GOLDEN ANNIVERSARY OF SCIENCE.

BY HORACE C. HOVEY.

Numerous local societies for scientific research and discussion were in existence before President Hitchcock, sixty years ago, suggested the "Association of American Geologists," which, ten years later, was widened into the "American Association for the Advancement of Science." Its lines were most liberal, namely, to promote intercourse between those who cultivate science in different parts of America, by means of "periodical and migratory meetings," and to stimulate systematic scientific research by offering them increased facilities and enlarged usefulness. Nine special sections have been organized. This year but two "general sessions" were held, one at the beginning and the other at the close; all the rest being done by the council and by the nine sections. The membership has varied from 461 at the outset to 2,054 in 1891; the enrollment in 1897 being 1,610. The meeting began on August 22 and closed on August 27.

The main criticism on the Boston jubilee meeting has been the vast hospitality with which provision was made for receptions, excursions, etc. Preparations were made on a splendid scale, the local associations and institutions vying with each other to entertain the scientific guests to such a degree as hardly to leave room for anything else. But such lavish attentions were agreeable.

Many delightful excursions were arranged and carried out, including a grand one of five days to the White Mountains. About 500 papers were presented.

Governor Walcott graced the opening meeting by his presence and made an address of welcome, after prayer had been offered by Bishop Lawrence. Addresses were also made by Mayor Quincy and Dr. Crafts, president of the Massachusetts Institute of Technology, in whose halls we were met. Then Prof. F. W. Putnam, the president-elect, having been introduced by the retiring president, had a most hearty greeting. He paid a high tribute to the founders, patrons, and officers of the A. A. A. S., urged scientists of every name and degree to join an organization where they could do so much good, and then recounted the main events of the twenty-five years during which he had been the permanent clerk, adding the striking fact that he had, first and last, been honored by every office in the gift of the Association. Prof. Désiré Charney then spoke briefly in French; greetings were brought from the Russian Geological Society and other foreign bodies. And then the members dispersed to meet in sections, where each vice-president made his annual address and each section was organized for work.

Monday evening, in Huntington Hall, President Walcott Gibbs gave the annual presidential address "On Some Points in Theoretical Chemistry," the main object of which was to give a general view of a group of compounds called "complex inorganic acids." He said that in 1861 Prof. Manque, of Geneva, discovered four groups of salts obtained by boiling silicic acid with acid tungstites. These salts were wholly new to chemistry, yet did not immediately attract the attention they deserved. In 1871 Scheidler described them briefly. Dr. Gibbs opened up the field in 1877 by the discovery of a large number of new compounds, which he analyzed and described. Two distinct classes of salts are now recognized—single and double. They vary much in composition, but have certain analogies that oblige us to place them in co-ordinate groups. Up to the present time they possess only a theoretical interest; but that, to the true chemist, is the brightest of all interests, for of all items in inorganic chemistry the two classes of complex acids take the first rank. The address was extremely technical for even a mixed audience of scientists to follow.

"Astronomical Photography" was the subject of an address by Vice-President E. E. Barnard before the section of astronomers and mathematicians. The speaker's connection with the Lick and Yerkes Observatories enabled him to handle his topic with authority. He discovered the fifth satellite of Jupiter, as well as numerous other heavenly bodies, and is an expert stellar photographer. His remarks were mainly historical. Photography was discovered about the time this association was formed. Dr. Dick, of Scotland, and Dr. Arago, of France, predicted that the moon and planets might be pictured by the plated disks of Daguerre. Dr. Draper, of New York, first photographed the moon. Harvard Observatory next undertook the task. Most of the progress made since then has been by American investigators. The Paris work done by Loewy and Puiseaux with special instruments excels, however, anything yet done elsewhere. The solar corona and what are termed sunspots next attracted attention. Stellar photography practically dates from 1882, in the efforts of Dr. Gill to catch the great comet of that year at the Cape of Good Hope. Since then the camera has been applied to many different lines of astronomical work, such as noting the variable stars, catching the details of nebulæ, and the discovery of asteroids, the results being astonishing.

