SCIENCE

VOL. 96 — FRIDAY, OCTOBER 2, 1942 — No. 2492

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. MCKEEN CATTELL and published every Friday by

THE SCIENCE PRESS

Lancaster, Pennsylvania

Annual Subscription, $6.00 — Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary in the Smithsonian Institution Building, Washington, D. C.

MOLDERS OF A BETTER DESTINY[1]

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IN fighting a war, the all-absorbing intent is to win. There is little time to analyze the rush of events or to appraise their consequences beyond the war's end. The united objective is rightly success for our arms.

Yet under the pressures of a great war there may be compressed scientific, economic and social developments that might have taken many decades to achieve under less urgent conditions. Their effects on our lives and all civilization may be more wide-reaching and lasting than any military conquest. They constitute one of the most imperative incentives to victory.

No American, least of all any scientist worthy the name, conceivably could endorse war as a justifiable means to progress. The destruction of life and property wrought by the present war far exceeds the havocs of a century's earthquakes. Most of mankind is burning itself on an altar of paganism.

Nonetheless, one fact is inescapable. Despite the recurrent malady of war, history's over-all course is forward. Mankind has the habit of rising phoenix-like from its own ashes to attain greater heights. Progress is immortal.

We emerged from the First World War with a wholly new concept of our possibilities. For the first time we began clearly to see that when the Creator conferred upon man freedom of choice and action, there were placed in man's hands the tools with which he could shape his destiny and modify his future. We learned that it was possible not only to emulate nature but even to excel her in certain fields of creation. We were shocked at how little we knew and at

[1] Address before the General Session of the American Chemical Society, Buffalo, N. Y., September 7, 1942.

how meagerly we had advanced in the light of what was still to be accomplished.

The new nation—and it was no less—that was built on this continent following 1918, largely as a result of the war-broadened vision, would have seemed a fantastic wonderland in 1914 had anybody then had the imagination to predict it.

The automobile came of age; aviation was established as a potent industry; the "wireless" of war days became "radio," and radio approached the miraculous in the marvel of television. Add to these the gigantic expansions realized by the telephone, the motion picture and rayon, all three of which were undeveloped infants in 1914, and you have a combination of influences truly staggering in their effects upon American life.

One of the greatest migrations of all time took place as millions moved from farms to cities and more millions from cities to suburbs. This mighty trek, made possible by improved transport, better highways and opportunities for more lucrative employment, paralleled further drastic changes in our traditional economy. We had led the world in agriculture; we now led it also in industry. Mass manufactures superseded the handicrafts almost to their extinction.

Meanwhile, the American woman had taken her destiny into her own hands. In 1914, she wore long skirts, cotton stockings, whalebone stays, and her "place was in the home." She came out of the war with a declaration of feminine independence that has since taken her to Congress, into the Cabinet and into almost every activity once sacred to man, including the military. In less than a decade she cut the bonds of centuries and destroyed for all time a hundred circumscribing taboos. Only the future historian can assess the full impact of this new freedom upon the family, the community and the nation. It was undoubtedly speeded to fruition by the First World War.

There were other advances—you are as familiar with them as I am. When we, the American people, on the seventh day of December, 1941, found ourselves again at war on a global scale, we were living on a plane that bore but little resemblance to the pre-war period of a quarter century earlier. Our clothes, our food, our homes were different. The character of our work was changed. Our environment and thinking were those of a new age.

Millions of dollars had become hundreds of millions in our national planning. Private industry risked tens of millions on ventures that earlier would have commanded hardly a tenth as much. Hosiery and furniture alike were being made from coal, water and air; dresses from wood, farm fertilizers from the atmosphere, camphor from pine stumps. These and many other achievements of chemical synthesis had altered or made obsolete trade practices and customs as old as the race.

Moreover, the scientist was just getting started. Tens of thousands of new chemical compounds and metallic alloys awaited his full exploration. We were speculating on the eventual conquest of disease. The elimination of poverty, at least as a social problem, was considered a goal that well might be realized. And, as organic chemistry was the source-spring of a major share of the infinitude of changes that inspired such hopes, the influences of the First World War could be very definitely traced here also. Our organic chemical industry in the United States grew directly in answer to needs made violently evident by that war.

It is unnecessary to detail to chemists what has happened in chemistry since 1914. That year, a mere handful of 528 workers made up the nation's total employment in the production of coal-tar chemicals. American-made dyes were not even listed in the official census reports. Our farmers had to buy German potash and Chilean nitrate. Our physicians looked to Europe for important drugs, sutures and optical glass. All science looked to Europe for leadership.

