RESEARCH-INVENTION

"Research Parade" is Preview Of Science's Aid to Industry

Electricity, Light, Sound, Rubber, Glass, Lignin, Power, Electron Image Tube, and Other Wonders Demonstrated

RESEARCH PARADE, a program of 13 demonstrations, arranged by Science Service and directed by Watson Davis, was presented as a part of the Centennial Celebration of the American Patent System on Nov. 23.

The techniques of stage, motion pictures and radio were combined with those of the lecture platform and scientific meeting in the presentation. In the following greatly condensed excerpts from Research Parade, a voice off-stage spoke the italicized words.

Prologue

Some who have lived in all ages have been apprehensive of the swift progress . . . have wearied of the changes that new ways and ideas must bring. Some have even called for moratoria or holidays from science! . . .

The day—Jan. 31, 1844. The place—Washington. The then Commissioner of Patents, Henry L. Ellsworth, writing in his annual report:

"The advancement of the arts from year to year taxes our credulity and seems to presage the arrival of that period when human improvement must end."

We attempt to look into the future. Out of the laboratories there come for a few brief moments a few scientific infants which give promise of being technologic giants of tomorrow.

What fate awaits these children of the laboratory? Science offers you a preview of its youth!

Direct Current Transmission

Prestige and civilization in the old world were dependent on the possession of slaves. Today we have slaves. The present high standard of living in the United States is due in large measure to its use of electrical *slaves.*

How can electricity be produced more cheaply, and so be available to more people?

Dr. Albert W. Hull, General Electric Co.—Our present alternating current generators and transformers are excellent, but direct current would be better for transmission. The ideal would be to keep all of our present system and simply change, by some magic, the alternating current into direct current as it enters the transmission line, and back again into alternating at the other end of the line.

This ideal is found to be attainable. The magic of changing alternating current into direct current and back again has been accomplished by means of Thyratron tubes.

Solar Power

For light, heat, and power, man and all living things upon the earth must look to the great flaming star at the center of our planetary system, the sun. Power, whether it be in the form of electricity, steam, or human muscle, comes from the sun.

Scientists have long dreamed of tapping the sun directly.

Dr. Charles G. Abbot, Smithsonian Institution — Counting cloudless daylight hours, the sun furnishes to the State of New Mexico about 100 times as much energy per year as the total of all coal, oil and water power used per year in the United States. New Mexico would be a rich state if she could cash in on this free gift.

For 40 years I have been feeling out this problem. First of all came the invention of instruments and establishment of desert mountain stations to measure the energy of sun rays.

Next came a playful experiment of a solar cooking device. With this outfit I made many measurements to see what becomes of the sun's heat. I found it mostly lost in the focus tube, which cannot be protected by glass wool. Finding a transparent vacuum jacket to the focus tube indispensable, I have played around with it for about six years, and now have the use of it solved in two ways. In that outfit the mirror and the focus tube are highly efficient, but not so the conveyance to the engine.

I am now preparing a new device wherein the use of the solar heat will also be as efficient as the collection and retention of it has been already.