Among other papers before this section may be mentioned that by Prof. Safford, of Williamstown Observatory, concerning "Personal Equation," that is to say, the time it takes an astronomer to think. In 1795 the astronomer royal of England discharged David Kinnebrook because he was half a second too late in thinking. As long as the "eye and ear method" was in use, by which the astronomer had both to watch his object and keep note of time, errors were inevitable. The chronograph obviates this difficulty only in part, and there is still room for experimental observations and inventions to prevent mistakes in time.

Miss Mary Proctor, daughter of R. A. Proctor, follows in her father's footsteps in efforts to make astronomy popular, and she gave her ideas on the subject, which might apply to chemistry and other sciences as well. Ponderous knowledge discourages people.

In this connection we may say that a similar plea was made by Prof. Venable, of North Carolina, for more simplicity and familiarity in chemical language. He warned his hearers against the idolatry of learned formulas, and said that while technical terms are of use, just as shorthand is, a perfect system of instruction would recognize the necessity of making itself intelligible to learners as well as to experts.

A feature of special interest was the announcement by Prof. Charles F. Brush that he had discovered a new gas as an atmospheric constituent, to which he has given the name of "etherion." Its chief characteristic is its conductivity of heat at a low pressure, which exceeds a thousand times that of hydrogen, the best gaseous conductor hitherto known. Etherion was discovered a year and a half ago, while looking for occluded hydrogen in glass. It has recently been obtained in approximate purity by successive diffusions of air. A close relationship is proved between heat conductivity and molecular velocity. It is estimated that the velocity of etherion at freezing temperature exceeds a hundred miles a second; that its density is but a thousandth part that of hydrogen, and its specific heat 6,000 times greater than anything heretofore known. So peculiar a gas could not be confined to our atmosphere, and probably fills interstellar spaces, being identical with the hitherto hypothetical ether; hence the name given to the new gas, which possibly may be proved to be a mixture of two or three gases, with qualities yet to be discovered.

In his vice-presidential address before the section of botany, Prof. W. G. Farlow, of Cambridge, contrived to extract ideas of popular interest from a dry title: "The conception of species as affected by recent investigations on fungi," a class of plants with which he is very familiar. He quoted with approval the old definition of species as "a perennial succession of like individuals." Even in the early days of the A. A. A. S., to have denied the permanence and immutability of species would have made one a scientific outcast. The rapidity of the growth of fungi makes this a fertile field in which to experiment as to the results of environment and artificial culture.

Addressing the section of physicists, Prof. F. W. Whitman summed up the history of research as to "Color-Vision," from the days of Sir Isaac Newton down to the present time. Color-blindness, of course, was much of the story, the speaker reviewing the various theories advanced to account for the false appreciation of colors. Visual purple has particularly puzzled all anatomists, its probable function being to aid vision in faint light. It is proved that the number of color sensations is small, and many hypotheses about them are untenable. The vision of white light is not compound, though the white light itself may be complex. Yet the inter-relations of human phenomena grew daily more complex, and the actual mechanism governing them remains almost entirely unknown. The most hopeful path seeks the relations between color-sensations and physical properties. It need not surprise us if the next great step comes from chemical investigations instead of from the side of physics.

We have already mentioned an important paper by a lady, and there were several others worthy of note. "Imperialism" was the topic on which Miss Cora A. Bennison, a graduate of Cambridge law school, spoke concisely and clearly. The Constitution discriminates between what the executive may do and what he must do. His domain of authority has been enlarged by acts of Congress and decisions of the courts, as well as by acts of the executive himself. A state of war influences the competence of the President. A distinction is to be made between ministerial and discretionary acts. Her conclusion was that the limitations of our executive are such that we need not fear imperialism, unless the people themselves co-operate to bring about a radical change of government.

The efforts of Prof. Horsford to trace the remains of the Northmen in New England are now supplemented by his daughter, Miss Cornelia Horsford, in a way quite remarkable. Her paper on the subject gave proofs that the Northmen were on Cape Cod and the Charles River. The geographical evidences come from the Icelandic descriptions of Vineland, applying them to the North Atlantic coast. Archæological proofs are found in New England ruins as compared with ancient Icelandic works, and which are found to be utterly unlike the works of either the native or the pre-Columbian races on this continent.

