

BROCHURE 4 OF VOL. II.

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VOLUME INDEX AND CONTENTS.

PROCEEDINGS
OF THE
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VOLUME II.



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In the south one hears many wonderful accounts of certain snakes and their marvelous peculiarities and these are generally believed by the people. The so-called "glass snake" (*Ophiosaurus ventralis*) is a subject of romance. It is not a true ophidian but in reality belongs to the saurians. A careful dissection shows the rudimentary legs, which with its other characteristics betray its relationship to the lizard family. The popular name is due to the brittleness of the tail, which may be broken, by pressure or a blow, into sections. It is thus quite plain to see how the greater part of the length of the creature can be easily broken off by a slight blow, and how a detached portion would have an amount of nervous vitality which would enable it to propel itself for some distance. It would, however, be absurd to suppose that the two portions would meet and join. The living body will, however, reproduce a caudal appendage which will enable it to reappear in public within a year and pass as a respectable member of reptilian society.

Do not try to kill every snake you see. The greater part of them are harmless and some are friendly to the human race. Most of them are useful in killing moles, field mice and other animals injurious to crops.

Remarks were made upon the subject of Mr. Warner's paper by Mr. Charles H. Ward, Mr. Elon Huntington and Mr. J. E. Putnam.

Mr. Charles H. Ward exhibited and described some living specimens of the "Gila Monster" (*Heloderma suspectum*.) About fifteen specimens were shown in a metal tank. In color they were mottled black and orange. They were quite inactive, excepting the largest one, which was removed from the tank, and handled with circumspection. It was about fifteen inches long and six inches in girth.

Mr. Ward also exhibited two alcoholic specimens of the "Surinam toad" (*Pipa Americana*), one a male and the other a female. Upon the back of the latter the young of the animal were present in several stages of development. There was an informal discussion regarding these specimens exhibited by Mr. Ward.

Professor C. W. Dodge described the life history and the physiology of respiration in the young of the *Pipa*.

The remainder of the evening was occupied with reviews in departments of science as follows:

Professor C. W. Dodge spoke on "Fatigue of Nerve Cells," giving an account of an investigation made by Dr. Hodge, of Clark Uni-

versity, upon the visible changes which take place in nerve cells as a result of their functional activity.

"The cells of resting or unworked nerve ganglia were found to be large, rounded in outline, full of granular protoplasm, with large rounded nuclei which stained faintly with a variety of dyes. In contrast to these, fatigued cells were shrunken in size, the protoplasm contained a large number of spaces filled with watery fluid, the nuclei were much shrunken and irregular in outline and the nuclei stained deeply with the same dyes which stained the nuclei of resting cells only faintly.

"These differences indicate that the activity of the nerve cells had been accompanied by a loss of the material substance or protoplasm, of which the cell is composed, as well as by a change in the chemical nature of the substance.

"Dr. Hodge's experiments go to prove that all nervous activity whether in the direction of voluntary motion or of thought, is accompanied by an actual destruction of the material composing the nerve cells. His experiment also shows that the fatigued cells, if allowed to rest gradually regained the condition of the unworked cells. Here then, is proof of the necessity of rest for people who are nervously exhausted."

Mr. E. J. Putnam remarked upon the new dynamos of the Citizen's Light and Power Co. He described them as a novelty from the Westinghouse Co., furnishing both a continuous and alternating current with the same armature and winding.

City Surveyor, J. Y. McClintock, who had just returned from a trip up the Genesee River, made an address on which the substance is as follows :

"We have lately seen in the Genesee valley the third greatest flood which has occurred for thirty or forty years ; studies have been made to determine at what rate of speed the height of the flood traveled from Mt. Morris to Rochester, and as this flood ran great enough to cover the broad flats, it gave a good example. I found that the flood was at its height as follows ; Mt. Morris, May 21st, 3 a. m. ; Geneseo, May 21st, 12 m. ; York, May 22d, 9 a. m. ; Avon, May 23d, 6 a. m. ; Rochester, May 23d, 2 p. m.

"The distances down the general course of the valley are as follows : Mt. Morris to Geneseo, $5\frac{1}{2}$ miles ; Geneseo to York, 3 miles ; York to Avon, $5\frac{1}{2}$ miles ; Avon to Rochester, 18 miles.

