sive use of symbolic representations and abstract categorizations to insulate administrators from contact with reality. This factor can be decreased in importance by constantly emphasizing the abstract nature of symbols and by stressing the importance of relating symbols to physical operations or things. The second is the tendency to misunderstand the relationship of the leader to the group and to expect operations to be "directed" from the top because of this misunderstanding. This factor can be minimized by achieving a clear understanding of the operational meaning of leadership, whereby the functions of leaders are seen to become increasingly abstract in progression from the operational level, through the coordination level, up to the inspirational level.

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The American Philosophical Society:

Abstracts of Papers Presented at 1947 Annual General Meeting

Clinical Experience With Hemoglobin-Saline Solutions

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In collaboration with C. Martin Rhode and Mrs. Joye J. Jennings, a method has been devised for the preparation of hemoglobin-saline solutions suitable for intravenous injections in clinical cases. Injections have been made into 14 patients, 7 of whom have received more than one.

In the multiply-injected group there were five cases of secondary anemia due to hemorrhage or infection. Of these, three patients showed definite improvement after treatment, exhibiting reticulocytosis and an increase of blood hemoglobin and hematocrit values. In a fourth patient the effect of the injections could not be evaluated, since hemorrhage continued. In none of these four cases did oliguria develop. In a fifth patient the secondary anemia developed from a severe hemorrhage post partum, which led to a state of shock. Administration of hemoglobin-saline (2,300 cc. in five injections) restored blood pressure to normal. The patient appeared to be recovering, but developed oliguria and died on the ninth day. In one case of lymphatic leukemia and one of agnogenic myeloid metaplasia no improvement was observed after repeated injections. Urine flow remained normal.

In the singly-injected group no beneficial effects were observed. One patient showed oliguria, with recovery. Another patient died two hours after injection, without pyrogenic reaction or other clinical signs.

Although definite oliguria was observed in only two cases in the series, indications of renal impairment (by NPN or clearance values) were observed in three other cases, two of the multiply-injected group and one of the singly-injected group. In the last-mentioned patient, after injection of 200 cc. of hemoglobin-saline, both glomerular filtration rate, as measured by mannitol clearance, and renal plasma flow and Tm, as measured by PAH clearance, were reduced to about one-third of the original values, with later recovery to normal. Liver function tests remained normal in the three cases tested.

In most cases the solutions exert a pressor effect which endures for several hours. The rise in blood pressure is accompanied by bradycardia.

In some cases injections up to a volume of 500 cc. (= 50–60 grams hemoglobin) have given no rise in temperature or other reactions. In other cases usually mild, but occasionally severe, pyrogenic reactions, complicated by other reactions, have been observed.

No evidence of anaphylactic reactions caused by hemoglobin was observed in any case.

The solutions do not agglutinate cells of the four main blood groups.

Methemoglobin does not accumulate in the plasma, even after large injections of these solutions.

In 6 patients the average amount of hemoglobin which appeared in the urine was 18 per cent of that injected.

New Effects in Superconductivity

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The Johns Hopkins University

With the aid of a grant from the American Philosophical Society, an investigation was undertaken in 1938 to survey the possibilities of using superconducting metals as electrical thermometers for measuring very small amounts of thermal energy. During the recent war a need arose for fast-acting devices for measuring small pulses of infrared radiation, and it was found that bolometers capable of measuring as little as 10^{-6} ergs in 10^{-8} seconds could be made of superconducting alloys. This corresponded to temperature changes of the order of 10^{-7} degrees. It appeared that the infrared was absorbed directly in the superconductor with a coefficient of about 50 per cent, contrary to the expectation that a superconductor might be a perfect reflector.

The sensitivity of such bolometers was limited by the inherent thermal fluctuations in the superconductor. By observing the fluctuations in strips of columbium nitride, it was found that just above the superconducting transition the random fluctuation had a peak-to-peak average of 0.01 μv

when a current of 1 Ma. was passing through the metal. When the temperature was lowered into the superconducting transition zone, the random fluctuation, or "noise," increased in amplitude about threefold. Studies with currents ranging up to 5 Ma. showed that noise increased roughly proportionately to the current. Observations with zero current showed that the noise in the normal state still increased by a factor of several fold when the metal passed through the transition, decreasing again when the metal was completely superconducting. The noise level is thus an indication of the state of the metallic electrons even when zero current is passing.