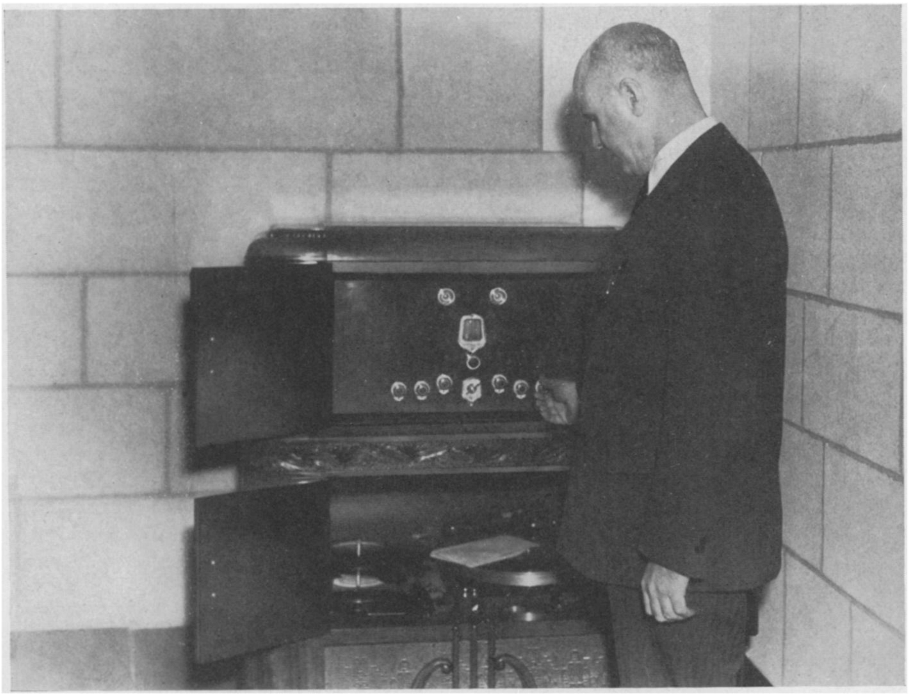
Polarized Light

Thanks to our prodigality with artificial light, our modern civilization lives intensively both by day and by night. After dark automobiles rush over roads at high speed guided by their brilliant headlights. Many of the some 36,000 annual auto fatalities are due in some measure to headlight glare.

Some 300 years ago Huygens discovered the property of light that is called "polarization." This light that vibrates or dances in one manner only may soon be saving lives by making our highways safe from glare.

RESEARCH PARADERS

Participants in the Research Parade, commemorating the present American Patent System's hundredth birthday.



RADIO'S HEAVY ARTILLERY

Fifty tubes in one hookup make this set at once exceedingly powerful and exceedingly flexible. E. H. Scott demonstrating.

Dr. L. W. Chubb, Westinghouse Electric & Mfg. Co.—Several means of plane polarizing light might be used to polarize the beam from an automobile headlight. The method I show is by use of polarizing crystals.

Most crystalline material transmits light vibrations only in planes parallel and perpendicular to the optic axis of the crystal. Some crystals absorb one of these quadrature vibrations and thus transmit plane polarized light. Tourmaline and iodo-sulphate of quinine are two such crystals. The latter, discovered in 1852 and later called "Herapathite", is the one which will be used to demonstrate the application of polarized light to vehicle lighting.

Now if a crystal transmits only light vibrations parallel to its optic axis, the light which passes through will pass on through a second crystal if its optic axis is parallel to that of the first. If, however, the second crystal is turned so that its optic axis is perpendicular to the first, the light passing through the first will be absorbed by the second.

This simple principle is used in the new vehicle lighting system to selectively absorb the light from opposing headlights and freely transmit the light from your own headlamps reflected back from the illuminated field of view.

All cars have the light projected from the headlamps polarized so that the vibrations of the light are in a plane 45 degrees from the horizontal. Each car is equipped with a viewing screen or eye glasses before the eyes of the driver and having its plane of polarization parallel to that of the headlight.

Mr. George Wheelwright, 3d, Land-Wheelwright Laboratories—Polaroid is the new tool of science, which makes possible for the first time extensive polarizing areas. These two discs are actually two polarizing sheets laminated between glass plates for optical purposes. My face is plainly visible through either one alone or through both when the optical slots are parallel, as I cross these discs my face becomes invisible.

Our production laboratories have produced many thousand square feet in the past year. Each sheet is like a great synthetic polarizing crystal and is composed of probably a thousand billion crystals to the square inch, each one substantially parallel to all the others and immovably imbedded in a transparent matrix. For the first time, large polarizing areas are available at a cost that is within reach of the commercial world. This material and the process for making it is the development of E. H. Land.

Here we have a polariscope, probably the largest polarizing area that any of you have ever seen. It can serve many useful purposes. Here we have a piece of glass. To the unaided eye it looks perfectly satisfactory. It is only when we put it in the polarized field that we see that there is serious strain, for glass unstrained in a polarized field remains colorless. Strained glass shows the colors which you see here. Models of bridges, structural elements in general, any areas which may be under stress and strain, can be copied in transparent plastic; placed in the field of a polariscope thus; and when stress or strain is applied, it is immediately visible to the naked eye.

Here is a large square of celluloid with Cellophane affixed thereon. It is transparent, colorless. I place this transparent sheet in the polariscope. Instantly, colorless Cellophane takes on brilliant hues, the color depending on the thickness and the position in which the Cellophane is lined up. Everywhere where colors are useful, from small window displays through architectural trim, interior design, even up to large facades and building fronts, this new color is now available. These colors are permanent. And now I rotate the front Polaroid and behold, all the colors have changed to their complementary opposite; or, again I place in the polariscope another sheet of Cellophane and all the colors are once more changed. We have for the first time designs that are permanent, yet changeable at will. These are only some of the many uses of Polaroid, three-dimensional movies in color being another field.