Indeed, it was a simple, almost a scientifically primitive economy in which we Americans then lived. On all the seven seas, America-bound ships heavy with goods and raw materials testified to our dependency on foreign lands. The homes in which we lived differed little from those of our great-grandfathers; the tailors of the Caesars knew the textiles of which we made our clothes; the finishes of our 1914-model horseless carriages dated to ancient Egypt and the building of the Pyramids. All steel rusted. The best rubber tires were worn out after about 3,000 miles of highly uncertain road service.

One shudders at what might be our plight if those were the tires of to-day, or if by some colossal blunder we had failed to establish an organic chemical industry in the United States as a consequence of that other war's bitter lessons.

Thank God, we did establish a chemical industry!

We did more than that. We established a nationwide common consciousness of the power of science in every branch of American industry. Steel, textiles, transportation, foods, oil, in fact, every basic producer came to the turn in the lane where all signposts of progress pointed in one direction—to the research laboratory. We did not get there all at once, but most of us got there long before German hobnailed boots were pounding over the streets of Warsaw.

Expenditures for industrial research in the United States rose from an inconsequential sum yearly in the pre-First-World-War period, to an amount estimated at 300 millions of dollars yearly in the pre-Second-World-War period. The number of research laboratories grew to more than 2,000. Huge sums were spent in expanding technical and scientific schools to meet the demands of our awakened youth. The number of doctorates granted in chemistry alone was multiplied by twenty or thirty times.

I am not implying that all research is chemical or that chemistry provides the one Aladdin's lamp which all scientists must rub. However, let chemistry be ignored and the other lamps become lifeless brass. Perhaps the greatest benefit that has come to America from our chemical awakening is the renascence of all science that has accompanied it. The chemical synthesis of vitamins, for example, to say nothing of hormones and the sulfa drugs, not only is revolutionizing medicine and dietetics but putting these sciences on incomparably higher planes of performance and future promise. And at the opposite extreme of the pendulum's swing, the modern long-range bomber, while a machine, is also a composite chemical triumph expressed in metals, plastics and liquids.

The famous tribute paid Washington—first in peace and first in war—might be paid with equal justice to chemistry. Its record during our other world war is history. Its contributions to the nation's progress during the peaceful years of the '20's and '30's while the organic chemical industry grew to maturity, helped crowd into those years many of the most notable advances that mankind has gained since civilization began.

Now, we are again at war. With the full strength and vigor of its young manhood, the chemical industry is fighting again for an American victory and an American peace. To this task wholly it has dedicated itself wholly.

And we hear questions: Is the fight worthwhile? Will a victorious peace be worth the price that all too evidently we will need to pay for it? After victory—what?

My answer is that now, to-day, even as I speak, the pressures of this war are compressing into the space of months developments that might have taken us a half century to realize if necessity had not forced the pace.

Those pressures are unprecedented. The developments are unprecedented. Give us a victorious peace and the freedom of enterprise it should guarantee, and our progress will be unprecedented!

One does not need to venture into prophecy to sketch the bold lines of what that progress can be. They have already been traced. Already our world of 1940, in which we took such pardonable if mistaken pride, is so distant in the past that it has become an antiquity, as seen through scientific eyes. The inconceivables of two years ago are to-day's realities.

More than a century was consumed in bringing the crude rubber production of the world up to a million tons yearly. The United States alone is now undertaking to accomplish almost as mighty a feat in less than two years, by the manufacture of chemical rubbers from petroleum, alcohol and coal and limestone.

By the end of 1943, our production of aluminum will be at a rate almost seven times greater than was attained in 1939 after fifty years of intensive development. And we will be recovering from brine, sea water and other sources approximately 100 times the amount of magnesium that was produced in 1939, when the magnesium industry in America was 24 years old.

Our aviation industry is establishing facilities for the manufacture in one year of almost double the number of planes it produced throughout the 37 years of its history beginning with the Wright brothers at Kitty Hawk and culminating in the Defense Program. Meanwhile, largely as a result of chemical advances in fuels, plastics and light metals, aircraft engineers are designing trans-oceanic planes capable of flying to Europe and back non-stop, carrying payloads of 20 tons. The projected planes are quadruple the size of the famous "Clipper" planes that pioneered in inaugurating transatlantic commercial air service.

