

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

the American Chemical Society, fittingly responded. The society then held a general meeting, at which the following papers were presented:

"The Chemical Problems of an Active Volcano" (illustrated), by Arthur L. Day.

"The Chemical Fitness of the World for Life," by L. J. Henderson.

"Flame Reactions," by W. D. Baneroff.

"Chemical Reactions at Low Pressures," by Irving Langmuir.

At one o'clock the society adjourned for an excursion to the Filtration Plant of the Cincinnati Water Works, optional excursions being available to the following plants:

Andrews Steel Co., Wiedemann Brewing Co., Old "76" Distilling Co., Frank Tea and Spice Co., Heekin Spice Co., Icy-Hot Bottle Co., Cincinnati's New City Hospital preceded by car ride through suburbs, the Dolly Varden Chocolate Co., W. T. Wagners' Sons Mineral Waters.

In the evening, a complimentary dinner was given to the ladies attending the meeting, followed by a theater party. At eight o'clock, P.M., a complimentary smoker was held at the Hotel Sinton, with 550 members and guests present. Mementos were given to all those attending, and the smoker will long be remembered, especially for the interesting and witty entertainment provided by the local members, and by talent especially engaged for the occasion.

Divisional meetings were held on Wednesday morning and all day Thursday at the University of Cincinnati, at which 181 papers were presented, a special symposium on the teaching of organic chemistry being also held by that division.

Complimentary lunches were furnished on Wednesday and Thursday. On Wednesday afternoon the members were taken through the works of the Globe Soap Company and Proctor and Gamble, with the following optional excursions also offered, W. S. Merrell Chemical Co., Lloyd Library and Museum, Fleischmann Distilling Co., American Diamalt Co., Eagle White Lead Co., National Lead Co., Lunkenheimer Co. Brass Goods, the Zoological Gardens.

On Wednesday evening a symphony concert was given complimentary to the members of the society, and the immense Emery auditorium was filled to hear a concert, under the direction of Ernst Kuhnwald, which has had few superiors in the history of American music.

On Thursday evening, a banquet was enjoyed

by the members at the Hotel Sinton, with some 300 present. The banquet was unusual in that especially fine music was furnished by soloists. A decoration particularly worthy of note was an immense American Chemical Society pin in blue and gold flowers.

On Friday a special train complimentary to the members of the society took them and their guests to Dayton to visit the works of the National Cash Register Company, where lunch was served to all of those attending, after which the train proceeded to the works of the American Rolling Mills, at Middletown, and from there to Cincinnati. This day's excursion was particularly enjoyed and the works visited were among the most interesting ever opened to the members of the society.

The meeting closed with the arrival of the members in Cincinnati, and will always be remembered by those present. The members and officers of the Cincinnati section made every effort to insure the comfort and entertainment of their guests, and their hearty good will will never be forgotten by the recipients of their hospitality.

Meetings of all of the divisions of the society, as well as the India Rubber Section and the Water, Sanitation and Sewage Section were held. Details will appear in the published program, as above stated.

The meeting was the largest spring meeting ever held in the history of the society, 658 members and guests being present.

The following are abstracts of the papers presented before the various divisions so far as they could be procured:

#### DIVISION OF AGRICULTURAL AND FOOD CHEMISTRY

Floyd W. Robinson, chairman

Glen F. Mason, secretary

*Address.* FLOYD W. ROBINSON, chairman.

*Standards of Food and Drug Chemists:* EDWARD GUDEMAN.

*The Determination of Mixed Carbohydrates in Infant Foods:* T. M. RECTOR AND E. B. WETTENGEL.

In preparations containing mixtures of sucrose, maltose, lactose and dextrine, the sucrose is determined by loss of rotation after inversion with invertase. The dextrine is determined by loss of polarization after precipitation with lead acetate and ammonia. The combined polarization of the sucrose and dextrine is subtracted from the total polarization, giving the polarization of the mal-

tose and lactose. A copper reduction is then run on an aliquot of the solution and the amount of copper reduced by 1 gm. of the sample is calculated. From this value and the combined polarization of the maltose and lactose the percentages of these sugars are calculated by a formula.