Polaroid was tailor-made to fit one of the most troublesome problems of the day—the headlight glare elimination problem. Here I have a headlight with Polaroid placed between the lens and the bulb inside the light. As the light faces you, you can easily see the glare. Now, I hold up this large disc of Polaroid which represents your windshield. I turn it so that its optical slot is crossed with the Polaroid in the headlight. The glare is removed.

Inaudible Sound

Inaudible sound is true sound in the sense that it consists of vibrations in the air. But the vibrations are so much more frequent that the human ear can not detect them. They are ultrasonic waves.

Dr. R. W. Wood, Johns Hopkins University—A generator of high frequency (300,000 per second) electric oscillations applies an alternating electric force of 30,000 volts to the opposite sides of a disc of quartz immersed in an oil bath. The vibrations of the crystal plate throw up a mound or fountain of oil several inches in height. These vibrations are transferred to glass vessels containing various liquids (water, benzene oil, etc.) by immersing the bottom of the vessel in the oil fountain. Oil, mercury and other liquids can be "atomized" into water, forming colloidal suspensions.

Small particles of powdered anthracite coal, suspended in water, gather in a few seconds to a single large lump which swims about in perfectly clear liquid.

The vibrations can also be gathered by a test-tube drawn down to a thin glass rod or thread at the neck. If this thread is pinched with the fingers the skin is burned though the thread is cold. If the end of the cold rod is pressed against a piece of dry pine wood, the wood is charred and may even take fire. If the end of the rod is warmed with a match flame, reflection of the waves from the top of the rod is prevented and all the energy accumulates at the tip of the rod, which melts to a luminous globule after the match flame is removed.

Oil or benzene applied to the outside of a tube carrying high frequency sound waves is thrown off as a fine spray or smoke, and if the side of a lighted candle is touched to the tube there is a great flash of flame as the "atomized" paraffin ignites. Experiments were made in collaboration with A. L. Loomis.

Sound Reproduction

Let us see what can be done with the most modern forms of sound reproducers. The phonograph and radio have come a long way since their creation during this century of invention. The music and off-stage voice of Research Parade issues from a 50-tube creation of the E. H. Scott Radio Laboratories.

Mr. E. H. Scott—The voices of famous artists and the music of the great symphony orchestras can now be reproduced with a degree of fidelity that makes it extremely difficult to realize the artist is not present in person before you, or that you are not in the auditorium with the symphony orchestra in front of you. A selection from *Carmen* recorded by Leopold Stokowski and the Philadelphia Symphony Orchestra shows how faithful to the original production music can be over a wide range of frequencies and also without the slightest distortion from the very softest pianissimo passages to the loudest forte passages.

The instrument is fully capable of reproducing the music of a large symphony orchestra at approximately the same degree of volume as if the orchestra were here in the auditorium. It has been designed not for an auditorium, but for use in the finer homes of the future—for the power you have heard demonstrated can be perfectly controlled and brought down to any desired degree of volume, so that it is just as perfect and enjoyable in the room of a home as in an auditorium.

The Electron Image Tube

The unaided eye responds only to a few octaves in the middle of the spectrum of light vibrations. Were it not for devices by which we extend our vision, we could not be aware of important things which are happening outside our power to see.

The electron image tube allows us to see things illuminated by either ultraviolet or infra-red light.

What will it ultimately be good for? The tube has already captured the interests of experts in microscopy, who see in the device a tool to extend their research in minute living organisms.

Dr. V. K. Zworykin, RCA Manufacturing Co.—The electron image tube may be thought of as the electronic equivalent of a copying camera. The tube shown converts an invisible infrared image into a visible image.

The image tube consists of a photosensitive cathode, a fluorescent screen, and an electron optical system for focusing the electrons from the cathode onto the screen. The cathode is so sensitized that it will emit electrons when illuminated by radiation in the visible, ultra-violet, or infra-red regions of the spectrum. If an image is projected on the cathode, electrons will be emitted from every point of its surface in proportion to the illumination in that region. Thus, close to the cathode the electrons form an electrical image which is an exact reproduction of the image projected on the cathode. This image would be blurred out and lost, at a few centimeters from the cathode, due to the initial velocities of the photo-electrons, if these electrons were left unguided. However, it has been found—by the application of electron optics—to be possible to guide the electrons in such a way that the image is refocused at the fluorescent screen.