“This shows that the flood starting from Mt. Morris moved at the following speeds: To Geneseo, six-tenths miles per hour; from there to York, fourteen-one-hundredths miles per hour; from there to Avon, twenty-one-one-hundredths miles per hour; and from there to Rochester, Court street dam, two and one-quarter miles per hour. The total time from Mt. Morris to Rochester, 59 hours.

“Apparently the velocity increases gradually, although not regularly, but depending upon the width of the valley, which is very much narrower below Avon than above and affords less storage capacity.

“From our observations at Rochester, we had come to the conclusion that the flow of water during this flood was nearly one-third less than was the flow of 1865, when so much damage was done. I was able to verify this conclusion by interviews with old residents at various points along the river. At York the high water of 1865 was about three feet above that of 1894; at Avon it was somewhat over two feet.

“One other important point was as to whether the great flats would furnish storage room for the flood, below the surface of its ground, to any such extent as is usually assumed. This I was able to learn by ocular demonstration.

“The river banks proper are generally quite steep, of clayey soil, from eight to twelve feet high, and as the level of the river has fallen from twelve to fifteen feet within a few days the ground has not had time to dry out, but was exuding water from its whole surface. This showed that the flats act as a great storage. The importance of this will be shown by Mr. Rafter in his forthcoming report on the proposed storage dam. He will call attention to the fact that the 60 to 80 square miles of flats when soaked with water will hold far more than the great reservoir to be made.”

JUNE 11, 1894.

STATED MEETING.

The President, PROFESSOR H. L. FAIRCHILD, in the chair.

Thirty-five persons present.

The Council report recommended:

(1.) The payment of certain bills.

(2.) The election of the following candidates as active members:

MISS JOSEPHINE HOFFMAN, MR. CLIFTON J. SARLE, MR. EDWARD P. WEBSTER.

(3.) The election of MR. J. EUGENE WHITNEY as Second Vice-President, in place of DR. M. L. MALLORY, deceased.

The bills were ordered paid, and the candidates were elected by formal ballot.

By a formal ballot of the Society Mr. Whitney was elected Second Vice-President for the remainder of the year.

The Librarian, Miss Beckwith, reported the accession to the library since the annual meeting in January, of three hundred titles; two hundred of these from foreign countries, and one hundred from various societies and institutions of the United States.

Mr. F. W. Warner exhibited a curious membranous sheet of tissue, without at once explaining its origin. It was brown in color, very thin, tough, but soft and flexible, and in appearance resembling a very thin sheet of rubber, excepting it was not elastic. Mr. Warner finally explained that it was the "mother" from vinegar. He had washed and scraped it and had treated it with potash and with ammonia, to remove the acid and the vinegar odor, but without success in respect to the latter.

MR. ELON HUNTINGTON read a paper entitled:

THE EARTH'S ROTATION AND INTERIOR HEAT.

The paper was a discussion of the physical problems connected with the earth.

MR. CHARLES H. WARD exhibited plaster casts of a hand and foot illustrating a case of abnormal enlargement of the extremities, a disease known as Acromegaly, and read an interesting account of the subject from which these casts were made, and presented the facts already known concerning this newly recognized disease. He discussed the effect of the disease upon various portions of the body, and stated the fact that the "pituitary body" in the brain was always affected. By a diagram on the blackboard he explained the theoretical relation of the "pituitary body" to the cavities of the embryo.

The matter was discussed by Dr. E. V. Stoddard.

JUNE 25, 1894.

STATED MEETING.

The President, PROFESSOR H. L. FAIRCHILD, in the chair.

Forty-seven persons present.

The following paper was presented :

ON THE USE OF CONCRETE FOR THE PROPOSED STORAGE DAM AT MOUNT MORRIS.

BY GEORGE W. RAFTER.

After some remarks upon the matter of Mr. Rafter's paper, the President stated that the remainder of the meeting would be held under the direction of the Botanical Section, as had been announced upon the notices of the meeting. The President then yielded the chair to the Chairman of the Section, MISS MARY E. MACAULEY.

The first paper announced on the printed program was read for the author by the Recorder of the Section, MRS. J. H. MCGUIRE, as follows :

ON VOLVOX GLOBATOR.