The analyses of some commercial infant foods by this method are given.

*The Determination of Tannin in Tea:* H. C. FULLER.

The powdered tea is first extracted with petroleum ether, which is discarded, and then percolated with 50 per cent. alcohol. The alcoholic solution is precipitated with an excess of lead acetate solution and the whole made up to a definite volume. An aliquot of this is then taken and the excess of lead precipitated with hydrogen in the presence of sodium hydroxide, the lead sulphide being filtered into a tared Gooch, washed and dried over sulphuric acid. A blank is run at the same time and the difference in lead figures is a measure of the lead taken up by the tannin.

*A Rapid Method for the Determination of Sodium Chloride in Butter and its Substitutes:* T. M. RECTOR.

The salt is determined by titration with silver nitrate with chromate indicator, in a water solution of a weighed sample of butter in the presence of the butter fat. Some results are given to show that the butter fat does not interfere with the accuracy of the method.

*A Rapid Method for the Determination of Unsaponifiable Matter in Fats and Oils:* T. M. RECTOR.

The sample is saponified in the usual manner and the alcoholic soap solution diluted to an alcohol content of 55 per cent. The solution is then extracted with light petroleum spirit, the solvent evaporated, and the residue dried in vacuo and weighed.

Freedom from emulsification is claimed for this method.

*The Determination of Caffein in Coffee and Tea:* H. C. FULLER.

The sample is ground so that it will pass through a 60-mesh sieve and a weighed amount boiled with dilute hydrochloric acid; the decoction filtered and the extracting process repeated three times with boiling water. From the filtrate the caffein is removed with chloroform, after rendering alkaline with ammonia, and after recovering the solvent the crude caffein is dissolved in acid and precipitated with iodide, and finally

recovered from the iodide precipitate by treatment with sulphite and shaking out with chloroform.

*The Official Method for Determining Crude-fiber as Applied to Cottonseed Meal:* CHAS. K. FRANCIS.

*The Arsenates of Lead:* H. V. TARTAR AND R. H. ROBINSON.

Methods have been developed for the preparation of pure lead hydrogen arsenate and lead pyroarsenate. All attempts to prepare lead orthoarsenate have failed. A new basic lead arsenate has been prepared. The authors believe that lead orthoarsenate is not a constituent of the ordinary commercial salts used as insecticides. The substance present which has been thought to be the orthoarsenate is in reality the basic lead arsenate mentioned above. The specific gravity of pure lead hydrogen arsenate is 5.786 and of the basic arsenate is 7.10. Analytical methods have been worked out for the quantitative estimation of lead hydrogen arsenate in the presence of the basic arsenate. This paper will soon be presented in full for publication in the *Journal of the American Chemical Society*.

*The Changes Produced by the Wrapping of Bread:* H. E. BISHOP.

*The Determination of Lecithin-phosphorus in Macaroni and Farinaceous Articles:* H. C. FULLER.

The macaroni is thoroughly softened with hot water, the mass treated with a large excess of alcohol, the liquid filtered and the solid substance treated with further portions of alcohol; the combined alcoholic solutions are evaporated and the residue extracted with ether, which dissolves the lecithin. Phosphoric acid is determined in the latter by ignition of calcium acetate and finishing in the usual way with ammonium molybdate and magnesium mixture.

*Lobster Oil:* H. S. BAILEY AND L. B. BURNETT.

In the cooking of lobsters preparatory to canning there is always a layer of oil collected upon the top of the kettles. For a number of years it has been the custom of the packers to skim off this oil and sell it to the dealers in fish oil who doubtless mixed it in with their low-grade products. Through the kindness of Dr. W. D. Bigelow we were able last year to obtain a sample of this lobster oil. It is a bright orange red in color and has a characteristic fishy odor and taste. A search of the literature failed to reveal any mention of this oil, although König<sup>1</sup> states that the

<sup>1</sup> *Chem. Nahr-u-Genussm.*, Vol. II., p. 493.

fresh German lobster contains about 1.84 per cent. of oil.