In order to refocus the electrons, it is necessary to construct the electrical equivalent of an optical lens. Such an "electron lens" is possible because of the similarity between electron paths through a cylindrically symmetrical electrostatic field, and those of light rays through a lens. The basis of the "electron lens" in the image tube is the electrostatic field formed between two co-axial cylinders of equal diameter. These cylinders are arranged so that the cathode forms the end of one while the screen closes the second.

Tests for the Consumer

Science and research discover new principles and make new materials. There is also the continuing problem of making the things produced from new or old materials measure up to the proper standards of performance. Laboratory tests are used to ascertain the chemical composition and physical properties of materials. New testing methods are now being devised to measure serviceability.

Warren E. Emley, National Bureau of Standards—The hosiery testing machine shown in this motion picture illustrates the new kind of testing.

When machines can be devised, to imitate hard and regular service, they have the advantage of giving the same impartial and unchanging test to every sample, going through the set motions tirelessly. The stocking test-machine stretches the goods until a weak thread breaks.

Glandular Extracts

Glands weighing less than an ounce are capable of working fantastic changes in living creatures.

Amazing and almost beyond belief are the effects of one gland, the thymus, better known as sweetbreads. Dr. Adolph Hanson, practicing and researching physician of Faribault, Minn., made an extract from the thymus of young calves.

Inject this thymus extract into rats.

What happens? Not much at first. But continue this treatment—not just on one generation but on successive generations. The effects are visited upon the children, the grandchildren and the ever-so-great grandchildren.

The thymus speeds the pace of development faster and faster. Baby rats open eyes, erupt teeth, become sexually mature and grow old in record-breaking time. They are precocious giants in infancy, larger and more advanced as the generations of continued treatment increase in number.

Another little and powerful gland likewise visits effects upon future generations. Extract of the pineal gland, *located at the base of the brain, produces precocity, but growth is stunted and the precocious rats remain like dwarfs all their life.*

Arthur Steinberg, Philadelphia Institute for Medical Research—(See article and illustration on this page.)

Enigma of the Forest

One of the commonest of materials —and the least known—now joins the Research Parade. It is the enigma of the forest—and it has been the enigma of chemistry for many years. Its name is lignin.

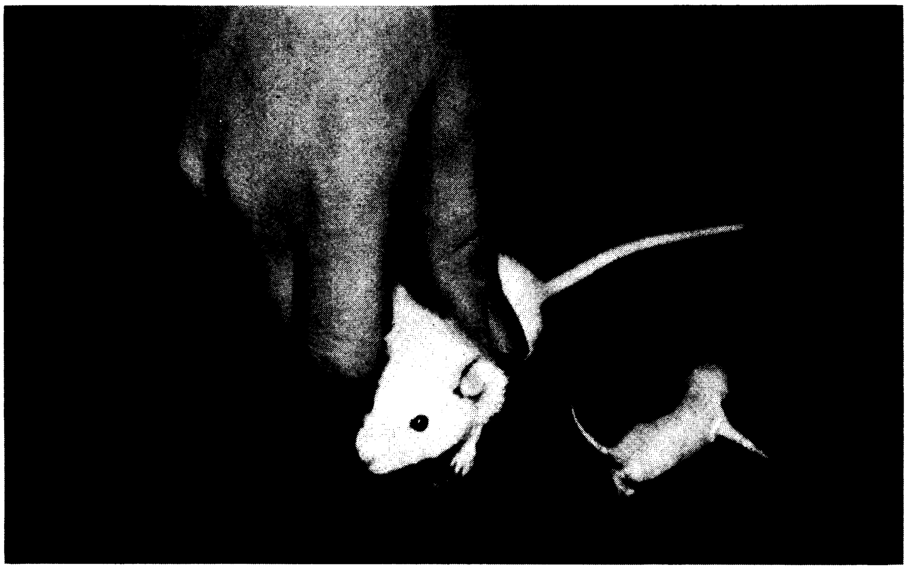
Carlile P. Winslow and Dr. E. C. Sherrard, U. S. Forest Products Laboratory—Lignin is a bulk constituent of all woody and vegetative growth, making up 20 to 30 per cent of the weight of the plant stem. Billions of tons of it are present in the world at any one time. The supply renews itself indefinitely.

One million tons of lignin are dumped into our streams annually as waste liquor from pulping mills; 15 million tons more are contained in four times that tonnage of waste wood.

Lignin is the cementing and reinforcing substance around cellulose fibers. *Cellulose* has structure. *Lignin* is amorphous or structureless. The chemist finds it unresponsive to hydrolysis or organic manipulation, and stubbornly resistant to conventional patterns of analysis.