BY A. M. DUMOND.

These beautiful forms forcibly remind me of the ancient Egyptian symbol of life, a flying globe, and may it not be that that wonderful people, away back in the dim ages of the past, knew and studied this interesting form? *Volvox globator*, when fully grown, varies from $\frac{1}{30}$ to $\frac{1}{50}$ of an inch in diameter. It is a colony, composed of thousands of cells called gonidia, so grouped together that they form a hollow sphere, the inner surface of which is studded with thousands of green points, while the outer surface has the appearance of a nearly transparent globe composed of hexagonal cells, bound together by a net-work of wonderful beauty; each of the hexagonal cells, or gonidia, of which there are several thousand, is, when free, a somewhat pear-shaped cell, about $\frac{1}{3000}$ of an inch in diameter, containing chlorophyl grains and with traces of starch diffused through its protoplasmic contents.

A red spot is also usually perceptible, which is generally believed to consist of altered chlorophyl. From the small end of this pear-shaped cell project two cilia, which are evidently a portion of the

protoplasm of the cell thrust out through openings in the cell-wall, with which they lash the water, thereby propelling their colonial globe. Each cell is the center of six other cells with which it is connected by the retaining net-work just mentioned, which not only serves the purpose of binding the whole colony together, but the further and more important purpose of putting each individual in communication with every other individual in the colony.

There is, without doubt, a free circulation of water through the globe at all times, thus supplying food and oxygen to both parent and offspring.

Dr. Carpenter, in speaking of these gonidia, says: "It is impossible not to recognize the precise similarity between the structure of this body and that of the motile encysted cell of *Protococcus pluvialis*. There is, in fact, no perceptible difference between them, save that which arises from the regular aggregation of the cells in *Volvox*, which normally are detached in *Protococcus*." Professor Williams says: "A singular provision is made in the structure of the gonidia, consisting of a slender elastic filament, by which each is attached to the cell-wall. At times it is seen to thrust itself out as if in search of food, it is then seen quickly to recover its former position by means of the contractility of the elastic filament."

Another interesting fact not generally noted in regard to *Volvox*, first pointed out by Mr. Buck, of the Royal Society, is that "at certain times, under favorable conditions, individual members of the colony detach themselves and lead an independent life; but it is noted that when this is the case the gonidia are double, hence the colony is not ruptured by the departure of the individual." Again, Dr. Hicks says: "Under favorable conditions the contents of the cell may be converted into a free moving mass of naked protoplasm, a veritable *Amaba* to all appearances, and as such it will vacate its cell and go roaming about in the cavity of the *Volvox*." The intent and destiny of these last forms is not known.

Professor Cohn is to be credited with the honor of having done much toward working out the generative processes of *Volvox*, which are as follows: Any one or more of the gonidia may increase in size, when it is seen to be composed of a number of somewhat angular green masses, separated by the interposition of a somewhat transparent substance, the whole being inclosed in a transparent envelope of considerable thickness. This, the young *Volvox*, increasing in size, soon appears like a button attached to the inner surface of the parent

Volvox. Later it appears to be attached to the parent by the adhesion of its transparent envelope at the point of contact only, and soon after it is observed to be detached and revolving within the body of the parent. As many as twenty young colonies may be seen in some instances within the body of the parent. Even at this early stage in the life of the young *Volvox*, there may be seen certain cells within itself, of a larger growth than their fellows, which are destined to become still other colonies. This is the ordinary mode of multiplication in *Volvox*, and is essentially a process of cell subdivision, taking place during the greater part of the season, and under favorable circumstances is repeated many times, a mature individual developing from an embryo in a few hours.