An analysis of this particular sample gave the following results:

Specific gravity, 25°/25° .....	0.9255
Refractive index, 25° .....	1.4765
Iodine number .....	145
Saponification number .....	175
Soluble acids (as butyric) .....	0.65%
Saturated (solid) acids .....	10.5%
Unsaturated (liquid) acids .....	80%
Insoluble acids .....	88%
Acetyl value .....	16.9
Iodine number of unsaturated acids .....	160
Iodine number of saturated acids .....	1.5
Melting point (capillary tube) of solid acids .....	51.6° C.
Molecular wt. of unsaturated acids .....	315
Saponification number of acetylated fat ..	184

*Tomato-Seed Oil:* H. S. BAILEY AND L. B. BURNETT.

The rapidly increasing production of tomato pulp and catsup in the United States, and the fact that oil is already being made on a commercial scale from the waste tomato seeds in Italy, make an investigation of the composition of this oil very desirable. Last season a few pounds of tomato seeds were obtained, and pressed in an expeller of the continuous action type. The oil thus obtained refined and bleached easily and was apparently a satisfactory food oil.

*The Digestibility of Corn Consumed by Swine:* S. C. GUERNSEY.

Digestion trials to compare the digestibility of maize in the natural state, with that of the shelled and ground grain, the latter two forms being fed both dry and soaked, were conducted in 1909 with 10 heavy-weight swine, weighing about 200 pounds, in 1910 with the same number of light-weight animals weighing about 70 pounds, and in 1911 with 10 light-weight and ten heavy-weight hogs. Each year the different forms of maize were fed through four ten-day periods to the swine, which were kept in cages, five animals being fed at a time, each receiving one form of corn through a ten-day period. The apparent digestibility was determined by weighing and analyzing the feed and corresponding feces, the latter being collected in rubber bags attached to the animals by a harness. A charcoal marker was fed at the beginning and end of each period for identification of the corresponding feces. The light-weight swine digested whole-grain on cob, and shelled

grain more thoroughly than did the heavy-weights, while the latter utilized the soaked ground grain to better advantage than did the former. With the light swine, the whole grain on cob has the highest digestion coefficient, then dry shelled, dry ground, soaked shelled and soaked ground grain, while with the heavy-weights the soaked ground grain has the highest digestibility, then dry ground, dry shelled, ear and soaked shelled corn. A remarkable correlation between digestibility and time required for digestion was found in the series of experiments conducted in 1909-10, brought to notice by observations on the interval between the feeding of bone-black and its appearance in the feces. In a general way, the higher the coefficient of digestion, the longer the time required for the feces to pass through the alimentary canal, and *vice versa*, which holds true with both classes of swine as a whole or as separate classes.

*Chemical Changes Occurring During the Period of Silage Formation:* RAY E. NEIDIG.

The investigation included studies of the principal chemical changes which occurred in three silos built of different materials. The period covered was the first three weeks after filling the silos. The rate of increase or decrease of the following substances was determined daily: volatile acids, non-volatile acids, soluble carbohydrates and alcohol. Daily analyses were made of the gases of the silos and temperatures were taken by means of electric thermometers buried in different parts of the silos. The results show that sucrose is hydrolyzed to invert sugar in the early stages of fermentation and then a very gradual loss in carbohydrates is noted. The soluble carbohydrates do not disappear entirely, however, and those remaining were identified as invert sugar. Along with the gradual diminishing of the carbohydrates there is a uniform rise in acidity; both volatile and non-volatile acids are formed, the latter predominating. The volatile acid consists mainly of acetic acid together with some propionic acid; the non-volatile acid is the inactive or racemic variety of lactic acid. Alcohol was found in small quantities in all silos in slightly varying amounts. The gas analysis showed a rapid production of carbon-dioxide after filling the silos, reaching the maximum during the first few days and then gradually decreasing. Oxygen, on the other hand, was found only in traces after the first three days. The temperatures were quite uniform in all silos, the maximum temperature observed being 32.8° Centigrade.

*Preliminary Notes on the Curing of Cucumber Pickles:* H. N. RILEY.

