SCIENCE NEWS

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SCIENCE AT THE CENTURY OF PROGRESS EXPOSITION

SCIENCE that has remade the world in the last hundred years is glorified at Chicago's Century of Progress exposition.

First of all, the very ground upon which the miles of buildings rest was created out of the shallow water of Lake Michigan by an engineering operation.

Then for the past three years engineers have been at work designing and rearing the buildings which are to serve for the next six months and then be demolished, much like the settings of a movie city. Yet while it lasts, the Century of Progress city will entertain millions of visitors and exhibit millions of dollars worth of displays and treasures. It will serve millions of meals. Adequate fire protection must be provided and hundreds of police, guides and other personnel will inhabit the exhibition city during the exhibition hours.

Some of the buildings strike new notes in modern architecture. The bright hues of many-colored paints are spread over the pylons, towers and walls, and unusual lighting effects blaze their contributions to the fair's decorative scheme at night.

Within the exhibition buildings and in outdoor exhibits, the imprint of science upon our everyday life is exemplified.

From the hemispherical planetarium at the northern corner to the gigantic transportation hall near the southern end of the exposition's expanse, there awaits the visitor a liberal education in science and its effects on human life.

The Hall of Science, to which the cross-bannered court of honor of the principal entrance leads directly, contains an array of mechanized, self-operating demonstrations and exhibits in chemistry, biology, physics, medicine and the earth sciences.

For nearly three years a corps of scientists has been at work designing, planning and building these exhibits, which are arranged in gaily painted booths upon wide aisles. In some cases the visitor or attendant pushes a button and the machine goes through its cycle of demonstrating a basic science principle. In other cases the exhibit methodically carries out its demonstration every few minutes without the prodding of button pushing.

Some of the machines talk their message by means of sound film or phonograph attachments, while others use more prosaic labels in ordinary or transparent lettering. Lantern slides automatically projected are parts of many demonstrations.

Giant electric machines, automatic telephones and switchboards and the thousands of devices developed by science and used in communication or the electrical arts are displayed in the great halls of communication and electricity. Here the large electrical manufacturers, the telephone and telegraph companies have their exhibits.

In the gold-domed Federal Building and the Hall of States with its emblematic façades, the federal and state governments show their public service and governmental activities, particularly along scientific lines.

The Adler Planetarium, as yet America's only mechanical show of the stars, is a part of the exhibition. In this richly somber dome the astronomical exhibits are contained.

America's agricultural interests are represented by a low, long building decorated in black, red and blue-green.

On Northerly Island, across the lagoon from the Hall of Science, is also the Hall of the Social Sciences, in which exhibits will recall the social consequences of the century of progress and suggest how the problems can be met.

Southward along the lake front, beyond concession buildings designed to amuse or convince the throngs commercially, is an area devoted to America's aborigines.

Rising to a commanding position is a reproduction of one of America's earliest and most striking architectural developments, a Maya temple. With strange carvings of huge mask heads, great serpents and other elaborate designs, painted brilliant yellow and green, there is duplicated a portion of the Munjas or Nunnery at Uxmal in Yucatan, built by the Maya Indians many years before Columbus discovered America. Within it can be seen some of the most valuable of the Maya treasures loaned by American museums.

In the shadow of the Maya temple five groups of American Indians will live primitive existences as their ancestors did before them. This will be their contribution to the Century of Progress. Nootka Indians from the American Northwest will raise their totem poles. Winnebagoes in wigwams will represent the woodland tribes. The plains Indians whose existence depended upon the buffalo will be represented by a group of Sioux Indians living in tipis, while the Pueblos will dwell in reproductions of their terraced villages, which were America's earliest apartment houses. Navahos, too, will show the part they played in the old Southwest. For the visitors these Indians will dance their ceremonials and sing their chants.

Close by the Indian villages and the Maya temple are the exhibition buildings of leading automobile manufacturers. Here may be seen the operating assembly line where complete cars are built from piles of parts.

The pageant of a century of transportation will be shown under the gigantic sky-hung dome of the travel and transport building, so large that railroad cars and transport airplanes seem lost beneath it. Antique vehicles used years ago will be contrasted with the most modern in transport. Along the lake front will be found famous ships of to-day and yesterday.

Enter the great central portion of the Hall of Science and a great globe will be slowly spinning before your eyes, while below there are samples and information on the ninety-three building blocks of the earth, arranged in the form of the chemist's periodic table.

These ninety-three chemical elements are the stuff from which all the rest of the fair's exhibits are made. They are the basic materials of the world and the universe. They have therefore been given a central position in the Century of Progress. Those who learned in school that there are 92 elements are informed that neuton is the one added to the periodic table in the last year.