The nation will emerge from this war with capacities for making plastics, synthetic fibers, nitrates, hydrocarbons, high octane gasolines and literally scores of chemical and other raw materials on a scale that only two years ago was beyond our comprehension. The changes that have taken place in our thinking and planning approach the unbelievable when one detaches himself from the present long enough to regain the viewpoint of only the recent past. The first proposal that we build 50,000 war planes left us incredulous. We asked how could we maintain such a vast fleet, even should it be built, or train the men to fly it. Now, the demand for 125,000 war planes in a single year is met with the answer, "Give us the materials and we'll give you the planes, as ordered."

In terms of dollars, the hundreds of millions of that bygone economy stemming from the First World War have suddenly become tens of billions! A million dollars is hardly pin-money in our planning!

Few of us, even among scientists, grasp the technical implications of these enormous projects which are becoming facts with emergency speed. The aluminum-producing capacity being created will furnish in one year metal enough to build thrice the number of passenger cars now operating on all American railroads. To produce this aluminum will require more electricity annually than was consumed in 1940 in 27 of our 48 states. Despite wartime tax schedules and wages, aluminum ingots now cost 25 per cent. less than in 1940, and further economies are forecast through savings in fabricating costs. Aluminum has become a major metal.

Magnesium is about 60 per cent. the weight of aluminum and about one fifth the weight of steel. It sold, in 1915, for $5.00 per pound and until a few years ago was a structural curiosity. To-day, measured by cubic feet, magnesium at 22½ cents a pound is cheaper than aluminum selling at 15 cents a pound, and almost a half ton of it, on the average, is going into every American fighting plane that is built. After the war, the nation's capacity for producing this lightest of all structural metals will be more than double its aluminum output of 1939.

Equally significant is the source of most of the magnesium now employed industrially. For the first time in the history of the world a structural metal is being obtained from the sea by a chemical process. Huge pumps force 300,000,000 gallons of sea water daily through intricate apparatus. At present, magnesium and bromine are the only products precipitated, but ocean water contains traces of every element found on land. Are we opening a new field of chemistry, far more bizarre than any of the imaginings of fictionists? Nobody knows as yet.

In turn, steel is challenging the light metals. Low alloy steels and new modifications of the higher alloy steels, fresh from the laboratory, are bidding for expanding uses in aviation and wherever lightness and strength are requisites. In the steel industry to-day, technicians speak confidently of monster aircraft that will be largely steel. These new alloys are three times the weight of aluminum and almost five times the weight of magnesium, but their tensile strength approximates 190,000 pounds to the square inch. This advantage permits weight to be shed by reducing bulk and eliminating needless supports.

The larger planes grow in the future, say the chemists of steel, the more pronounced will be the trend to the new steel alloys. Less subject to corrosion than plain steel, they are more easily corroded than aluminum, but this problem in protection is said to be on the way to early solution. So watch steel in the mounting competition of light metals.

By all means, too, watch petroleum. Some years ago it was believed that the ultimate in motor fuel would be reached by the creation of a gasoline equivalent in power and anti-knock qualities to pure iso-octane. So superior was iso-octane in these respects that it arbitrarily was given an octane number of 100, which became the standard in evaluating all gasolines. But that was before the Battle of Britain.

The epic fight of the Royal Air Force to save England, raging month upon month against odds, was also a chemists' fight to produce better fuels—fuels that would get planes into the air in a fraction of the former time, that would give greater and yet greater speeds, longer and yet longer ranges. The American chemist was in that fight because he knew more about motor fuels than any other chemist on earth. The Battle of Britain became a testing and development laboratory in which a nation's life was the stake.

The work done in that laboratory, and in our laboratories here at home as an outgrowth of that experience, has precipitated changes in motor fuel technology of which the effects will be reverberating long after the peace. Fuels now can be made that go beyond the octane scale. Their estimated octane numbers are of the order of 110 or 115 and even higher. They deliver one half again as much power as 100 octane fuel. Looking upon the situation that is indicated for after the war, the petroleum chemist now sees all existing motors as out of date, with knowledge of fuels advancing so rapidly that September's motor might be out of date in October.