The activities manifest in a curing tank of cucumber pickles seem all to depend upon the growth of certain bacteria, known as "lactic-acid bacteria." These seem to govern the rate of fermentation, or giving off of gas, and the production of acid. The rate of fermentation mechanically governs the rate of absorption of salt, which is also influenced, to some extent, by the size of the pickle. The growth of mold and yeast seems destructive as they destroy the acid which is the principal keeping factor in the brine.

*A Rapid Graphic Method for Calculating Rations and Dietaries:* D. L. RANDALL.

The different common foods were classified according to the weight of protein in a hundred calorie portion and were arranged graphically on cards so that the distance taken up by any quantity of a food is the same as that which represents the protein as plotted to a definite scale. By suitable manipulation of these cards one can determine the quantity of different foods in combination necessary to get a definite amount of protein and energy and can determine the composition of any mixture of foods, all this being done with no other calculation than the addition of simple whole numbers usually less than ten.

*The Hydrolysis, under Pressure, of Sugar Solutions:* W. S. HUBBARD AND W. L. MITCHELL.

*Notes on the Determination of Total Sulfur:* PHILIP L. BLUMENTHAL.

*Barium in Various Plants:* NICHOLAS KNIGHT AND LESTER W. RUSK.

The leaves and stems of thirteen different plants and common trees have been examined and barium has been found in all of them. Twenty-five grams of the leaf or stem have been taken for each determination. The investigation will be extended to include plants from widely different localities.

*The Non-uniformity of Drying Oven Temperatures:* LORIN H. BAILEY.

Tests on eight different types of drying ovens, including those heated by gas, electricity, hot water and steam, showed that only those ovens which are surrounded by boiling water and steam, or by steam alone, maintain uniform temperatures. Other ovens show maximum variations of from 15° C. to 24° C. throughout the drying chambers, and a range from 2° to 17° C. from the temperature indicated by thermometer inserted through the top of oven and ordinarily taken as the tem-

perature at which the drying is done. It is the type rather than the price that makes a good oven.

*The Analysis of Alkali Soils:* C. N. CATLIN.

The determination of "alkali," in soil, is one of the most important analyses the agricultural chemist in semi-arid countries is called upon to make, but there are no standard methods for the determination. The author has collected and made a comparative study of many of the methods now in use. The results in several cases were not even comparable, the percentage of water soluble solids by some methods amounting to several times that found by others. Chlorides corresponded approximately. The chief source of difference lies in the completeness of solution of sodium carbonate and of calcium sulphate, neither of which is dissolved easily and completely from the soil. The highest results were obtained by the method in use at the Arizona Agricultural Experiment Station. This consists in digesting 50 grams of soil with 800 to 100 c.c. of water for ten hours on the boiling bath, whereby a constant and complete extraction of water-soluble salts is secured. Aside from the difference due to completeness of extraction, large discrepancies were found in determining sodium carbonate.

*Dates: Comparative Cost of, in Akron, Ohio:* CHAS. P. FOX.

*The Composition of Gooseberries, with Special Reference to their Pectin Content:* E. H. S. BAILEY.

Some preliminary analyses have been made upon a variety of wild spiny gooseberries that grow abundantly through northern latitudes. The interior of the half-ripened berry; the condition best suited to jelly making, consists of a firm, hard, glistening mass, with but few seeds. In order to obtain the juice it is necessary to boil the crushed berries repeatedly with water. On a large scale the berries yield 9.88 per cent. of insoluble material, including skins, seeds and short stems.

A preliminary analysis of the berries gives:

	Per Cent.
Dry solids .....	19.42
Ash .....	.87
Ash, soluble in water .....	.87
Ash, insoluble in water .....	.33
Proteins .....	1.37
Acid (as acetic) .....	1.27

Since pectins are precipitated by mineral salts, the question is raised to what extent the use of

hard water in the making of jellies reduces the pectin contact. Experiments in this line are being conducted. A bibliography of recent work is appended.

*A Rapid Method for Commercial Analysis for Marls and Limestones:* O. B. WINTER.