Miss Alice C. Fletcher, a fellow in the Peabody Museum, is an authority on matters pertaining to Indian manners and antiquities. She has made her home among them, and devoted years to studying their customs and history. Her paper this year concerned Indian clothing, its origin, development, and use. Under the topic she included all regalia and religious vestments. From Omaha legends, we learn that clothing was invented to satisfy a new want kindled by self-consciousness. Adornments either symbolized supernatural relations or deeds of valor. Six regular honors might be won in warfare, and each had its peculiar sign. The right to use any one of these honors was publicly accorded from the sacred Tent of War. Practical uses of clothing to screen the body or protect it from cold were secondary to the original purposes just mentioned. Lantern views showed the untutored Indian's adjustment of his robe or blanket to harmonize with his passing impulses, and many of the attitudes taken were equal to those immortalized by classic art.

Prof. Archibald Blue, Director of the Bureau of Mines of Canada, and Vice-President of Section I, gave an able plea for "The Historic Method in Economics." He introduced his essay by reviewing what had been done in the economic line by the A. A. A. S. He advocated, as an illumining way of treating public problems, the tracing of the history of such matters, their development, their bearings, and their reactions on the course of national growth and prosperity.

A curiously interesting paper was read by Dr. L. O. Howard, the newly-elected permanent secretary of the association, and the United States Entomologist of the Department of Agriculture, concerning caprifigs in California. It seems that, in their efforts to rival the Smyrna figs, the Californians have used imported cuttings, but the trees thus grown invariably drop their fruits when they reach the bearing state. Growers of figs on the Mediterranean coast have long known that they are fertilized by an insect, the Blastophora psenes, which inhabits the wild fig, or "caprifig," as it is locally called. People go and break off branches of the caprifig every year and tie them to the tame figs, which are thus fertilized by the pollen-laden insect. Artificial fertilization has been attempted in California, the fruit thus ripened having the true Smyrna flavor. The government is now trying the experiment on a larger scale. There are numerous places in California where caprifigs abound, and Dr. Howard believes that the establishment of the fertilizing Blastophora can be successfully accomplished, although the problem has its difficulties.

Dr. E. O. Hovey, of the American Museum of Natural History, in New York city, contributed several papers of interest in Sections E and F. He described a number of foreign museums visited by him in 1897, at St. Petersburg, London, and elsewhere. He was impressed by the fact that almost every museum had some good features of its own that might wisely be borrowed by similar institutions. He spoke with special approval of the model arrangements at South Kensington Museum. He described at some length the famous Naples Zoological Station, whose first laboratory was established by Dr. Dohrn in 1872.

A third paper described the New York Museum, with which the speaker is connected. The collection in geology has 8,000 types and figured specimens. Many of the types of the Paleozoic came by purchasing the James Hall collection, twenty years ago, while other Tertiary types are from the F. S. Holmes collection of South Carolina, and there are others from the West.

Among the curiosities in the museum are some enormous lobsters that were captured off Atlantic City, in the spring of 1897, one weighing 31 and the other 34 pounds. The attempt was made to keep them alive, but they could not stand captivity, and their carcasses were presented to the museum. As mounted they are 37 and 40 inches long. The paper gave a series of accurate measurements of the mounted shells.

Among papers read by other members was one on "Greater New York," by Dr. William E. Hale; by Paul DuChaillu on "The Norseman as the Conqueror of Britain;" by Prof. Pollard on the forming of a land-locked area off the coast of Florida; by E. L. Corthell on "The Progress of the World's Maritime Commerce During the Past Fifty Years," giving startling statistics as to the power of steam as a factor in progress. Dr. Thomas Dwight, an honorary secretary of the Association, spoke on "Variations in Human Bones, especially those of the Axial Skeleton," and exhibited forty anomalous human spines, a collection unrivaled in this country.

The fact should be mentioned that this year, for the first time, students of Ferns organized to hear papers and hunt specimens. This they did under the auspices of the Fern chapter of the Agassiz Association, in Horticultural Hall.

The proceedings of the Geological Society will be made the subject of another communication, including several matters of general interest

Boston entertained the association so royally that it was found a somewhat difficult task to secure the next place of meeting. But after a prolonged discussion the council fixed on Columbus, Ohio, and nominated

Prof. Edward Orton, the State geologist of Ohio, as president of the A. A. A. S. for 1899. Prof. Orton was born at Deposit, N. Y., March 9, 1829, was educated at Hamilton College, and at the Lawrence Scientific School, Harvard University. He was for a time professor of natural history in the New York Normal School, and afterward held a similar place at Antioch College, of which he was subsequently elected president. In 1873 he was made president of the Ohio State University. Since 1881 he has had charge of the Ohio State Survey.