Exploring the phenomenon further with the aid of a loud-speaker, it was found that the character of the noise as perceived by the ear changed sharply in the transition, so that one could thus distinguish the passage of the metallic electrons from one state to another. While carrying on these experiments it was discovered that, in certain narrow regions of temperature, the voices from local commercial broadcast programs were heard on the loud-speaker. To explore this effect further, radio-frequency signals were generated in the laboratory in the range of 0.1–30 Mc. In several frequency bands in this range the reception was of a much higher intensity than in other ranges. Holding frequency constant and varying temperature, one finds again a series of "temperature" bands in which detection takes place, starting in the middle of the superconducting transition and extending considerably below it. The number of bands increases with increasing current. The position of the first band on the temperature scale appears to be independent of radio frequency over the range of study. The height of the first band goes through a continuous increase from zero current to 0.4 Ma., passing to a maximum and then decreasing.

Since the bands which appear with heavier current are found in a region removed over half a degree from the transition, there seems to be evidence for sharply temperature-sensitive phenomena of a new kind associated with superconductivity in ranges where hitherto only temperature-insensitive phenomena have been observed.

Biochemical Mechanism of Cellular Oxidation

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The human body at rest uses about the same amount of energy as a 100-watt electric light bulb. Like the bulb, the body obtains this energy by a process which involves the flow of an electric current. In the living cell, electrons flow from the foodstuffs we ingest to oxygen, thus reducing the oxygen to form water. The "filament" of the cell over which these electrons flow is not of uniform composition as it is in a light bulb. The electrons in the cell are passed along over a chain of compounds composed of iron-containing proteins, the cytochromes, and vitamin-containing units named coenzymes. The over-all process involves a potential change of about 1.17v and a total flow of current in all the body cells which amounts to about 76 amp. The process occurs, however, in a stepwise fashion which involves five or six successive transfers of electrons between the various components comprising the cellular "filament" or oxidative chain. Each pair of components may thus be looked upon as forming a battery, the pairs being connected in series. A drop in voltage occurs with the interaction of each pair in this series; its magnitude may be estimated from our knowledge of the oxidation-reduction potentials of each of the systems involved. How the energy released at each of these interactions is utilized by the cell is not exactly known. A good portion of it, however, seems to be converted into high-energy phosphate bonds which, in turn, directly supply the driving force for many of the various physiological processes which constitute life.

The Nürnberg Trial

The Honorable Francis Biddle
Former Attorney General of the United States

The Nürnberg trial was a military proceeding, and therefore representatives of the victorious powers only sat on the Tribunal. The defendants could have been given "political" treatment (punishment without trial), but this would have imitated the Nazi methods for which they were being called to account.

The principles of both the Charter, to which 23 nations adhered, and the Judgment were approved by the General Assembly of the United Nations, which has begun, very tentatively, the formulation of an International Criminal Code based on these principles.

The doctrine of *nullum crimen sine lege* is not a limitation of sovereignty, but a general principle of justice. The question was therefore not whether it was lawful, but whether it was just, to try Goering and his associates on the charge of launching aggressive war. That aggressive war was considered a crime before the Pact of Paris was adopted was generally recognized. International law is not the product of an international legislature but gradually develops in the customs of states.

Another important principle of international law recognized by the Judgment was its application to individuals who could not shield themselves by the doctrine of state sovereignty when the state had moved outside its competence.

The Tribunal narrowed the broad theory of conspiracy to wage aggressive war advanced by the Prosecution and found only 11 defendants guilty on this count. The Judgment approached with great caution the Prosecution's request that the Tribunal declare criminal certain named organizations and, as to those three which it did declare to be criminal, included in the definition of membership only persons who joined voluntarily and knew of the criminal purpose.

The Soviet dissent was not based on a disagreement as to any general principle adopted by the majority, but simply on a different interpretation of the facts with respect to the three acquittals, and the three organizations not declared to be guilty.

The West Coast Corridor: A Chapter in the Northward Expansion of Mexico

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Ever since the Spanish conquest in the 16th Century a vase area in northern Mexico open for colonization has been a spur to the initiative of people from the more crowded regions farther south. Turner wrote a brilliant monograph on the sig-

nificance of the frontier in the development of society in English North America. It would be interesting to consider to what extent his thesis is applicable to the history of Mexico.

The place in which European and native have had longest and most vital contacts is in the central and southern area, where the native peoples had achieved a high civilization. Here, after the conquest, the first new Spain and first new Mexico, with vital elements from each of the parent stocks, were formed. Here Spanish law and native custom first operated side by side on the same terrain.