Lignin is combustible; as waste wood or as recovered from waste pulping liquor we can burn it to warm a room or heat a boiler, or simply to get rid of it; it supplies heat also in one important process of recovering pulping chemicals. Again, waste pulp liquor is boiled down to make many thousand barrels of linoleum adhesive. Mixed with road materials, pulping effluent is giving interesting experimental results as a road binder. It also yields a material which has a limited use in the tanning of leather. Lignin has been combined with nitrogen to produce a compound available as plant food.

The formation of pure oxalic acid from lignin is now at a stage to invite commercial comparisons. By nitration we obtain colored compounds of the dye type. And the tendency of the furane aggregate discovered in lignin to condense further and form resinous products leads directly into the field of low-cost high-tonnage plastics from wood waste—panels, wallboards, and the like—to which (*Turn to page* 362)



GLAND-MADE GIANT

This little rat (on left) had thymus extract; this little rat (on right) had none. Both are of the same age.

ENDOCRINOLOGY

Growth Speeding by Thymus May be Due to Glutathione

CASUALLY pulling rats out of his pockets like a magician instead of a scientist, Arthur Steinberg of the Philadelphia Institute for Medical Research just as casually made the first announcement of what may prove the major medical discovery of the decade in his demonstration in the Research Parade arranged by Science Service as part of the centennial celebration of the American Patent System.

Glutathione, the chemical believed responsible for normal growth and for cancerous growth, is found in the thymus gland, Mr. Steinberg told his audience after first amazing them with a demonstration of the precocious growth and development attained by rats treated with thymus gland extract.

The extract was prepared by Dr. A. M. Hanson, practicing and researching physician of Faribault, Minn. Its role in stimulating growth and development was demonstrated at the Philadelphia Institute for Medical Research under the direction of Dr. L. G. Rowntree. Feeding this extract to white rats makes the next generation of rats develop much earlier and grow much larger than their parents. As each successive generation is fed the extract, growth and development is speeded up in the offspring at a truly amazing rate. In the tenth generation the rats matured in about one-fifth the time it takes for a normal rat to mature.

The thymus gland plays its role of controlling growth and development in the young, it now appears, by means of the powerful chemical glutathione. This chemical, scientists have already learned, can speed up cell division and thus influence both normal growth and the abnormal growth that is cancer. When chemical analysis of thymus gland extract showed that it contained glutathione, Dr. Rowntree and associates started feeding the pure chemical to white rats, as they had fed the animals thymus extract. The results were the same as with the gland extract, only even more striking. Successive generations of rats whose parents were fed glutathione grew and developed at an even faster pace than the animals that had been fed the thymus gland extract.

Whether the gland manufactures this chemical, as the pancreas does insulin, or whether it merely is a storehouse for the chemical, Mr. Steinberg did not state. That and possible practical applications of the latest discovery must await further research.

Science News Letter, December 5, 1936

INVENTION

Einstein Invents Automatic Camera With "Electric Eye"

Great Relativist Revealed as Inventor in New U. S. Patent; Two Previous Einstein Patents Also Disclosed

DR. ALBERT EINSTEIN, the famed proponent of relativity and acknowledged leader of the science of mathematical physics, stands revealed on the records of the U. S. Patent Office as the inventor of a camera that snaps photographs with the proper aperture and exposure automatically determined.

He has applied the photoelectric cell or "electric eye" to cameras. Experts reading the patent specifications foresee the possibility that the invention will be practically and commercially important in the next few years.

The patent is No. 2,058,562 and the application was filed on Dec. 11, 1935, by Dr. Einstein jointly with Dr. Gustav Bucky of New York City.

This is the way the Bucky-Einstein camera works: Light from the scene or object being photographed comes into an auxiliary lens and falls on the photoelectric cell. There is a screen of varying transparency mounted in the main camera lens system that is moved in accord with the amount of light that the electric eye sees, letting more light fall on the photographic plate when necessary.

So far as can be judged, abstruse mathematical theory was not needed in designing the patented camera but Einstein's genius probably contributed largely to making it operate correctly.

What plans Dr. Bucky and Dr. Einstein have for commercializing the invention are not yet known. The device can be adapted to motion picture cameras.

Dr. Einstein is the leading member of the Institute for Advanced Study at Princeton, N. J., which operates in close cooperation with Princeton University, but is not a part of it.