Let us glance at another phase of petroleum chemistry. A barrel of crude oil contains literally thousands of chemical compounds. The chemist has long been fascinated by the possibility that almost anything under the sun might be created with these chemical building blocks of hydrogen and carbon; that simply by the addition of oxygen and other elements in the proper combination, he might obtain new alcohols, esters, acids, solvents, perfumes, pharmaceuticals and organic synthetics of every type. Catalytic cracking processes and adaptations of them, brought very recently to high stages of performance, are now leading toward this goal and taking petroleum chemistry into a realm once exclusive to coal-tar chemistry.

The largest catalytic cracking capacity in the world is being operated by American oil companies. Soon this capacity will approximate some hundreds of thousands of barrels daily. The significance of this development, well underway in 1939 but expanded to gigantic size by the needs of war, is beyond all present vision. Synthetic rubber, which, as every chemist knows, is not rubber at all but a new material of broader and yet more promising utility, is being produced from butadiene and styrene synthesized from petroleum. Toluene, best known as the basis of one of the most important of modern high explosives but also essential in dye chemistry and many other industries, is now a petroleum product.

With almost equal facility the petroleum chemist can give us ethylene, on the one hand, or benzene on the other, and supply them in quantities measured in hundreds of tons daily. This feat might be likened to drawing wine or water at will from the same cask, or getting beef or pork from the same animal, inasmuch as ethylene and benzene are members of quite different chemical families. Practically, they are employed in such diverse uses as the manufacture of styrene plastics, both the Buna and Thiokol types of synthetic rubbers, drugs, dyes and nylon. Moreover, acetylene can be produced from refinery gases to furnish the principal intermediate in the manufacture of neoprene.

Germany's early mastery and world monopoly of the production of benzene, toluene and other coal-tar crudes and intermediates—her then "secret weapon"—brought her armies almost to victory in the First World War. It was only by prodigious effort and at huge cost that private industry in the United States was able, during and after that war, to win independence in these chemicals, which are part and parcel of the nation's economic life-blood both in peace and war.

To-day, we are doubly independent. Our coal-tar chemical industry is securely established. In addition, the possible output of benzene and toluene from petroleum is many times their peak output from coal tar. Furthermore, in super motor fuels, which may well be this war's deciding weapons, we are excelling the enemy's best in quantity and quality alike. Where Germany stood in 1914 with coal tar, the United States stands to-day with petroleum.

A sign of the swiftness of the pace with which the hurly-burly of change is sweeping the petroleum industry is given by a printed card that now hangs behind the desk of the research director of one of America's greatest oil companies. The card reads: "You don't have to be crazy to work here, but it surely helps!"

May I add that a similar card could be hung with profit in every American office and shop and laboratory and farm barn. We are going to need to be "crazy," as judged by 1940's thinking, to make this upset world right again. We are going to need to be visionary to the point of audacity, in the light of to-day's evident facts, to discharge just a fair share of the post-war opportunities and responsibilities.

Plastics were of sensational promise before Pearl Harbor. The newest and most versatile of plastics will be available after this war on a scale beyond all previous conceptions. The high-pressure synthesis of ammonia, one of the major chemical exploits of the century, will have taken on an industrial status that, in terms of new producing capacity, may be comparable to the discovery of a sixth continent. The amount of fertilizer chemicals that this new capacity will be able to supply farmers for fertilizers will be so large that the basic trends of agriculture might be changed. And these are but one group of a hundred or more products stemming from this high-pressure synthesis, which utilizes air, water and coal as its building blocks.

We will have glass that is unbreakable and glass that will float, wood that won't burn, and laminations of plastics and wood that will compete with the structural metals. Hosiery derived from air, water and coal, a wonder of pre-war days, is but the forerunner of many innovations from the same source, ranging from shoes that contain no leather and window screens that contain no wire, to machinery bearings that contain no metal.

At the moment, we are handicapped by shortages. Scarcity as such is not the reason for them, however. Never has there been so great a plenty as measured by our ability to produce, and that ability grows by the hour. The shortages are the consequences of the diversion of goods to war, and from ourselves to others. To-day, we produce to destroy.

But to-morrow we will produce to build, and we will continue to invent and thus to multiply our possessions. Released by an American victory, the stream of production, compared with its volume in the past, will be as a great river is to one of its tributary creeks. We will have at our command ten, fifty, a hundred times what we had before, chiefly of new materials.

That prospect is as certain as to-morrow's dawn. We need only to make the victory definite. Then, the choice will be ours, either boldly to harness the stream of plenty, or, if we are timid and of myopic or restricted vision, to be embarrassed by the very abundance of means we have created.