Meanwhile, a new chapter in Mexican history was begun. The area of Spanish settlement was extended northward into regions occupied by natives representing a relatively primitive society—peoples whom the Spaniards called *Chichimecos*. Here the historical process after the conquest was fundamentally different from that further south.

Beginning north of Vera Cruz on the Gulf of Mexico, the line between these two cultures ran generally westward, passing north of Mexico City and Guadalajara, to Tepic, and thence north to Culicán. South of this line lived the sedentary, and north of it the nonsedentary, peoples.

Spanish colonization north of the line proceeded in three columns, determined by two great mountain chains, the Sierra Madre Oriental and the Sierra Madre Occidental, natural barriers which divide the northern expanse into distinct geographical provinces: the East Coast Corridor, the Central Plateau, and the West Coast Corridor. The Sierra Madre Occidental, so rugged that for nearly 1,000 miles north of Tepic it has seldom or never yet been crossed by a wheel track, spectacularly isolates the West Coast Corridor. Nevertheless, the salient has had great significance.

The Diffusion and Influence of Locke's *Essay Concerning Human Understanding* in France Before Voltaire's *Lettres Philosophiques*

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Contrary to Voltaire's claim, his *Lettres philosophiques* (1734) did not initiate in France the diffusion and influence of Locke's *Essay concerning human understanding*.

Before 1700 this diffusion begins with articles in the French periodicals published in Holland: a long outline of the *Essay*, two years before its publication, in Leclerc's *Bibliothèque universelle*; reviews of the first four English editions of the book; and references to the discussion of the *Essay* in England, particularly to the controversy between Locke and Stillingfleet. In 1700 Coste's French translation of the *Essay* quickens the diffusion of Locke's thought on the Continent. In the following years attention is drawn to the *Essay* by various publications: French translations of Locke's *Posthumous works* and of Wynne's *Abridgement* of the *Essay*; frequent references to Locke in the widely read translation of the *Spectator*; Desmaizeaux' *Recueil philosophique*, containing comments of Leibniz on the first two books of the *Essay*; and a long article on Locke by Nicéron in his *Mémoires*. The interest in the *Essay* is evidenced by many references of French writers: Locke's rejection of innate ideas is criticized by d'Aguesseau and Polignac, but approved by Bayle, Fréret, Boulainvilliers, Lévesque de Burigny; Locke's statements on thinking matter are questioned by Bayle and by the Jesuit editors of the *Mémoires de Trévoux*.

The influence of the *Essay* is particularly significant in the case of three French writers: DuBos, in his *Réflexions critiques* (1719), applies the empirical and sensualistic method of Locke to the field of aesthetics; in his *Théorie des sentiments agréables* (1729), Lévesque de Pouilly develops the element of hedonism implied in Locke's analysis of pleasure; in his *Traité des premières verités* (1724), Buffier mitigates the rationalistic tendencies of Locke in religious matters, but closely follows him in the matter of inneism and in the analysis of simple or complex ideas.

Do Judges Make or Discover Law?

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Two English judges started this controversy in 1345: "Law is the will of the Justices." "No, law is that which is right." Blackstone says a judge must not "pronounce a new law, but . . . expound the old one." Holmes ridicules Blackstone. "The common law is not a brooding omnipresence in the sky, but the articulate voice of some sovereign. . . . "

The controversy over whether judges make case-law as legislators make statutes affects at least five practical questions: (1) Is a transaction which is valid or lawful by a previous decision rendered otherwise by a subsequent decision overruling the first decision? (2) Congress orders a Federal judge to decide a case between citizens of different states, involving no Federal issue, according to "the laws" of the state. May he disregard a state court decision squarely in point and find what would be a better nation-wide rule in precedents elsewhere? (3) Is a state decision holding criminal an act which was not criminal by cases before its commission an "ex post facto law"? (4) If, in an action on a contract, a state court grants a defense unrecognized by the state's case-law before the contract was made, is this decision a "law impairing the Obligation of Contracts"? (5) Is a state decision enunciating an arbitrary unreasonable rule of substantive law a deprivation of life, liberty, or property by the state, violating the 14th Amendment?

Detailed examination of cases in these five situations shows some supporting Blackstone's theory of what judges do and some Holmes's. Reasons of practical policy might justify the results apart from choice of either theory.

Probably courts will never adopt either theory wholeheartedly. Holmes's "sovereign" is unreal like Blackstone's impersonal common law. Yet each theory contains some truth which cannot be rejected. A possible compromise is: Judges make law out of what they discover. Law is the will of the Justices trying to do that which is right.