The Integrity of the Spanish Dominions.

When Philip II. began to reign, Spain was the most powerful nation in the world. So vast were her possessions in Europe, Asia, Africa, and America, that "the sun never set on her dominions;" but with the beginning of the decadence, before his death and in the first years of the reign of his immediate successor, nearly all her possessions in North Africa, Burgundy, Naples, Sicily, and Milan were lost.

In modern times her losses have been as follows:

1628, Malacca, Ceylon, Java.
1640, Portugal.
1648, Officially renounced her rights over Holland.
1649, A number of strong fortresses in the Netherlands.
1659, Roussillon and Sardinia.
1648–1713, Flanders.
1697, Island of Hayti, except Santo Domingo.
1704, Gibraltar.
1795, Santo Domingo.
1797, Trinidad.
1800, Louisiana.
1819, Florida.
1810–21, Mexico, Venezuela, Colombia, Ecuador, Peru, Bolivia, Chile, Argentina, Uruguay, Paraguay, Guatemala, Honduras, Nicaragua, San Salvador, etc.
1898, Cuba, Porto Rico, Philippines, Marianas or Ladrone Islands.

What will remain for her to lose in the twentieth century? Perhaps the home country.—From Patria, the New York organ of the Cuban revolutionists.

Mountain Railway in the Tropics.

There have been many rack railways, but the one constructed in Sumatra is said to be the first of its kind, of any considerable length, that has been built for purely industrial purposes, says The Trade Journals Review. Like all other pioneer undertakings, its completion has not been effected without the usual accompaniment of difficulties, and these were not lessened by the fact that that part of the earth's surface traversed by the iron path was an almost unknown region when the enterprise was set a-going. This line crosses the Barisan mountain range and now forms part of the Sumatra state railways. The rack is of the Riggenbach type, made of two soft steel channels joined by riveted pins. The rack itself is bolted to cast iron chairs fastened to steel sleepers, which latter also carry the ordinary rails. The locomotives were built at Stuttgart. They are made to draw maximum train loads of 65 tons up the incline and 70 tons on the down grade of the steep western slope, but on the eastern side, 90 tons for the up trains and 110 tons down. The mean speed is 8 miles per hour. The total length of the railway is 19 miles, the greatest elevation overcome is 3,875 feet, the maximum rise being 8 per cent and the minimum radius of curve 492 feet. The railway is built for conveying coal from rich mines near the river Ombilien to the new port of Pedang.

Extent of the Yukon Gold Fields.

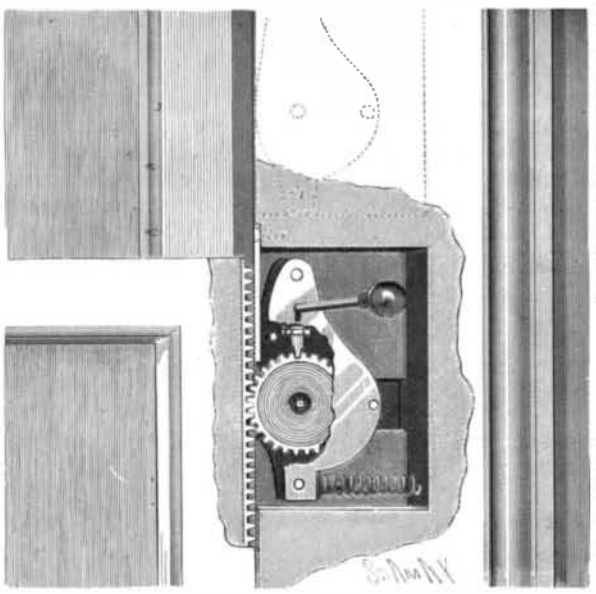
Mr. William Ogilvie, chief of the geographical survey of Northwestern Canada, and who, for six years, has been engaged in the Mackenzie and Yukon River districts, declares the Yukon gold fields extend over more than 125,000 square miles of territory. The fact Mr. Ogilvie is known to be most conservative in all his estimates, and not at all given to speculation and romance, gives additional weight to his assertions. Other precious metals are to be found in the same district; there is also coal, petroleum, and other products, awaiting only the means of securing and transporting to market. A system of thawing the frost-bound ground in winter, by the aid of electricity, is now said to be being experimented on in the gold fields.