The process above described is the common or asexual form of reproduction. Sometimes, however, as Autumn approaches, certain of the cells undergo changes by which they are converted, some into sperm cells, others into germ cells, the greater number, however, remaining sterile. These cells are at first distinguishable only by their larger size. The sperm cells begin to undergo subdivision when they have attained about three times the size of the normal cell. This subdivision is peculiar, in that it is not on the binary plan but the whole mass resolves itself into a number of cells at one and the same time. These secondary cells are seen to consist of an elongated body of an orange or red color, provided with a pair of long cilia. As the sperm cell approaches maturity, the contained cells may be seen in motion. The motion continues with greater violence as they approach the time of their liberation, which is effected by the giving way of the wall of the sperm cell, when the young antherozoids disperse to all parts of the cavity of the *Volvox* sphere. Meanwhile the germ cells continue to increase in size, but do not undergo subdivision, becoming filled with a dark green substance, gradually changing from its original pear-shape to a globular form, projecting into the cavity of the *Volvox*, and at the same time acquiring a gelatinous envelope. In this gelatinous envelope the antherozoids literally bury themselves, penetrating to the interior, where they appear to dissolve, thus becoming incorporated with the contents of the germ cells. Evidently this is a form of conjugation. The product of this fusion is a resting spore, which on the breaking up of the *Volvox* falls to the bottom of the water, where it remains a longer or a shorter time, and finally develops into a perfect *Volvox*. Some authorities believe that the resting spores begin to develop on the approach of the fol-

lowing spring; others believe that it is necessary that they be thoroughly dried before they will develop. I will only say that in my experience, I am sure of finding *Volvox* in its season in certain ponds that dry up in the summer, but not at all sure of finding them elsewhere.

The fish-like odor emitted by *Volvox* during the sexual process of reproduction, is, without doubt, somewhat analogous to the odor emitted by flowering plants when in bloom, and like that, this odor is present at no other time.*

The writer in the company of an honored member of this society has, on several occasions within the year, visited a pond, the waters of which were teeming with *Volvox*, frequently fully five hundred to the cubic inch of water, and yet there was no suggestion of an odor arising therefrom, neither during the development nor the decay of the plant. It is a fact that *Volvox* emits the fish-like odor *only* during periods of reproduction *by the sexual process*. It is a further fact that this sexual reproduction does not take place annually, but only on rare occasions at intervals of several years, and has not occurred in this vicinity since 1888. It is, therefore, not a regular alternation of generation, but a form of revivification.

In noticing the movements of a *Volvox*, one is often impressed with the manner in which it will change its course, apparently to avoid an obstacle in its path. It will advance or retreat, revolve or come to rest, in as good order as did ever a Roman or Egyptian war galley, under the eye of an Anthony or Cleopatra, indicating a will and a purpose in its movements. Its ability in this direction is best seen where the sphere has been rent or ruptured; one may frequently see an irregular fragment, consisting of one-tenth to nine-tenths of the original sphere, moving through the water *in a direct line*.

*The Executive Board of this city, in its annual report for 1888-89, published a report on the "Cause of the odor and taste of the Hemlock Lake water," in which there are two quite serious errors, for which the printer might have been responsible. As I have never seen these errors corrected I take this opportunity of doing so. The principal error (on page 44) is as to the process of reproduction then taking place. It was not the *asexual* process of reproduction, as the report states, but the *sexual* (or rarer) process. The other error referred to occurs in a foot-note on the same page, and naturally follows the first error. These errors may seem to be of small moment, but when we remember that the facts therein sought to be recorded are misstated, and therefore misleading, we are not surprised to learn that some Algæists have even gone so far as to openly question whether we were dealing with *Volvox globator*, in short, whether or not we knew the organism. Because these facts were not made clear in the report above referred to, the correctness of the conclusions of the Microscopical Section is unjustly questioned by other scientists, and yet not without apparently good grounds for their conclusions.

It is a well known fact that *Volvox*, and, for that matter, all the motile chlorophyl-producing forms of either animal or vegetable microscopic life, are powerfully attracted by the light, either solar or artificial. "And no wonder (you say) because without the aid of sunlight the creature could not produce chlorophyl," and frequently one will find that in these chlorophyl-bearing motile forms the red or perhaps black eye-spot is present. To my mind this is sufficient evidence to prove that the red eye-spot is an organ of vision, capable of making its possessor sensible of the direction from which light proceeds.

In the beginning of the present decade Professor Balbiani, in a lecture before the College de France, announced his discovery of a true crystalline lens in the eye-spot of *Pandorina morum*, a form well known as being a relative of *Volvox globator*.

The paper was illustrated by large water colored paintings and by living specimens of *Volvox* under microscopes.

Remarks were made by Mr. Rafter in explanation and justification of the statements in the paper criticized by Mr. Dumond.

