series of acids, organic and inorganic, was made and the results are given in the table on p. 948. Pieces of the testis, a branched filamentous organ, were placed in a $n/100$ concentration of acid and the time for color change noted. In addition the partition coefficients of the acids between xylol/water was determined as a measure of the lipoid solubility. Only a very few acids will pass to xylol from $n/100$ concentration in water and a few more from $n/10$ concentration. The strength of the acid (after Ostwald), its effect in lowering the surface tension of water (after J. Traube) and its toxicity for cilia (studies of my own carried out in Torres Strait) are also included in the table. The acids are arranged in order of efficiency in each case. Those with nearly the same effect or property are tabulated in groups and in an order to correspond as nearly as possible with the penetration series. An asterisk marks the acids considerably out of place in each series as compared with the penetration series.

With the exception of benzoic and salicylic all the acids encounter a resistance—small for some, greater for others—at the cell surface. If the tissue has previously been killed this resistance is abolished and the cells become readily permeable for all acids. The specific permeability of the tissue for each acid is therefore dependent on the living cells.

It will be noted that there is no exact quantitative agreement between any two of the series. The best agreement is between penetration rate and toxicity; the worst between penetration rate and degree of dissociation. One may conclude that those acids are most toxic which are able to penetrate the cell most rapidly, a conclusion supported by my results with alkalies. In neither case is there a relation between toxicity and dissociation.

As regards the lipoid theory my results can not be said to wholly support it; neither do they wholly contradict it. The same statement applies to Traube's Haftdruck theory. There is a general relation between the power to lower the surface tension of water (capillary activity) and rate of penetration, but it is not exact. With acids as with dyes and so many other substances, Overton's theory applies in the majority of cases, but not in all. In my opinion this can only mean that the power of penetration of an acid depends on several variable factors. One of these is lipoid solubility or capillary activity, for the two run more or less parallel, and a second is the strength or affinity of the acid for certain protein substances of the cell surface. This would explain the rather rapid penetration of strong acids little soluble or insoluble in lipoids.

E. NEWTON HARVEY

PRINCETON, N. J.,
April 28, 1914

A DESTRUCTIVE STRAWBERRY DISEASE

MANY of the long-distance strawberry shipments of this season have suffered serious injury culminating in a condition designated by the consignees as "molds" or "leaks."

In case of mold the berries, one or more per box, often quite the whole contents of the box, are more or less densely covered with a hairy mold.

The term "leak" designates a condition in which a liquid issues copiously from the bottom of the box. "Leaks" are accompanied by a soggy condition of the berries which mat down to occupy only one third or one fifth of their original volume.

The loss occasioned by these conditions is very large and will in all probability reach well into the millions this season. The berries now so affected originate in Louisiana and Mississippi. Data are not available concerning conditions in other states. The conditions mentioned have not occurred in previous years to sufficient extent to attract the marked attention of the buyers or inspectors though it is hardly to be supposed that they have been entirely absent.

The writer on April 30, acting for the Illinois Central Railroad, visited the berry region of Louisiana to ascertain the condition, the cause, and to render any assistance possible.

A preliminary examination at Hammond, La., May 1, of berries which had been in refrigerators over night, which had been picked

about eighteen hours, showed that these berries on an average exhibited two or three per box with very small rotten spots, perhaps 2 to 3 mm. in diameter though only rarely, even under the lens, was any mold apparent.

Visits to the fields showed many berries, green as well as ripe, rotting and molding while still on the vines.

While several types of fungi were present the one which was most characteristic was a *Botrytis,* probably *Botrytis cinerea.*

In the disease history, typically, the rotten spot appears, attains a size of several millimeters. Then a slight surface mold visible under the lens comes over the spot. Later the center of this area becomes coated with the typical *Botrytis* conidia, the whole berry becoming rapidly involved.

In late stages the picture may become complicated by invasion of other fungi, particularly by *Rhizopus nigricans.*

The sorters on the berry farms throw out most of the infected berries and these may be seen, bushels of them, near the sorting benches. Such discarded berries when several days old were almost always covered with *Botrytis* spores and the refuse heap reminded one of an immense culture dish of this fungus, though invariably contaminated by *Rhizopus.*

To ascertain whether apparently sound berries were really infected culture chambers were improvised of jelly jars with the aid of absorbent cotton.

The following tests were made in such dishes:

1. A large number of berries showing incipient decay but with no mold visible under the lens, were cultured. In twenty-four hours every berry showed profuse mold in nearly all cases of the *Botrytis* type; in a few cases other and various types.

2. A large number of apparently healthy berries, fully ripe, but carefully selected were cultured. These at twenty-four and at forty-eight hours showed no mold.

3. A large number of ripe healthy berries were severely jammed, bruised and crushed then cultured. They showed no mold in twenty-four hours.

4. A large number of berries showing various imperfections, sun scald, blister, insect injury, imperfect fertilization but no rotten spots were cultured. No mold appeared.

5. Sound berries were placed half covered with water. No mold appeared in twenty-four hours.

All of the above tests were made at room temperature.

From the practically universal presence of the *Botrytis* on young infected areas and its predominance on the refuse heaps I believe that this fungus is the primary cause of the molding, that the *Botrytis* initiates the decay, opening the way to such other saprophytes as may be present; of such saprophytes, *Rhizopus* is by far the most prominent and most abundant.

Laboratory tests which I have since made show that a berry inoculated with *Rhizopus* will rot rapidly with the escape of a large amount of liquid. It therefore seems probable that the "leaks" are due largely if not entirely to *Rhizopus* invasion.

Both the *Botrytis* and *Rhizopus* have been separated in pure culture in my laboratory and further study of these as well as of the other berry fungi will be made.

In the way of prevention extremely rigid sorting should be emphasized and it would also be well to prevent the refuse heaps from becoming culture beds of the fungus. This can perhaps best be accomplished by liberal use of lime.

F. L. Stevens

Urbana, Illinois,
May 8, 1914

THE AMERICAN CHEMICAL SOCIETY

The forty-ninth general meeting of the American Chemical Society was held at Cincinnati, Ohio, Monday, April 6, to Friday, April 10. The meeting opened with a council meeting on the evening of April 6. Tuesday morning the general meeting of the society was held in the auditorium of the University of Cincinnati and was addressed by the Hon. Frederick S. Spiegel, mayor of Cincinnati, and by President Charles W. Dabney, of the University of Cincinnati, both welcoming the society to the city. President T. W. Richards, of