Dr. Bucky is a radiologist practicing in New York City with offices at 5 East 76th Street, and is also connected with New York University. Dr. Bucky is a naturalized American citizen of German birth. He practiced in Berlin until 1923.

A search of the U. S. Patent Office files showed that Dr. Einstein is also a co-inventor of two other patents. These relate to refrigeration and were taken out jointly with Leo Szilard, who is believed to be the well-known radiologist at St. Bartholomew's Hospital, London. These two patents, British No. 282,428, granted Nov. 15, 1928, and U. S. No. 1,781,541, granted Nov. 11, 1930, cover a new system of circulation in the gas type of refrigeration and the use of butane gas as the refrigerant. The U. S. patent is assigned to the Electrolux-Servel Corporation of New York and is believed to have been commercially profitable.

His associates who work with him daily at Princeton did not know that Dr. Albert Einstein is an inventor until Science Service made inquiries.

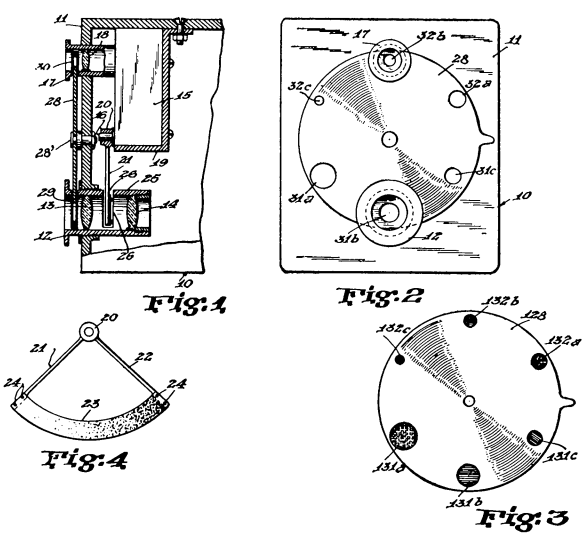
"Dr. Einstein's patent?" said a feminine voice. "We didn't know he had one. Those who work with him daily here didn't know it either, I am sure."

Science News Letter, December 5, 1936

Oct. 27, 1936. G. BUCKY ET AL 2,058,562

LIGHT INTENSITY SELF ADJUSTING CAMERA

Filed Dec. 11, 1935



EINSTEINIAN BRAINCHILD

Abstruse mathematics yield for the moment to practical ingenuity, as Prof. Einstein collaborates in the production of a new-type camera. Above are reproductions of official U. S. Patent Office drawings of the device.

From Page 359

the Forest Products Laboratory is now giving specific attention.

Chloroprene Rubber

Natural rubber is the monopoly of the rubber tree. How to make it is a trade secret that nature has jealously hidden.

Synthetic rubber! That was a cherished goal. Scientists — Americans, British, French, Germans and Russians —have spent long years, tremendous effort, much ingenuity in endeavoring to make rubber in the laboratory.

Now we have man-made rubber. Not exactly the same as natural rubber, but better for many purposes. Rubber made from coal and limestone and water. It is chloroprene rubber.

Born of pure chemical research by the late Father Nieuwland, chloroprene has been nurtured and developed by the great du Pont laboratories.

Ernest R. Bridgwater, E. I. du Pont de Nemours & Co.—Chloroprene rubber not only equals the natural product in strength, toughness and elasticity, but is much more resistant to the traditional enemies of rubber—oxygen, heat, sunlight and oils.

No less striking than the properties of this man-made rubber are the chemical processes by which it is made. Coke fused with lime in an electric furnace produces calcium carbide. Water reacts with calcium carbide to produce acetylene gas. Under the influence of suitable catalysts, it has been found possible to cause two molecules of acetylene gas to join hands. The resultant product is also a gas known as monovinylacetylene. Again the magic of catalysis is utilized to cause a molecule of monovinylacetylene gas to react with a molecule of hydrogen chloride gas, producing a molecule of a previously unknown chemical substance which has been christened "chloroprene." Until now we have been dealing with colorless, invisible gases, but chloroprene is a clear, water-white liquid which boils at 60 degrees Centigrade. Here is a sample of it which is only a few days old and has been kept packed in solid carbon dioxide since it was first made. And here is another sample of chloroprene of the same age which has been kept slightly above room temperature, exposed to light and shaken at intervals to bring the whole mass into contact with air. As you see, it has assumed a light straw color and has become very viscous. Much of the chloroprene in this test tube has polymerized; that is, the individual molecules have joined together to produce giant molecules of chloroprene rubber which is dissolved in the portion of the chloroprene that remains unpolymerized.