Mr. Dumond stated in reply that the paper referred to did not correctly state the conclusions of the Microscopical Section.

The next paper was entitled :

OUR TREES.

BY C. C. LANEY.

This paper gave a description of the cultivated trees, chiefly in the grounds along East Avenue, in Rochester. In illustration Mr. Laney exhibited leafy branches and flowers from a large number of the rare and interesting trees to which he had referred. This paper is published in full in the *Democrat and Chronicle* of Wednesday, June 27th.

Remarks upon the paper were made by Miss M. E. Macauley, Mr. John Walton and Mr. G. T. Fish.

The third paper read was :

THE FLORA OF LONG POND.

BY ANNA H. SEARING.

The flora under consideration is for the most part found upon the sand-bar, between Lake Ontario and Long Pond, which is one of a series extending from Braddock's Bay to Charlotte.

The method of formation of this and similar deposits is within the province of the geologist to describe; a work which Mr. G. K. Gilbert has already done in a most satisfactory manner.

On the lake side the accumulation seems to be pure sand and gravel, upon which the flora is very limited, but there is a considerable number of large trees. Indeed, this beach has more of the arbo-real vegetation than we are accustomed to see upon such sandy beaches.

Toward the marshy border, where a rich black alluvial deposit has mingled with the sand, the ordinary flora of such districts flourishes. At the immediate margin where Long Pond in its fluctuations sometimes encroaches, more or less of a marshy tract is left, and becomes the favorite habitat of rushes, sedges and aquatic grasses; also other plants of which I will speak hereafter. And finally in the shallow water are the true water-plants found in similar situations in other localities.

The changes which have taken place since man became an inhabitant of the beach are to be noted, since some members of our flora are shy of the footsteps of man, and do not gracefully accept civilization. Some plants which I recognized when the beach was in a comparatively primitive condition, I have not seen for some time.

Of the *Ranunculaceæ*, the peculiar water form of *Ranunculus aquatilis*, var. *trichophyllus*, finds here the requisite conditions for growth and flourishes correspondingly. *Ranunculus Pennsylvanicus* is not infrequently found on the borderland of moisture. The water lilies are so abundant in the water they need scarcely be mentioned. *Cakile Americana* is increasingly abundant. So far as I have noticed this so-called sea-rocket favors sandy lake beaches in preference to maritime borders. *Elodes Virginiana* was found so near to Long Pond that it cannot practically be excluded from our list. *Hibiscus Moscheutos*, the elegant swamp rose-mallow, was noticed a few years since by Rev. John E. Baker, in the marsh on the opposite side of Long Pond and adjacent to Cranberry Pond; it was also observed in 1892 by others. *Lathyrus maritimus* was formerly found in more or less abundance near to the sandy shores of the lake. I think it has passed away in the conflict for existence. *Astragalus Canadensis*, which is the only species of this genus having a foothold here, but which is abundantly represented in some portions of the West beyond the Mississippi, is increasingly abundant, indicating that by the aid of its rather shrubby growth it

is able to overcome the possibly adverse influences of surroundings. Of the species of *Potentilla*, some of which are rather abundant, *Potentilla paradoxa*, now known as *supina*, is rare, but is given by Gray as found in this locality. It seems rather shy of civilization, having disappeared from former stations, but is still found tolerably abundant somewhat nearer to Braddock's Bay. Of the water-milfoil family, we find *Myriophyllum spicatum*, growing in water of some depth.

Nesaea verticillata is an interesting member of our marsh flora, forming a good illustration for study of the transformation of underground stems to the varying needs of plants situated where the environments of water and land are fluctuating.

Of the *Polygonums*, many of which are water-loving plants, there are seven species and varieties.

Utricularia vulgaris is common. *Scrophularia nodosa*, formerly found, has, I think, entirely disappeared. Our beautiful *Convolvulus sepium* luxuriates not only in the native marshy tract, but even makes beautiful the track of the railway.

Euphorbia polygonifolia is a denizen of the sands, but has never been abundant. Of the *Araceæ* we have the common *Acorus calamus* or sweet flag. *Peltandra Virginica*, I have found but once and now that has disappeared. Most of the water plants found in other localities are also found here, but of these most interest attaches to the *Juncaceæ*, of which there are nine of the species *Juncus*.