The commercial value of marls and limestones used for agricultural purposes depends largely upon their content of calcium and magnesium in the form of carbonates. Two methods are given for estimating lime—bone, precipitating the calcium oxalate in the presence of oxalic acid, and the other, in the presence of hydrochloric acid. The carbon dioxide is determined by treating the sample with a small volume of hydrochloric acid and measuring the gas evolved. Results show that this method for carbon dioxide compares favorably with several other methods when certain precautions are used.

The magnesium is determined by calculating the amount necessary to combine with the carbon dioxide not taken up by the lime.

*A Method for the Estimation of Calcium, Strontium and Magnesium in the Presence of Phosphoric Acid and Iron:* O. B. WINTER.

Calcium and strontium are precipitated as the oxalates in a dilute hydrochloric acid solution. The oxalates are burned to the oxides, weighed and then nitrated and the nitrates weighed. The amounts of each (calcium and strontium) are determined as follows: (1) By separating the nitrates with absolute alcohol and ether. (2) By calculation from the amounts of oxides and nitrates. The magnesium is determined as magnesium pyrophosphate in the filtrate from the oxalates, by removing the ammonium salts and silica, and keeping the iron in solution by means of sodium acetate.

*The Chemistry of the Decomposition of Peat and Muck:* C. S. ROBINSON.

*Some Pot Experiments with Mixtures with Peat and Manure in Connection with Various Fertilizers:* C. S. ROBINSON.

BIOLOGICAL CHEMISTRY DIVISION

Carl L. Alsberg, chairman

I. K. Phelps, secretary

*Coagulation of Albumen by Electrolytes:* WILDER D. BANCROFT.

*Colloidal Swelling and Hydrogen<sup>1</sup> Ion Concentration:* L. J. HENDERSON, W. W. PALMER AND L. H. NEWBURGH.

*The Functions of Ammonium and Phosphoric Acid in the Regulatory Excretion of Acid:* L. J. HENDERSON AND W. W. PALMER.

*Partition of the Nitrogen of Plant, Yeast and Meat Extracts:* F. C. COOK.

There is great variation in the precipitating power of the different reagents compared. Phosphotungstic acid precipitated the highest, tannin salt reagent the next highest and acid-alcohol the lowest percentage of the nitrogen of the seven plant, five meat and one yeast extracts examined. The formol titrated method gave lower results for amino nitrogen than the Van Slyke method. All of the methods showed a larger percentage of the nitrogen present in a more completely hydrolyzed state in the plant than in the other extracts. No kreatinin, and very little purin nitrogen was found in the plant extracts. The yeast extract was high in purin nitrogen, but contained no kreatin or kreatinin. The nitrogen of the plant extracts was found in the filtrate from the acid-alcohol reagent. Twenty-five per cent. of the nitrogen of the other extracts was precipitated by this reagent. The plant extracts showed more ammonia by the Folin method than the other extracts.

*Comparison of the Various Methods for the Quantitative Determination of Sugar in Blood:* MAX KAHN. (By title.)

*Clinical Studies of the Russo Test:* MAX KAHN. (By title.)

*Urinary Catalase in Health and Disease:* MAX KAHN AND C. J. BRIM. (By title.)

*On the Presence of Oleic Acid in Gastric Contents of Patients Suffering with Gastric Carcinoma:* MAX KAHN AND J. SUBKIS. (By title.)

*The Lipins of Diseased Human Livers:* J. ROSEN-BLOOM. (By title.)

*The Potassium Content of Cerebrospinal Fluid in Various Diseases:* J. ROSEN-BLOOM AND V. L. ANDREWS. (By title.)

*A Standard in the Determination of Ammonia by Nesslerizing with the Duboscq Calorimeter:* A. R. ROSE AND KATHERINE R. COLEMAN. (By title.)

*Nephelometry in the Study of Nucleases:* P. A. KOBER.

*A Soluble Polysaccharide in Lower Fungi:* A. W. DOX.

*The Chemical Dynamics of Living Protoplasm:* W. J. V. OSTERHOUT.

*The Physiological Water Requirement and the Growth of Plants in Glycocoll Solutions:* ALFRED DACHNOWSKI AND A. GORMLEY.