This test tube contains ordinary ethyl alcohol, which is not a solvent for chloroprene rubber, but is readily miscible with unpolymerized chloroprene. As I pour the alcohol into the partly polymerized chloroprene, the chloroprene rubber comes out as a heavy, flocculent precipitate. The unpolymerized chloroprene remains in solution with the alcohol. Time does not permit me to squeeze and dry the liquids out of the chloroprene rubber in this test tube, but I have here a sample of dried chloroprene rubber which is exactly the same as the precipitate in this test tube, excepting that an anti-catalyst has been added to it to prevent it from polymerizing further and thereby becoming hard and non-resilient.

This product of American ingenuity has found hundreds of uses in which its superior properties more than justify its higher cost.

Old Glass in New Forms

From the time that history began, man has made and used glass. Glass of ancient China. Glass of Egyptian tombs. Cathedral windows.

But always glass has been proverbially the breakable material. Dictionaries call glass the "hard, transparent brittle substance." Brittle is defined as "like glass."

Now science breaks with the past. Glass has become a material of a quite different temper.

Old glass takes on new forms. Glass becomes soft as silk and strong as steel. Glass acquires strength. Glass, the fragile, becomes unbreakable.

Dr. J. C. Hostetter, Corning Glass Works—Several centuries ago the philosophers were mystified by the remarkable properties of a peculiar pear-shaped bit of glass having an elongated tail. "Prince Rupert Drops" withstand hammer blows on the bulbous section but fly into bits as the tail is broken off. Such drops are highly strained—a heavy compressional layer surrounding a zone of terrific tension. Such a distribution of internal stress accounts fully for their unusual properties.

A somewhat similar phenomenon is demonstrated by means of the classical "Bologna Phial." This heavy-walled flask may be considered a hollow portion of an enlarged Prince Rupert Drop. Mr. C. J. Phillips demonstrates their great strength by using them as a hammer to drive spikes into a board. These phials are strong because the outer surface is in heavy compression but compensating this, the inner surface layer is in tension. (The phial is held inside a glass battery jar and then scratched inside by a hardened steel point. It explodes violently.)

These phenomena illustrate what we may call uncontrolled internal stress and, therefore, while interesting scientifically, are of no commercial importance. They do, however, point to the possibility of introducing a great increase in useful strength into what is commonly called a brittle material. Fortunately, glass is a material ideally adapted to quantitative photo-elastic studies by means of polarized light and a Babinet compensator. (Kodachrome moving pictures, taken especially for this occasion, showed various kinds of glass treated in various ways as seen by polarized light.) Studies over a period of some 15 to 20 years have resulted in the successful production of really strong glass. A piece of plate glass will readily support a substantial load. (Mr. Phillips stood on a windshield. See photograph, page 355.)

While this glass is remarkably strong and can be broken only under unusual conditions, it possesses the great advantage that when it does break, the resulting pieces are not dangerous—they are small cubes with blunt edges. (See front cover.)

Applications of tempered glass have been made in the transportation industry as safety glazing for automobiles, passenger cars, and ocean liners. In other fields there are tempered boiler gauge glasses, and more recently top-of-stove-ware.

And now, passing to another new form of our old material, we find that when glass is reduced to a fine, fibrous condition the fibers are extremely strong. In cooperative research now going forward between the Owens-Illinois and the Corning companies, tensile strengths of over one million pounds per square inch have been measured on individual fibers. Felted masses of fibers three or four ten-thousandths of an inch in diameter are finding applications as thermal insulation and as acoustical treatment. Felted masses of still finer fibers are as soft as silk.

Made in textile form, however, there is probably a much greater potential field of applications. Some of these textile fibers are less than 1/10,000 of an inch in diameter. A pound of it will reach around the earth. It can be spun at a rate which would discourage the most ambitious silk worm, working full time. The new material is shown here as sliver, yarn, thread, oven cloth, and braid. Colors have been produced, and they are permanent. As applications, fabrics and textile products of all kinds, made from this material, are first of all *fireproof,* hence should find use as draperies (background in upper left photograph on p. 355), theater curtains, awnings, and rugs. Glass is a good electrical insulator. In tape form it should therefore be of interest to wire and cable manufacturers. In another field, the chemical engineers are already interested in an acid-proof cloth for filters. These are some of the possible uses, and the type that is attracting our attention, rather than such items as clothing, although some neckties have been made up recently. (Dr. Hostetter wore a glass necktie.)