A SPECIAL dispatch to The Daily Mail from Cape Town says that a meteor, that is described as being half the size of St. Paul's Cathedral, has fallen at Port Alfred. It made a hole in the ground 50 feet deep, 120 feet long, and 60 feet wide.

A NOVEL WINDOW RAISING AND LOCKING DEVICE.

The device illustrated in the accompanying engraving embodies simple mechanism for raising and locking a window sash. The mechanism in question consists of a spring-motor that will be automatically wound or set by a downward movement of the sash, the usual weights being discarded.

The illustration represents the mechanism in partial section as applied to a window sash and frame. It will be observed that the device comprises a rack on the window sash, which rack is engaged by a spring-operated gear-wheel mounted in a frame. The gear-wheel is held in engagement with the rack by means of the spring shown. When it is desired to increase the tension of the spring, the shaft of the gear-wheel is rotated in one direction, a dog preventing the backward movement of the wheel. When it is desired to decrease the tension of the spring, the frame in which the gear-wheel is mounted is swung aside on the pivot on which it is hung, so that the teeth of the wheel are disengaged from the rack; in this position the dog is lifted and the tension of the spring lowered to the required degree. A holding and locking device for the gear-wheel is provided, consisting of a slide-pin operated by a removable key, as shown in the illustration.



BRUNO'S WINDOW RAISING AND LOCKING DEVICE.

As indicated in the figure, raising and lowering devices are arranged one on each side of the window.

When it is desired to raise the sash, the holding pins are moved out of engagement with the gear-wheel by means of the key. When the gear-wheels are thus released, the springs operate to rotate the wheels, the movement being communicated to the window sash by means of the racks. By permitting the holding pins to fall back into engagement with the teeth of the wheels, the sash may be locked in any desired position. It is evident that when moved downwardly the sash, by means of the racks, will operate the gear-wheel to wind up the spring and place the mechanism in adjustment for raising the window again.

The device has been patented by the inventor, Frans Bruno, of 78 Herkimer Street, Brooklyn, N. Y.

RETURN OF THE VICTORIOUS FLEET FROM CUBA.

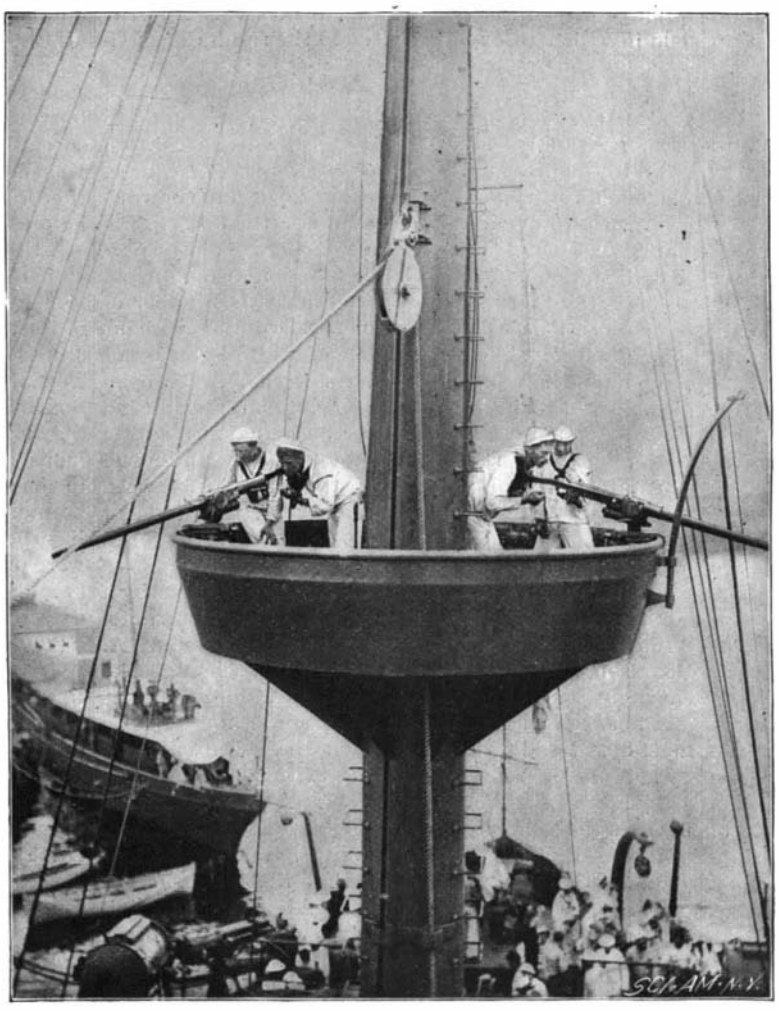
Saturday, August 20, was a red-letter day in the history of New York city, for when the seven armored warships of Admiral Sampson's fleet, fresh from the smoke of battle and bearing the scars of a victorious struggle, steamed in stately line up the North River, New Yorkers gazed upon a sight the like of which no city has ever witnessed before.