If I know the American chemist, his will be the bold course—the course toward a better destiny. And all science will set its course by the same compass!

Possessing the tools, the experience and the knowledge that we now have, we should be unfaithful servants indeed if, upon the coming of peace, we merely buried the talents charged to our keeping. Means will be at hand to perform feats that men have long dreamed of doing.

Fuels and metals and plastics are now ready to complete the revolution in transportation begun early in the century. The automobile manufacturer's slate has been wiped clean for a fresh start, which should result in new cars that will be of incredible efficiency as judged by present standards. Since motor car production stopped, the shiny new models that are now gathering dust in dealers' storerooms have aged, technically, at least two decades. We are now in the 1960's of motor cars, as measured by the old pace of development.

Sealed cooling systems, proved on large-scale by aviation, may end in the post-war car the nuisance of adding water to radiators. Weights may be half what they are, saving from 1,500 to 2,000 pounds of useless load. The power output per cubic inch of piston displacement may double, treble and even quadruple. Fuels may yield 50 miles to the gallon or better.

In the oil industry they are speculating on fuels with octane ratings of 150, or almost twice that of the best automobile gasoline of two years ago. They say gasoline itself may be displaced by a superior petroleum product. They are talking of the practicability of midget automobiles for children.

Instead of rubber alone, there will be a hundred and one rubbers for tires and other uses. In tires, the indicated range is from all natural rubber casings, through varying combinations of natural rubber and synthetics, to the all-synthetics. When one remembers that at present the synthetics are being adapted to tire specifications written for rubber and that the truly synthetic-type tire is yet to be engineered, the prospect is one of progressive changes.

The upsurge of automobile technology will be paralleled in aviation. Designers are thinking in terms of hemisphere-spanning freighters and of passenger air-carriers in fleets numbering hundreds of planes. Transcontinental non-stop air trains of gliders, which would drop off or pick up "coaches" over the principal cities enroute, are no longer figments of an imaginative air man's dream. They are probabilities. Leaders of the industry say that technical considerations no longer limit the size of airplanes that can be built.

Now present are most of the elements essential to the wide popular ownership of planes. Small, highly efficient, almost foolproof craft can be produced at low cost. An enormous plant capacity will be awaiting utilization, tens of thousands will have been trained in flying, and the post-war land will be dotted with air fields. Only within very large cities will we be deficient in field facilities, and there too the signs of impending change are clear.

As never before we are conscious of the need for cheaper and better housing. Crowded city slums stand as an ugly reproach to our lack of initiative and vision in home-building. The slums should be emptied after the war by the combination of forces that is being arrayed against them; and once empty, airports might well take over those bleak blocks.

Lower-cost motor cars, which will draw still more thousands of city dwellers to suburbs and country, represent one of the forces that is going to help empty the slum. Public opinion, shaped by a more enlightened conception of the basic needs of healthful living, is another. The third will be the better housing that so long has been awaited. It is coming.

It is coming because in no better way will we be able to put into worthwhile service the abundance of materials suitable for building all kinds of things. The very prospect of this plenty, on the one hand, and the all-too glaring lack of inexpensive modern housing on the other, have started men thinking who have given but little attention to this problem in the past. The engineer, the chemist, the production expert and the development departments of some of our largest companies are alert to an opportunity, and will become productively interested the moment the war releases their services.

Thus far, only general objectives have taken form. They are for homes costing in the order of $500 to $800 per room. Prefabricated sections, which can be easily handled by two men, will permit flexibility in architectural designs. New insulating materials, making possible light walls that will be several times as efficient as heavy masonry ones, will allow the use of revolutionary structural principles.

Plywood, plastics, rustless steels, non-ferrous alloys, various types of composition board, fire-resistant woods, ceramics and synthetic finishes of lasting durability will be employed in profusion. For example, stainless steel is indicated as a common roofing material of the future. It will last as long as the house and require no maintenance. Lighting will be automatic, governed by electric "eyes" sensitive to outside variations in the daylight. Air-conditioning units will filter out the pollens of hay fever and asthma.

The movement for better homes marches side by side with that to educate the public in better diet. I venture to say that more popular training in the chemistry of food and its digestion has been crammed into the past two years than was given in the preceding two centuries. The knowledge of food's real values to the body that is flowing from sound scientific studies of broad scope is accumulating means of incalculable power to prolong life.