"Maid of Science"

To Research Parade comes a parade of fashions made possible by science. Hail to our "Maid of Science," dressed in raiment that would have been priceless a few years ago because science had not yet produced it.

This young lady, ready for the most formal occasion, wears, not silk and satin, but a white evening gown of acetate crepe. The wrap which offers a striking contrast in fabric is of Celanese vel-

When the Roman roads were the great highways of traffic, 40 to 50 miles was thought a good day's travel on wheels or horseback.

Some naturalists believe that wildfowl fly in V-formation because this enables each following bird to avoid the "wake" of disturbed air from the bird ahead.

vet. Rayon flowers form the graceful bandeau for her hair.

With her acetate crepe dress, the young lady wears hose of rayon spun under tension, thus imparting greater strength to the fiber.

"Maid of Science" carries a rare historic object—a silk purse made from sows' ears. A great chemist, Arthur D. Little, in 1921 actually gathered up the ears of sows, made gelatine of them, and by a process similar to that of producing rayon, the threads were spun and dyed. This green and rust colored silk was knitted into a form of purse such as medieval ladies once carried.

The little purse is more than a stunt, it is a symbol. By making that purse, modern science defied the age-old impossibilities: "You can't make a silk purse from a sow's ear."

There are no sows' ear purses on the market; there are other sources of silk much better for our use. But the moral remains: If a problem in science is sufficiently interesting, the worker in pure science will solve it.

Speaking of purses, would you like to know how much it costs to dress such beauty in such beautiful products of science? And such a costume is neither cheap nor extravagant. Girdle, slip, gown, wrap, sandals, bracelet, bandeau, cigarette case, hose—the costume complete sells for $137.45.

We must mention the Lastex which forms the foundation for the lady's costume. Lastex is a chemical triumph of the economic depression era.

Old-fashioned elastic could not be used in textile processes. What was needed was an invention—a way to vulcanize latex in a small uniform thread. This was achieved, and now, by coating the small rubber threads with fibers, spinning and knitting around them, you get elastic threads of which even lace may be made.

The field of plastics offers the young lady her bracelet of Catalin and her Catalin cigarette case. Only a chemist could love the early experimental objects of plastic stuff in their dark uninteresting colors. But synthetic resins have blossomed out into rainbow hues, palest pastels, and transparent effects.

Epilogue

So ends this Research Parade. In another sense, the Parade of Research will continue so long as man is inquisitive and has desires. If civilization is to continue, the Research Parade must go on and on. We salute the future. We greet the next hundred years.

Science News Letter, December 5, 1936

PHYSIOLOGY

Blood-Clotting Platelets Produced in the Lungs

BLOOD platelets, minute flattened disks important because they help to prevent death by hemorrhage, are produced in the lungs, it appears from research reported by Dr. William H. Howell, professor emeritus of physiology in the Johns Hopkins University, at the meeting of the American Philosophical Society.

First evidence that these vital elements of the blood are formed in the lungs was reported a year ago by Dr. Howell (See SNL, Dec. 7, 1935). His report now confirms this evidence, which helps to clear up a 50-year-old puzzle.

Scientists have held many theories as to the origin, function and fate of these platelets, which were discovered half a century ago. The marrow of the bones where the red blood cells and many of the white blood cells are formed was generally considered their birthplace, until Dr. Howell's research showed that they are formed in the lungs as a sort of solid secretion produced by cells called megacaryocytes.

The megacaryocytes increase in number and are stimulated to greater growth and activity by defibrination, Dr. Howell reported. This process consists in removing the fibrin from the blood and causes destruction of the platelets. But while the number of platelets circulating in the blood is reduced when some of the fibrin is removed, production of new platelets is stimulated by the process.

Injecting peptone into the blood also causes an immediate large reduction in the number of platelets, Dr. Howell reported, but the number returns practically to normal within two or three hours.

"What happens," he explained, "is that the peptone causes clumping of the platelets in the circulation and these clumps are strained off in the capillaries (smallest-sized veins and arteries), especially the capillaries of the lungs, where they disintegrate or become phagocytized.

"The rapid return to normal is not due to the restoration of the clumped platelets to the circulation but to an accelerated formation of new ones."

Examination of sections of the lungs under the microscope bears out this interpretation. A characteristic feature, after a certain time, is the number of small, apparently newly developed giant cells found in the lungs.

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