some thirty pupils, who are being taught to readily understand every thing said to them by watching the movements of the speaker's lips, and are themselves in turn taught to speak and read aloud through the oral method. This class of scholars was organized some three years ago, and resulted in the formation of a society for the improved instruction of deaf-mutes. About one year ago the society succeeded in having provision made whereby the classes should form part of the public-school system. There should be better provision made, however, for the development of this branch of the public-school system. More room is needed for the pupils; additional instructors are required; and, beyond any question of dispute, this work, so well begun by private subscription, should be fostered and cared for out of the school fund. There are now being made efforts to have schools located in different parts of the State, and at the next session of the Legislature there will be presented a bill in which the State will be expected to pay for the education of all deaf-mute citizens of the State by this oral method.

DANGER LURKING IN DECOMPOSING ANIMAL OR VEGETABLE FOOD.[1]

MUSCARINE as a product of putrefaction has already been alluded to by me in my last report for the chemical department of the Agricultural College, and in foreign scientific journals, where the case has attracted some attention as furnishing facts previously unknown. My connection with the occurrences reported originated through the death of four persons from the consuming of fish-containing-food in a slightly putrid condition; and my analysis of the food was undertaken at the solicitation of the police department of the Hokkaidō Chō.

Two adults and two children living in Chitose died suddenly with symptoms of narcotic poisoning. Post-mortem examination, however, failed to satisfactorily account for death; but the appearance of the organs, together with the ante-mortem symptoms, were considered by the officiating physicians to resemble poisoning from the poisonous mushroom (*Agaricus muscarine*).

Specimens of the food eaten by the deceased were therefore sent me for chemical examination. The articles received were two; namely, a variety of edible mushroom, and a native food called "*sushi*," consisting of a mixture of fish and rice with a little *saké*, which is allowed to ferment and become vinegar before the mixture is eaten. The fish was *gnoi*, one of the most common and wholesome of Japanese river-fish. In the former of the two substances subjected to examination, no trace of alkaloid or other injurious substance could be detected. The "*sushi*," however, reached me in an advance stage of putrefaction. (This food is usually eaten in a condition decidedly "strong.") I was therefore compelled to recognize the uselessness of attempting the elimination or recognition of alkaloids by the usual methods of procedure, and to admit the extreme probability of the presence of some ptomaïne as a product of decomposition. The methods pursued and the results obtained may possibly require a brief introduction, that the facts involved may be the better recognized. Only the briefest possible *résumé* of the facts necessary for a better consideration of the questions involved is here admissible. The relations between alkaloids and albuminoids are known to be most intimate. The latter, acted on by certain micro-organisms, undergo a decomposition known as putrefaction, and the life-function of certain of these organisms results in the conversion of albuminoids into alkaloids; this latter group of compounds consisting chiefly of poisonous substances, until recently supposed to be exclusively of vegetable origin. Though numerous instances of poisoning through the consumption of food undergoing the process of putrefaction are recorded, and as long ago as 1822 Garpart and Stick made known the existence of a specific poison in decomposed animal matter, it was not till 1877 that really definite knowledge was evolved from the facts accumulated. The Italian chemist Selmi then first isolated a basic compound, of alkaloid character and toxic properties, of unmistakable putrefactive origin, and named by the discoverer "*cadaves alkaloid*," or "ptomaïne."

[1] Report by H. E. Stockbridge, Ph.D., of the Government Agricultural College, Sapporo, Japan.

In 1880 the Italian minister of justice appointed a commission of chemists and pharmacists to investigate the entire field thus opened, and formulate the facts gathered. The work thus begun has been continued by the investigators of different countries, until there are now known and isolated not less than twelve of these alkaloids of putrefaction, seven of which have been made known through the labors of Dr. Brieger of Berlin since 1883. It is chiefly to this investigator that we are indebted for the enunciation of reliable methods of elimination and recognition.

The method adopted by me in the investigation undertaken was in most respects identical with that recommended by Brieger, the modifications being only such as were suggested by the somewhat peculiar nature of the substance and the circumstances demanding the examination; the ptomaïnes thus far eliminated being for the most part insoluble in ether, while the latter removes large quantities of organic matter, the presence of which renders subsequent purification more difficult. I first subjected the mass to one hour's extraction with warm ether in an automatic extraction apparatus of my own device. The extract thus obtained was set aside for future examination; and the residue, slightly dried, and free from fats and other ether-extracted matter, was heated with water acidulated with hydrochloric acid for two hours, the temperature being kept below 100° C. The solution thus obtained was evaporated to a thick sirup over the water-bath, an acid re-action being carefully maintained, and the residue extracted several times with absolute alcohol, until the addition of alcohol failed to precipitate more nitrogenous matter. The fluid solution was then evaporated to dryness, the residue taken up in 90 per cent alcohol filtered and precipitated with platinic chloride. The precipitate thus formed was then treated with an excess of water; the alkaloid-platinum double salt, if present, going into solution, from which the insoluble platinum compound was separated by filtration. The solution was next subjected to a stream of hydrogen sulphide till all platinum was precipitated, the solution being then neutralized by sodium carbonate, and evaporated to dryness. This residue was repeatedly washed with absolute alcohol, and the solution obtained evaporated to dryness over the water-bath and then taken up in water. This solution should now contain the pure hydrochloride salt of any alkaloid extracted from the original substance by the acidulated water.