Science, too, follows the flag. This war, spreading over all zones and into all climates, presents a challenge to American medicine that is without precedent. That challenge is being met by a mobilization of all the sciences that likewise is without precedent in man's fight against disease.

The weapons being employed are unique to our time. They include the ultra-centrifuge, in which there is a peripheral speed of the rotating disk comparable to the velocity of a rifle bullet. Still another is the electron microscope, the largest of which now being built at Stanford University is expected to magnify 150,000 times. Mention should also be made of the giant cyclotrons, sometimes referred to as "atom smashers," with which it is possible to transform certain ordinary elements into wholly different elements possessing radioactivity. In addition, synthetic organic chemistry is making an ever-increasing and significant contribution to remedial medicine.

The single objective of this mobilization of science against disease is to prevent suffering and save human lives, irrespective of color or creed. The results which are certain to accrue may ultimately outweigh by many times even the staggering losses of the world-wide conflagration.

Taking an over-all look at the current press of events, one notes that, perhaps, the most important of all the signs pointing to better days is the fact that the emergency of war has dissipated innumerable inertias, each an interruptant of progress. Normally, the new is received with suspicion. People cling to the old and tried, are loath to experiment, slow to change. With peace, however, the usual slow developmental process will have been reversed. War shortages of conventional materials will have resulted in eager trials of every new material science and industry could offer. And countless of the "substitutes" will have proved their superiority. Thus, an experience with and an acceptance of the new will have been gained that ordinarily might have taken many years to achieve.

No doubt, some will become alarmed over the possible displacement of old materials and old industries. Changes of a drastic nature are inevitable, but they seldom result in the hardships that the timid predict. More wrought iron is being used in the world to-day than when wrought iron occupied the province now held by steel. The horse and buggy vanished, but the buggy manufacturers who were alert rose to new affluence with the motor car. The coal-tar colors ended the centuries-long reign of natural dyestuffs, but the dyestuffs industry has grown to many times its former size, and spawned a dozen new industries in addition.

Progress means going forward. It must build more than is destroyed or it does not merit its name. Not only should it be of a tangible, material character, but it should contain the elements of greater spiritual growth for the individual and community alike. It should lift the chin and put a new spring into humanity's step.

The President of the United States has said that we are fighting for four freedoms—freedom from want and freedom from fear, freedom of speech and freedom of religion. A former President of the United States, Herbert Hoover, has added that a fifth freedom is also mandatory in the victory—freedom of economic enterprise.

The scientist accepts these freedoms unreservedly. To their attainment he is glad to give life itself, if that is the price. But the scientist is fighting just as wholesouledly for five hundred, yes, for five thousand other freedoms.

The freedom to work, to expand the intellect, to worry through with a theory until it is validated or disproved; the freedom to banish the wasteful and enthrone the efficient; the freedom to improve, if he can, everything that exists under the sun, and beyond that to create things upon which the sun has never before shone—these, too, are freedoms for which the true scientist fights.

As a man, he fights for the freedom to better his lot and for the rewards that ability merits. As an incurable altruist—and the true scientist is one—he fights even harder for the freedom to better the lot of mankind, that each generation may rise to heights loftier than any won by its predecessor.

A soldier of peace, he fights for the freedom to mold a better destiny, both for the individual and for the race.

These freedoms have always been America's. We fight to keep them America's. Let our swords be mighty, and mighty indeed will be our plowshares.

SCIENTIFIC EVENTS

RECENT DEATHS

Dr. Thomas Milton Putnam, professor of mathematics at the University of California, died on September 22 at the age of sixty-seven years.

Dr. Homer Clyde Snook, consulting engineer of Summit, N. J., known for his work on electronics, died on September 22 at the age of sixty-four years.

Dr. Edward Fawcett, since 1934 emeritus professor of anatomy, previously from 1909 to 1934 dean of the faculty of medicine at the University of Bristol, died on September 22 at the age of seventy-five years.

Dr. David Waterston, since 1914 Bute professor of anatomy at St. Andrews University, died on September 4 at the age of seventy-one years.

TECHNOCHEMICAL LECTURES, 1942–1943, OF THE MELLON INSTITUTE

A series of lectures on recent advances and current trends in the American chemical industry will be presented by technologic specialists of Mellon Institute of Industrial Research during 1942–1943. These discourses, which will be delivered on alternate Wednesdays, in the fourth period (11:30 A.M.–12:30 P.M.), throughout both semesters, in the auditorium of the institute, will be open to all students in the profes-