True, there have been other naval parades signalizing the close of successful wars. Victors in even greater numbers had dressed ship, and bells had swung and trumpets blared at triumphal naval parades long before the Dutch founders of New York set foot upon Manhattan Island. But never before has such a fleet of armored battleships and cruisers, representing the latest ideas of warship construction, come home to parade in triumph with the scars of a victorious struggle fresh upon it.

Immediately after the signing of the Peace Protocol orders were given for the battleships and cruisers of Sampson's squadron to come north to be docked and overhauled at the Brooklyn navy yard.

In agreement with a popular wish, while the ships were coming up the coast, instructions were given for the fleet to parade from Tompkinsville, on its arrival at New York, up the North River to Grant's tomb and return. The instructions to this effect were delivered to the incoming fleet as it was working its way up the Jersey coast in the gray dawn of the morning. The photograph showing the flagship "New York" with the other vessels astern was taken while approaching the "New York" at 5 A. M. by our artist on the government boat "Nina." The dispatches were handed aboard, and by the time the fleet reached Staten Island, the ships were in trim for the parade, and the crews, dressed in their picturesque white duck, were formed up on the upper decks and superstructures in the picturesque grouping shown in the illustrations.

The flagship "New York," with Admiral Sampson on board, led the way. The sight of this handsome vessel, whose outline is perhaps the most familiar to the public of all the ships of the navy, recalled the many incidents of the war in which she has figured: The blockade of Havana, the bombardment of Matanzas, the cruise to Porto Rico, ending in the attack on San Juan, in which she was struck by a shell and one of her seamen killed, and finally her long stern chase at Santiago, where the chances of war had decreed that she should only be "in at the death," missing the great fight that preceded it.



FORWARD FIGHTING-TOP OF THE "TEXAS."

A few hundred yards astern loomed up the "Iowa," bigger than the "New York" (8,200 tons) by 3,140 tons, and looking especially formidable with her lofty spar deck and its forward 12-inch guns, carried 26 feet above the water line. The "Iowa" bore the marks of the San Juan and Santiago engagements. Forward on the starboard bow two square patches of plate showed where a couple of big shells had entered when the "Iowa" was exposed to the first rush of Cervera's fleet at Santiago. A score of holes on the berth deck show where the flying fragments of one of the shells tore through the tough steel plating. On the spar deck, holes big and little testify to the slaughter which another bursting shell would have caused among the 6-pounder batteries had the men not been sent below decks during the San Juan bombardment.

Next came the "Indiana," one of the famous trio of which the "Oregon" is just now the most popular member. She lay to the eastward of the harbor when the Spanish fleet came out, and it was only the unfortunate fact that her boilers were in trouble that prevented her from joining in the chase.

Although not the largest in displacement, the "Brooklyn," with her lofty bow, towering smokestacks, and great length, was, perhaps, the most impressive vessel in the fleet. The comparative inaction of this vessel in the earlier stages of the war was more than atoned for in the splendid opportunity which she was given in the Santiago fight. When the Spanish fleet headed for the west, the "Brooklyn" was the only vessel that lay directly in their path. They were all headed directly for her (the captured Spaniards say with the intention of crippling her by their concentrated fire, and so escaping from the slower battleships). As the "Vizcaya" drew near, the "Brooklyn"