Perlzweig, *J. Biol. Chem.* **167**, 157 (1947).
2. J. W. Huff, *J. Biol. Chem.* **167**, 151 (1947).
3. M. Kato, H. Shimizu, and Y. Hamamura, *Science* **116**, 462 (1952).
4. A preliminary report of this work was presented before the Division of Biological Chemistry, American Chemical Society, Sept. 1953.

5 February 1954.

A New Enemy of the Oyster Drill

It has been reported that the oyster drill, *Urosalpinx cinerea* (Say), and *Eupleura caudata* (Say) is its own worst predator (*1*). However, the moon snail, *Polinices duplicata* (Say), may in some areas destroy more oyster drills than the drills themselves destroy.

Dead drills from the Lower Miah Maull area of Delaware Bay, 937 in number, were examined for cause of death. Of these, 100 contained the large, heavily countersunk hole typical of the moon snail, and 76 contained the small, slightly countersunk hole typical of the oyster drill. These dead drills were obtained from material removed from the leased oyster beds by drill screens and a drill dredge. Drill screens and drill dredges are screening devices used by the oystermen to remove drills from their oyster beds.

To check these field observations, 23 oyster drills and three moon snails were placed together in a laboratory aquarium. At the end of 4 mo, one moon snail and one oyster drill were alive. The other two moon snails and 22 drills had been eaten by the moon snail(s).

It is possible that some cases of drill death previously attributed to cannibalism were cases of moon snail predation.

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Reference

1. L. A. Stauber, *Ecological Studies of the Oyster Drill* Urosalpinx cinerea *in Delaware Bay with Notes on the Associated Drill* Eupleura caudata, *and with Practical Consideration of Control Methods,* unpublished manuscript, Oyster Research Laboratory, N.J. Agr. Expt. Sta., 1943, p. 91.

4 June 1954.

Brochosomes and Leafhoppers

Brochosomes (Gr. βρόχος, mesh of a net; σῶμα, body) are hollow spheroids varying in diameter from 240 to 600 mμ which, because of a fixed arrangement of high and low electron-scattering areas, appear as netted bodies. They are found on the wings, wing scales, and hairs of many insects [G. S. Tulloch and J. E. Shapiro, *Bull. Brooklyn Ent. Soc.* **48** (3), 57 (1953)]. Their regular occurrence on a large number of leafhoppers representing several species from widely separated areas in the United States suggested that the brochosome-leafhopper association was not a casual one. Further studies dealing with the geographic range of this relationship are reported here along with data obtained by following the development of one species of leafhopper from egg to adult.

Leafhoppers were obtained from many sources throughout the world and prepared for examination under the electron microscope in the following manner. Wings were removed and placed in a drop of water on Formvar-filmed 200-mesh screening and allowed to dry at room temperature. By this technique, the wing is flattened and fixed to the film and some of the brochosomes, which are easily dislodged, are pulled to the periphery of the drop of water and there become fixed to the clear film. As a result of this survey, leafhoppers positive for brochosomes have been recorded from the United States, Mexico, Panama, Cuba, Jamaica, Peru, Belgian Congo, India, Pakistan, and China. Thus far, not a single leafhopper, regardless of its geographic origin, has been found free of brochosomes. Although material from Europe and Australia has not been examined, there is good indication from the available data of the universal nature of the brochosome-leafhopper association.

Other studies have been concerned with the presence or absence of brochosomes in the egg and in the several instars found in the development of the aster leafhopper, *Macrosteles divisus,* obtained from a laboratory colony. The eggs were removed from the host-plant tissues and from the female, macerated in a drop of water, and allowed to dry on the Formvar film. Since the early instars lack wings or wing pads, body fluids were utilized by employing the smear technique. For the older instars, the wings were mounted directly on the Formvar. Examination of these preparations under the electron microscope revealed that (i) eggs removed from the female as well as those dissected from plant tissues 1 and 8 days following deposition were negative; (ii) all specimens from the different instars, prepared either from body fluids or wing surfaces, were positive, although the body fluid material (instars I and II) gave a smaller brochosomal yield than the wings of the later instars.

The close association of brochosomes and leafhoppers both geographically and developmentally indicates that this relationship is not fortuitous. The presence of brochosomes in the body fluids suggests that they may be metabolic derivatives which reach the surface of the body through the pore canals.

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Limitations of the Symmetry Criteria for Optical Inactivity and Resolvability

Renewed interest in the subject of optical inactivity (*1*) has stimulated the present inquiry into the generality of symmetry criteria.

The criteria employed for predicting optical activity or nonactivity from a knowledge of the structure of a compound have evolved, in the historical sense, from Pasteur's original broad recognition of molecular dissymmetry, through Le Bel and van't Hoff's somewhat more restrictive theory of the asymmetric carbon atom, to the presently accepted view that from symmetry properties of the molecule alone one may be able to predict resolvability or the lack thereof (*2*). These views, in their modern context, may be stated briefly as follows.

Given the structural formula of a compound and some understanding of the energy barriers restricting bond distortion, it may be supposed that each molecule in the statistically significant aggregate is capable of assuming a number of reasonable conformations which, through bond rotation and distortion, are mutually interconvertible. In all cases so far considered, without exception, there exists at least one conformation (the "symmetry conformation") that possesses reflection symmetry—mirror-axes, for example, point, plane, or four n-fold alternating axis of symmetry; this conformation can be superimposed on its mirror image by the application of symmetry operations alone. The remaining dissymetric conformations are evenly distributed between nonsuperimposable enanti-