Of the *Cyperaceæ*, or sedge family, there are four species of *Cyperus*, seven of *Eleocharis*, four of *Scirpus*, and sixteen of *Carex*. The rare *Dulichium spathaceum* has also been found. *Eriophorum cyperinum* is quite abundant.

The *Gramineæ*, or grass family, has some very interesting members. Among these are the stately *Zizania*, with its distinct but not widely separated panicles of sterile and fertile flowers, and the peculiar *Leersias*.

Sporobolus cryptandrus has, I think, disappeared. *Calamagrostis Canadensis*, the beautiful blue-joint grass, which has thriven upon the meadows bordering Long Pond, cannot, it is to be feared, survive the present conditions. *Ammophila arundinacea*, said to be found on sandy sea beaches from New Jersey to Maine, has evidently found that the general conditions of the sandy banks bordering our great lakes are not adverse to its growth; while it has evidently a utilitarian function in preventing the drifting of the sand in inconvenient locations by means of its root masses. The spikes of this grass are not dissimilar

in appearance to heads of wheat. *Spartina cynosuroides*, the fresh water cord-grass, is not clearly distinguishable from the maritime species. It is a tall, coarse grass, but evidently has not held its strength in this locality. *Phalaris arundinacea* is a tall-growing species of the Canary grass genus. The *Glycerias*, of which three are found here, have no more beautiful species than *Glyceria fluitans*, which is one of our most graceful marsh grasses. Yet the *Phragmites communis*, with its heavy panicles of silky spikelets, must be awarded the palm in the entire series of attractive grasses of this flora. The *Andropogons* are represented by the species *furcatus*. Six species of *Panicums* have formerly been found here, but the most rare and notable, *Panicum, virgatum* has disappeared.

Characeæ, or stoneworts, have a representative which has a habit of appearing and disappearing in quiet waters in a very strange manner. One summer the deep trench by the railway was almost filled, while the next season there was scarcely a trace remaining.

The marsh fern, *Aspidium thelypteris*, and *Ophioglossum vulgatum*, are representatives of the ferns.

One rare moss, *Drummondia clavellata*, is alone worth mentioning.

In conclusion, I would say that of the plants and trees noticed, there are seventy genera.

Professor Henry A. Ward exhibited a specimen of marine algæ from the coast of California, and described the plant's structure and the growth of the fields of giant algæ which border the Pacific coast.

Exhibits of material were made by the Section, as follows: A series of original sketches of native flowers, both plain and in water colors, was shown by Mr. John Walton. These drawings were very beautiful and perfect representations, both as regards drawing and coloring, of a large number of our wild flowers.

Mr. William Streeter showed living *Volvox*, illustrating the paper of Mr. Dumond.

Members of the Section exhibited a large number of species of rare native plants collected from Bergen swamp, the shores of Irondequoit bay, and other localities; among these were *Sarracenia purpurea*, *Cypripedium pubescens*, *C. spectabile*, *Liparis liliifolia*, *L. Læselii*, *Spiranthes Romanzoffiana*, *Arethusa bulbosa*, *Habenaria hyperborea*, *H. lacera*, *Calopogon pulchellus*, *Tofieldia glutinosa*, *Lilium Canadense*, *Moneses uniflora*, *Monotropa Hypopitys*, *Aphyllon uniflora*, *Linnæa borealis*, *Valeriana sylvatica*.

A collection of twelve grasses was exhibited by Mr. C. M. Booth.

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to March, 1895,

By FLORENCE BECKWITH, *Librarian.*

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(a) NORTH AMERICA.

UNITED STATES.

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*This list includes the names of all institutions to which the Proceedings of the Rochester Academy of Science are donated, whether they have sent any matter in return or not.

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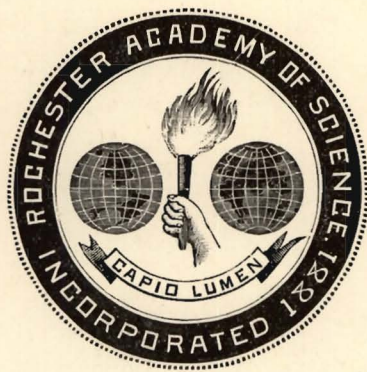
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