Allowed to slowly evaporate over sulphuric acid, fine laminar opaque crystals were formed, which were found to be soluble in alcohol and in water, but insoluble in ether. The aqueous solution gave with phospho-molybdic acid and with mercuric-potassium iodide amorphous precipitates. Mercuric chloride produced a white amorphous precipitate, crystallizing after some time. With gold chloride, a bronze-colored non-crystalline precipitate was obtained.

Platinum bichloride yielded a fine slightly crystalline precipitate of great insolubility. Excess of bromine-water produced a reddish-brown precipitate, soon disappearing.

The identity of the compound with muscarine, the poisonous constituent of the "toadstool," seems to be thus established, and is further confirmed by the evidence of the post-mortem on the victims of the consumption of the food from which the alkaloid was isolated. The official report of the examining physicians mentioned muscarine symptoms. No mushrooms were, however, found in the stomachs, though, because of the symptoms, some were furnished me for analysis. The further confirmation of elemental analysis has not yet been possible, since the total amount recovered was not more than sufficient for analysis: it was therefore deemed inexpedient to resort to the destruction of what might, under the circumstances, be required as evidence. A combustion analysis will, however, ultimately be made, and the results recorded. The ether extract made before the treatment with acidulated water, was subsequently found to contain an alkaloid yielding white crystals over sulphuric acid, and a crystalline precipitate with gold chloride. I have as yet, however, been unable to establish the identity of this compound, and therefore reserve further details, together with results of efforts to "cultivate" these products of decomposition at will, for some subsequent report.

Muscarine, so far as I am able to ascertain, has not heretofore been recorded among the ptomaïnes isolated and named, although

its existence as a product of putrefaction has been suspected; and Brieger speaks of the "*muscarin äuliche Wirkung*" of an alkaloid isolated by him, but is not satisfied of its identity, as this alkaloid is not included in the list of those discovered and recorded by him.

The case I have here reported is, moreover, doubtless the only one yet investigated wherein muscarine, heretofore known only as a vegetable alkaloid, has been found as a decomposition-product in a food the consumption of which has resulted in death, attended by the well-known symptoms of muscarine-poisoning. The facts observed and here recorded seem to present one more illustration of the intimacy existing between the composition and decomposition of animal and vegetable organisms, and furnish an additional proof of the interest and importance of this new field of investigation. Interest in the researches made in this new domain must be proportional to their importance, capable as they are of developing facts of so universal significance, and dealing with transformations occurring not only in the food we may eat, but in any animal body as well, and demanding new methods of lego-chemical investigation.

During the past year I have continued the investigation begun the previous season, and am now able to report the repeated isolation of muscarine as a product of the putrefaction of the food from the eating of which the four people at Chitose died, and, moreover, have been so fortunate as to discover two new and heretofore unknown ptomaïnes. One of these was obtained from the original ether extract; but, though their character has been carefully studied, I prefer to reserve opinion as to identification.

Discussion of the scientific interest and value of these facts is here out of place; but their practical value is, however, of widespread importance and applicability, both from sanitary and legal points of view. We are forced to recognize the danger of eating either animal or vegetable food after decomposition has begun, since this process may result in the development of deadly poisonous alkaloids resembling in physiological properties, strychnine, morphine, brucine, and other of the most powerful poisonous alkaloids hitherto known only as products of vegetable growth. Many diseases of a cholera-like character, perhaps even this most dreaded malady itself, may result from the consumption of food in which the process of putrefaction has begun. From a legal standpoint, chemists, physicians, and jurists are now compelled to recognize the possibility that many supposed cases of criminal poisoning are in reality the result of ptomaïne-formation, either in food or in the decomposing body after death.

BOOK-REVIEWS.

Fundamental Problems. By DR. PAUL CARUS. Chicago, Open Court Publ. Co. 12°. $1.