Though it is not known precisely to what extent amino acids occur in peat soils, the question of the ability of plants to utilize directly nitrogenous compounds in the soil other than nitrates and ammonia is of considerable importance. The data presented show that the absorption of glycocoll is not connected with the transpirational water loss, but with the efficiency of the nutritive metabolism characteristic of the plant, and with the amount of water retained within the plant and involved in metabolism. Changes in body weight, if taken as the measure of growth, may be pronouncedly altered by the quantity of the metabolically retained water as well as by the deposition or removal of reserve materials in the tissues. The failure to promote continuous growth may be due to the inefficiency of glycocoll to supply material for tissue construction. This and the lack of available water enforce compensating processes in the plant. The apparently inevitable conclusion is entertained that the problem of the water requirement of plants and the criteria for the wilting coefficient, in particular the relation between the water content of the plant and that of the soil at the time of wilting, need to be reinvestigated more quantitatively than has heretofore been attempted. The retention of water, not transpiration, is the physiological function correlated with and indispensable to growth in general, and to survival and greater areal distribution of plants entering physically or physiologically arid habits. (To appear in *Amer. Jour. of Botany*, Vol. I., April, 1914.)

*The Estimation of Amino Acids as Such in the Soil:* R. S. POTTER AND R. S. SNYDER.

*Methods Adapted for the Determination of Decomposition in Eggs and in other Protein Products:* H. W. HOUGHTON AND F. C. WEBER.

The methods that were found most applicable for the determination of decomposition are the Folin titration and Nesslerization methods for free ammonia, Klein's modification of Van Slyke's method for amino nitrogen and Folin-Wentworth method for acidity of fat. Calculating the results on liquid eggs to a moisture-fat free basis, the following amounts of ammonia nitrogen in milligrams per 100 grams of material were obtained: By the Folin titration method, seconds gave, 11.4, spots, 14.1, light rots, 17.3, rots, 26.2, black rots, 169.6; by the Folin-nesslerization method, seconds gave, 12.4, spots, 20.0, light rots, 21.5, rots, 29.9, black rots, 148.6. The amino

nitrogen determination is of service in detecting liquid and dried blood rings, spots and light rots. The increase in the acidity of the fat detects spots and worse grades of eggs. The ammonia methods applied to herring give results indicating decomposition of the fish after standing 24 hours at about 70° F. Applied to clams, an appreciable increase in the ammonia is shown after keeping two days at a temperature of 60° F. to 65° F.

*Factors Influencing the Quality of American Sardines:* F. C. WEBER AND H. W. HOUGHTON.

This paper embodies some of the results of the observations and studies conducted at the laboratory established by the bureau of chemistry of the Department of Agriculture at Eastport, Maine, during the season of 1913. It does not refer to the packing of sardines in California. The chief factors responsible for the lack of uniform quality in oil and mustard sardines packed on the eastern coast are: Excessive pickling and salting, which removes a large amount of protein material (amino compounds), and lack of attention in securing a uniform degree of salting. Use of fish containing undigested food, particularly "red feed," which is the principal cause of broken and damaged fish. The steaming process, which removes a great deal of salt and flavor from the fish. Insufficient drying of the fish before packing, causing in the finished product a milky appearance of the oil, a slight soapy taste and the fish to be too soft. Variations in the composition of the fish at different times of the year and from different localities, particularly in regard to the fat content. Quantity and quality of oil used. Freezing and thawing of the packed goods. Considering all the possibilities, in connection with this industry, the most important of which is the packing for quality rather than quantity, as is done at present, it is believed that sardines can be produced in this country that are in every respect as good as the foreign sardines.

*The Composition and Nutritive Value of the Proprietary Infant Foods:* F. C. WEBER AND F. C. COOK.

Chemical, bacteriological and microchemical examinations were made of 36 proprietary infant foods. The nitrogenous constituents were separated and analyses were made of the water extracts and of the ash. The foods, prepared according to the manufacturers' directions for a three-month formula, were analyzed. Charts based on the analyses of the foods and on the three-month formulae were prepared and the foods classified according to their composition and method of prepara-

tion for feeding. The results of feeding the three-month mixtures to rats, mice and kittens, and the nutritive value and ratios of these mixtures, were tabulated. The chemical deficiencies and abnormal nutritive ratios in some of the foods are confirmed by the results of the animal-feeding tests. Foods prepared with milk and water give uniformly better results than those prepared with water alone. A comparative study on puppies of the value of lactose and maltose was made.