Some of the samples in the display are rare specimens of chemical elements that were totally unknown a few years ago. Upon the model of the world above, there are shown the locations on the earth's surface where the elements are found most abundantly.

Man's highest into the stratosphere and lowest into the ocean's depths are represented by two historic spheres. One of these is the light aluminum gondola that Professor Auguste Piccard used in his world record balloon flights over Europe, while the other is the heavy steel ball in which Dr. William Beebe descended into the sea off the Bermuda coast for a world's record.

Atom smashing is symbolized by the original operating high voltage generator designed by Dr. Robert J. Van de Graaff, then of Princeton, and now of Massachusetts Institute of Technology. It is producing millions of volts for the enlightenment of the visitors.

A year's growth of a quarter-inch tree twig is visualized in 75 seconds by a 7½ foot model in another corner of the hall. In a most realistic manner, the ingenious mechanical linden twig model adds wood on the inside of the growing zone and bark on its outside just as it does invisibly in the actual miniature twig.

A complete miniature oil refinery, all constructed in glass and actually making gasoline and lubricating oil, is seen in full operation in the central alcove.

From this main exhibition hall, the visitor can set out on exciting excursions into three floors of booths and displays dynamically telling the stories of physics, chemistry, biology, medicine and mathematics. To race through the exhibits would take three or four solid hours. If the visitor wishes to see each one operate and is determined to study each one quickly but understandingly, two or three days should be spent in the Hall of Science.

Nineteen of the world's greatest scientific men have their names emblazoned on the wall of the exhibition foyer of the Hall of Science.

The two Americans on this list of scientific immortals are Rowland and Michelson, both physicists. Professor H. A. Rowland was the famous physicist of the Johns Hopkins University who determined the mechanical equivalent of heat and made diffraction gratings for spectrum analysis known the world over. Professor Albert A. Michelson, of the University of Chicago, made the most accurate determinations of the velocity of light. He died in 1931.

Aristotle heads the list. Dr. Henry Crew, chief of division of basic sciences of the Century of Progress, who directed the extensive science displays and selected the list, explained that it was not intended to pick a science honor roll with which all would agree. He will agree with any who comment that there are famous names omitted.

The list of scientists and the fields of their researches is as follows: Aristotle—Biology, Archimedes—Mathematics, Euclid—Mathematics, Hipparchus—Astronomy, Leonardo—Anatomy, Galileo—Physics, Huygens—Astronomy, Harvey—Physiology, Newton—Mathematics, Lavoisier—Chemistry, Dalton—Chemistry, Darwin—Biology, Pasteur—Medicine, Faraday—Physics, Helmholtz—Physics, Maxwell—Physics, Mendelejeff—Chemistry, Rowland—Physics, Michelson—Physics.

The history of science has been written in 151 words of lyric prose and lettered upon the wall of the principal exhibition room.

The text, written by Dr. Henry Crew, formerly professor of physics at Northwestern University and now head of the division of basic sciences of the Century of Progress, is as follows:

Pythagoras named the cosmos; Euclid shaped geometry . . . Archimedes physics.

Xenophanes gazing upon the Heavens saw them to be one. Copernicus placed central in that one, our shining sun.

In the motions of physical bodies Galileo beheld law; thence Newton and the principle of universal gravitation.

Democritus glimpsed the atomic theory of the structure of matter; Dalton established it.

When in the nineteenth century Lamarck and Darwin formulated the great principle of organic evolution, the science of life was first seen as a cosmic progression of nature.

For the saving of life through inoculation men give honor to Jenner and Pasteur.

The century of progress saw Oersted and Faraday set forth, and Maxwell and Hertz advance the theory of electromagnetism.

Through the labors of Becquerel, of the Curies and of Thomson, to our own day are revealed fragile atoms and electrons.

Planck's quantum and Einstein's relativity theory open new epochs to science.

From the vast literature of science fourteen quotations have been selected and written upon a wall of the Hall of Science as a concise summary of scientific philosophy. Poets and public men as well as scientists are among those who wrote the collected sentences. The quotations are as follows:

Science and peace will triumph over ignorance and war.—Pasteur

Man is the interpreter of nature. . . . Science the right interpretation.—Whewell

Nature never proclaims her secrets aloud, but always whispers them.—John Owen

Science has but one fashion. . . . To lose nothing once gained.—Stedman

There is nothing so powerful as truth, often nothing so strange.—Daniel Webster

Scientific education is an essential condition of industrial progress.—Huxley

If there is one way better than another, it is the way of nature.—Aristotle

The first and the last thing required of genius is the love of truth.—Goethe

Nature is not to be governed except through obeying her.—Bacon

More important than particular truths is the love of truth.—C. J. Little

The common experiences of normal people are the matter of science.—H. Dingle

Reason's voice and God's, Nature's and duty's, never are at odds.—Whittier

The essence of science is to discover identity in difference.—F. S. Marvin

Scientific law is a description, not a prescription. —Karl Pearson

Mechanical men reveal to the visitors of the exposition the physiology and chemistry of the human body.