THE author of this work is the editor of the *Open Court*, a paper professing to teach a new religion, and most of the chapters of which the book consists have already appeared in the columns of that paper. The object of the book is to set forth the philosophy of Dr. Carus, which, we suppose, must be taken as the basis of that improved religion which the *Open Court* was founded to teach. One merit the work certainly has: it is, except in the ethical part, plainly written, and leaves no doubt as to what the author's philosophy is. It is a crude and crass materialism. Indeed, we have never seen a work in which the materialistic view was presented in so extreme a form as in this of Dr. Carus. Thus, in discussing the origin of feeling, he says, "We must expect the solution of this problem from biological investigations. . . . The conditions of feeling must exist in the inorganic matter of our world, and the appearance of the phenomena of sensation will be found to depend upon a special form in which the molecules of protoplasma combine and disintegrate" (pp. 10–11). And elsewhere he says that "it is not improbable that feeling will be demonstrated as a special kind of reflex action in organized substance" (p. 185). "The ego . . . is the result of the innumerable and complicated nerve organisms in our body" (p. 214). And then, as if these assertions were not sufficient, Dr. Carus declares "it is undeniable that immaterial realities cannot exist. The thing exists by its being material" (p. 86). He ridicules the idea of a First Cause, even when conceived as the Unknowable, and calls it a chimerical nonentity. God is variously spoken of as the All-existence and as the order of the world. The doctor's ethical theory is confused and inconsistent. He rejects utilitarianism, and at first adopts Kant's view that the moral law is purely formal, without any reference to ends; yet again he says that man is moral "by observing and conforming to the cosmical order of nature;" and both these views are supplemented by the theory that morality consists in living for the ideal, though what the ideal is we are nowhere informed. Such are Dr. Carus's views; and we are constrained to say that we do not think they will revolutionize either philosophy or religion.

Hygiene of the Nursery. By LOUIS STARR. 2d ed. Philadelphia, Blakiston. 12°. $1.

WHEN the first edition of this manual appeared, we said, that, of the many books which have been published on this subject, this was by far the best. This, the second edition, is, by virtue of a thorough revision and numerous additions, superior to the first. It has our hearty commendation.

Statics for Beginners. By JOHN GREAVES. London and New York, Macmillan. 16°. 90 cents.

THIS work on "Statics for Beginners," by John Greaves, fellow and mathematical lecturer of Christ College, Cambridge, England, assumes no knowledge beyond "Euclid," Books 1–6, and elementary algebra, with a few propositions in trigonometry. Collections of easy examples are inserted after the more important propositions, while examples of greater difficulty are given at the ends of the chapters.

AMONG THE PUBLISHERS.

MESSRS. GINN & CO. announce as in preparation "Practical Latin Composition," by W. C. Collar, A.M., head master of the Roxbury Latin School, Boston, and author of "The Beginner's Latin Book" and "Collar's Eysenbach." This book embodies a method that has been followed by the author for many years with the most satisfactory results. A brief explanation of the method will show how rational it is, how well it accords with the principles of language-teaching now most approved, and how simple and effectual an aid it should prove to a real understanding of Latin. The book consists of three classes of exercises, all based on selections from the Latin authors usually read in schools. The first exercise of each group contains easy sentences to be turned into Latin orally, — sentences involving the use of words, idioms, and constructions of the Latin text assigned for study in preparation. The second exercise consists of a short passage of continuous English to be written out in Latin, based on the same Latin text as the preceding. The third exercise, which may be omitted at the teacher's option, contains questions in Latin, to be answered in Latin, on the subject-matter of the original, but not introducing either words or grammatical principles that are unfamiliar. Notes and occasional grammatical references accompany the exercises.

— "From Nineveh to the Lake; the Deluged Valley of the Conemaugh; Scenes Afoot," is announced by Alex. Y. Lee, architect and civil engineer, 96 4th Avenue, Pittsburgh, Penn. This is an extended bird's-eye view of the valley of the Conemaugh, Johnstown, and the lake, finely lithographed and drawn from personal sketches, and based upon surveys of the Pennsylvania Railroad.

— Roberts Brothers have just ready, in their series of Balzac's works, "Seraphita," which is the completing volume of Balzac's three philosophical novels, of which "The Magic Skin" and "Louis Lambert" have already been issued by this house. Many critics have so little understood the real meaning of "Louis Lambert" and "Seraphita," that they have wondered why the author gave them a place in the *Comédie Humaine*, which, nevertheless, without them, would be a temple without a pediment, as M. Taine very clearly saw and said. Mr. George F. Parsons takes advantage of Miss Wormeley's translation to state and prove and elucidate this truth in an introduction, and all serious readers who follow it throughout will never regret that they have thus prepared themselves to understand Balzac's work.