*The Electrical Stimulation of Tissue:* OLIVER E. CLOSSON.

In using standardized inductorium for the faradic stimulation of tissue by the break induced shock it was found that the point in the primary circuit where the break is made and the distribution and nature of the resistance must be the same as used in standardizing. Keeping the same resistance in the primary circuit so that the open circuit potential difference and amperage remain unaltered, the position of the secondary in the region 50 cm. from the primary may be made to vary as much as 15 cm. for the same stimulating value by changing the point in the primary circuit where the current is broken or by changing the distribution of the resistance. In the secondary circuit the distribution of the electrical capacity is of very great importance in determining the beta unit of Martin. It is found that the stimulating value is greatest when the distribution of the capacity is such as to produce the greatest fall in the average absolute negative potential (electron potential) of the kathode and anode. The irritability was greatest with an anelectrotonic change, just the opposite to the usual electrotonic findings. It, however, conforms with the findings which point to the kations as being the important factor in stimulation.

*A New Apparatus for Determining Crude Fiber in Foods, Feeding-stuffs and Feces:* A. D. EMMETT.

In crude fiber determinations, it is often very difficult to transfer the last portion of the insoluble residue from the flask to the Gooch crucible or funnel. The use of the beaker is an advantage, not only from the standpoint of accuracy, but also with respect to the saving of time. The special feature of this apparatus is the arrangement which makes it possible to use a beaker. It consists of a specially constructed glass cone and rubber ring which prevents appreciable loss of water vapor during the boiling and thereby any increase in the concentration of the acid and alkali solutions. The inverted cone is attached to a Hopkins

condenser with rubber tubing and the ring is snapped on to the lower edge of the cone. The condenser, cone and ring are then lowered over a 400 c.c. *lipless* beaker and adjusted until the connection between the rubber ring and beaker is tight. The entire apparatus is fastened in place by the clamp which holds the condenser. The glass cone is provided with a side-tube attachment which is so constructed that when air is drawn through the apparatus gently, the tendency to foam is greatly retarded.

*The Carbon Dioxide Excretion as Modified by Body Weight:* G. O. HIGLEY.

This work was done with the apparatus described in "The Carbon Dioxide Excretion Resulting from Bicycling," Higley and Bowen, *American Journal of Physiology*, XII, 4, page 311 (1904). There were nineteen subjects, students in the University of Michigan. The subjects, who had been engaged in laboratory work for several hours preceding the experiments, reclined for fifteen minutes preceding the putting on of the mask and the beginning of the record. The average excretion of carbon dioxide per kilogram of body weight was .0063 grams. Wide departures from this value seemed to be due (1) to an excessive amount of adipose tissue in the body of the subject giving low results, and (2) to colds and to indigestion giving high results.

*Proteins of the Central Nervous System:* H. H. MCGREGOR AND C. G. MACARTHUR.

A study of the proteins of the central nervous system has been conducted by drying the fresh tissue with an air current and removing a large proportion of the lipoids by cold solvents. After this treatment the solubility of the protein in aqueous solutions is found to be greatly increased, and the product precipitated by addition of excess of alcohol contains only slight amounts of lipoids. The protein obtained by this method contains phosphorus and has always given a slight though definite reaction for iron. Whether extracted by distilled water or by salt solutions, the protein is not precipitated upon dilution: the extract therefore contains no true globulin. Treatment with weak acetic acid yields an acid-precipitated and an acid-soluble fraction. The evidence from fractional heat coagulation and fractional salting out points to the individuality of the protein, instead of the presence of a mixture of nucleoprotein and globulin.

*Enzymes of the Central Nervous System:* H. M. ENGLISH AND C. G. MACARTHUR.