The famous transparent man, manufactured in Germany, as a life-sized display of the vital organs of human anatomy is a central exhibit in the medical section of the Hall of Science.

An American robot, ten feet high, who speaks and gestures and explains an illuminated interior view of himself, is a part of the chemical exhibit.

The life-size model transparent man, obtained from the famous Hygiene Museum at Dresden, has his exterior made of a synthetic transparent material. Heart, lungs, the stomach, liver and other interior organs are lighted in rotation to show vividly to the visitor their relation to the surface of the skin.

"Now, ladies and gentlemen, I shall swallow," the chemical robot tells his audience many times each day in exhibiting the mechanical movements of his stomach and intestines by illuminated dynamic pictures of his interior. "You will see the mouthful of food passing down my esophagus. The food is forced down by the contractions of the esophagus. Now you see the swallow entering the top door of my stomach. Watch my stomach contract to churn up the food."

The robot, who is a handsome well-dressed young man, except for the fact that his upper garments are pulled aside to show his digestive area, can point to the various happenings within him. He gives practical advice to the audience upon nutrition and the kinds of food that should be eaten.

A talking motion picture provides both the speech and the interior views of the robot, while ingenious mechanisms allow him to wave his arms when he orates.

Automatically and continuously, one of the many chemical exhibits is making gunpowder by mixing carbon, sulfur and niter and then exploding it before the eyes of the visitors by dropping it on a hot plate.

In other Century of Progress exhibits which show the principles and processes of chemistry that underlie our modern civilization, fire and sparks flash as there are repeated by the self-operating exhibits some of the famous and fundamental experiments that have made history.

Once a minute for ten hours each day, a dynamic display heats mercuric oxide in a test-tube and shows that metallic mercury, such as is contained in thermometers, and oxygen gas are given off. This repeats the experiment that resulted in the discovery of oxygen.

A ribbon of iron is burned in oxygen with a brilliant display of fire and another element, phosphorus, is allowed to burn simply by exposing it to the air.

Every two minutes in another booth the famous thermite reaction used in one kind of welding is performed to show the principle of chemical exchange or double decomposition. Iron oxide is mixed with aluminum dust and when the mixture is ignited there results molten iron and aluminum oxide.

That water can start fire is proved by an experiment in which the metal potassium is dropped into water with the result that it burns.

The breaking up of water into hydrogen and oxygen gas by an electric current is shown in another experiment and then these two gases are recombined into water by allowing them to burn.

Some materials cause a chemical change to take place without themselves participating in it. Such a catalytic action is illustrated by an operating experiment which shows ammonia being turned into powerful nitric acid. Before the catalytic change, the ammonia gas is basic and therefore turns a litmus solution blue when it is bubbled through it. After it is made into an acid a litmus solution is turned pink by the nitric acid gas bubbling through it.

Because sulfuric acid is one of the basic chemicals of modern industry, its manufacture is explained. The mining of the sulfur from the ground, its conversion into sulfur dioxide by burning, and its transformation into sulfuric acid by the catalytic contact process is carried out before the eyes of the visitors. Ninety-nine per cent. pure sulfuric acid is produced and the Cottrell electrical precipitator is seen changing the fog of sulfuric acid into a heavy liquid.

In another booth a dazzling color display of actual crystals being produced from a liquid and projected on a screen is to be seen.

Cherry red gold, the precious metal in finely divided solid suspension in a liquid, may also be seen. This is colloidal gold. A little acid added automatically to the solution turns the red gold to blue and then when more acid is added the gold is completely thrown down out of solution.

How gold mined from the earth is extracted from the rock is demonstrated in a complete ore flotation unit, where the gold ore is crushed, pulverized and then put through the flotation process to separate it from the lead and zinc sulfide with which it is associated.

A rubber tree with its latex sap flowing out of a gash in its bark is another exhibit which is the starting point for a complete story of the utilization of rubber in industry. Electroplating with rubber and vulcanization processes used in making automobile tires are shown in actual operation.

An automatic chromium plating plant built especially for the exposition will demonstrate this new process of electroplating as it produces appropriate souvenir letter openers which have impressed upon them a representation of chemistry's fundamental periodic table.