Enzyme extracts were made directly from fresh tissue by water, dilute acids, dilute alkalies, dilute salt and glycerine. After several days' standing with toluol or oil of mustard as a preservative, the extracts were examined. Lipase, peptase, nuclease, proteinase, peroxidase, arbutinase, salolase, dextrinase, were found to be present. Lipase gave activity on the following substances in the following order. Triacetin, monobutyryn, ethyl butyrate, olive oil, kefallin, lecithin. Sodium glycocholate, saponin sodium phosphate, were activators for lipase. The various divisions of the brain contained the same enzymes, but in different amounts. The cerebrum extract was several times as active as that of the medulla. Gray matter is much more active than white matter.

*Specificity in the Action of Drugs on Brain and Heart Fosfatids:* C. C. MACARTHUR AND G. H. CALDWELL.

If caffenin, cocain, strychnin and other brain drugs show their specificity by some particular effect on brain kefallin and brain lecithin, these drugs ought to change the very sensitive calcium chloride precipitation limit of the fosfatid solution. Many series of determinations gave no such result. Digitalis strofanthin (etc.) should effect heart lecithin and heart cuorin solutions in a similar way. No consistent results of this kind were noticed. These results suggest that the fosfatids, in the condition isolated, are not concerned either through their solubilities, through changes in the state of aggregation, or through chemical combination in drug action. Probably these drugs effect more complex combinations or more labile groups of substances than those we isolate.

*Reduction Processes in Plant and Soil:* M. X. SULLIVAN.

Plant roots possess the power to reduce ammonium molybdate to the blue oxide  $\text{MO}_3\text{O}_5$  and to reduce a mixture of para-nitroso-dimethyl aniline and alpha naphthol to naphthol blue. The first reduction is favored by a slightly acid medium and occurs predominantly within the parenchyme cells just back of the root tip. It is probably due to nonenzymotic products. The second reduction is not particularly localized, and is retarded by dilute acids, favored by dilute alkalies. Certain solids likewise have the power to form naphthol blue from the mixture of para-nitroso-dimethyl aniline and alpha naphthol. Soils possessing this power do not oxidize easily oxidizable substances such as aloin. Conversely, as far as investigated, soils acting on aloin do not form naphthol blue.

*The Passage of Nucleic Acid from Plant to Medium:* M. X. SULLIVAN.

In the water in which wheat had grown for sixteen days, with change of water every two days, material was found which was soluble in dilute alkali, precipitated by dilute acids and alcohol, contained phosphorus, gave the pentose reactions and on hydrolysis with dilute acid gave a reducing sugar and xanthine bases such as guanine, determined by color reaction and formation of the hydrochloride, and adenine, determined by color reaction. The material was judged to be nucleic acid.

*Chemical Studies upon the Genus Zygadenus:* C. L. ALSBERG.

A number of species of plants of the genus *Zygadenus* are regarded as poisonous. Great confusion from the toxicological standpoint has existed in this genus because the nomenclature of this genus has not always been clearly understood. Thus the alkaloids of the "veratrine" group have been misnamed. It is not found at all from species of the genus *Veratrum*. *Veratrum* contains no veratrine, but, as is now well known, is a mixture of quite different alkaloids. The alkaloids of the "veratrine" group are, as is generally known, obtained from sabodilla seeds. These are the seeds of a species of *Zygadenus*. Hunt was the first to show that the *Zygadenus Venenosus* of the western United States contains the same or similar alkaloids. Slade confirmed this and Heyl and his collaborators obtained a crystalline alkaloid, apparently belonging to this group, from *Z. intermedius*. In the investigation herein reported, similar alkaloids were obtained in crystalline form from *Z. Venenosus*, *Z. elegans* and *Z. coloradensis*, all of them very toxic and with similar pharmacological action. From a member of a closely related genus, *Amianthium muscatoxicum*, a similar active principle was obtained in an impure state. Apparently many of the species of this group of lilies contain "veratrine" alkaloids or alkaloids related to it.

*Nephelometry in the Study of Nucleases:* PHILIP ADOLPH KOBER AND SARA S. GRAVES.

The nephelometer can be used for the study of nucleases, if an acid egg albumin solution is used as a precipitant. This reagent will reveal the presence of one part of yeast nuclei acid in 1,000,000 parts of water, and in practical work is not affected by most substances found in physiological work.

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