The Place of Science in the Program of UNESCO

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The first important activities of UNESCO must necessarily be in fields which are welcomed by all nations. They should also lead demonstrably toward a peaceful adjustment of world society. These conditions are most fully realized in

science and its applications. UNESCO has accordingly planned an active program in science.

Where two nations have ideological differences that bring danger of war, many types of interchange of ideas are unwelcome or subject to suspicion. This applies in particular to the use of radio and the press, to the control of basic education, and to religious and philosophical thought. No such difficulty exists in the field of science. Since, for securing the peace of the world, it is precisely between nations with such differences that it becomes most important to obtain understanding and cooperation, scientific education and research become leading aspects of UNESCO's task.

Its science program includes: (a) rehabilitation of science education in devastated countries; (b) international exchange and conferences of scientists and technologists; and (c) promotion of research programs of international concern.

The rehabilitation of scientific activities will be undertaken by surveying the actual needs and by stimulating the creation of agencies to collect and distribute needed equipment and books. Also, enabling scientists to go for a limited period from exhausted countries to those where scientific study is active will serve to keep alive the scientific thought of these countries while their own institutions are being re-established.

Typical of the active research that will be sponsored by UNESCO is that of the effects of various types of prolonged malnutrition on the large populations of India and China. A related program is the study of the conditions for satisfactory living in the equatorial forest zone. As a concrete beginning, UNESCO will coordinate the researches by specialists from many nations on the resources and conditions of life.

Medical Treasures in the Library of the American Philosophical Society

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Medicine has always been considered by the American Philosophical Society to be one of the cultural-scientific branches of learning worthy of its attention. When the Society was founded in the 18th Century, men of general learning included medicine among their interests. Franklin, for example, had a number of medical volumes in his personal library. At the same time biology, zoology, and chemistry were professionally cultivated largely by the physicians. Not only were leading doctors elected to the Society, but many famous British and European physicians were honorary members. These men often contributed their works. The early librarians, Vaughan and Ord, purchased medical books. In later years there have always been medical members, and the presidential chair has several times been filled by physicians. The Society's library reflects this tradition, and, thus, although its medical books by no means form a systematic collection, they include many distinguished items, including rare American pamphlets by John Tennant (1740) and Benjamin Waterhouse (1800); works donated by eminent foreign members, including Jenner, Erasmus, Darwin, Lettsom, and Franklin's young friend, William Hewson; the Edinburgh dissertation of John Morgan, founder of the Medical School of the University of Pennsylvania; medical works of the early republic, such as those by Matthew Carey on the yellow fever of 1793 and by Currie on the climates of the U. S.; books by Benjamin Rush, and the *Anatomy* of Caspar Wistar; and such medical classics as Johnson's translation of Paré's works (1678); the anatomical plates of Eustachius (2nd ed., 1744) with the autograph of Abraham Chovet, Philadelphia's first anatomist; Withering on Foxglove (1785); and Cruikshank on the lymphatic vessels (1786).

The American Idea of Progress: 1750–1800

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The idea of progress was Americanized during the latter part of the colonial period and became more popular and more widely disseminated between 1750 and 1800. The American idea of progress had a relation to the Christian dream of the millennium (Samuel Sewall), to the increasing secularization of thought (Nathaniel Ames), to a genetic philosophy of history (William Douglass), to the development of science (American Philosophical Society), and to the rationale colonization. That Georgia is "capable of great improvements" was a main argument used by the trustees of that colony in 1733.

Leading thinkers of the American Revolution and early republic—Benjamin Franklin, Thomas Jefferson, George Washington, Tom Paine, and others—entertained great faith in the political progress of the United States. Optimistic affirmation, a firm belief in the new nation's potentialities of development, provided a dynamic to motivate American civilization from the time of its inception.

Richard Henry Lee of Virginia, John Rodgers of New York, John Witherspoon of New Jersey, James Wilson of Pennsylvania, David Ramsay of South Carolina, Samuel E. McCorkle of North Carolina, Joel Barlow of Connecticut, and John Lathrop and Francis Blake of Massachusetts are representative writers cited to illustrate the pervasiveness of the idea of progress (especially political progress) in the United States before 1800. The American awareness of the idea of degeneration and of the cyclical theory of history is also mentioned briefly.

Contributions of Physiology to Problems of Industry

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Industry has profited greatly from physiological research in the past, and yet the possibilities of applying this science to industrial problems are not yet fully appreciated. The failure of labor and management to make full use of physiology depends in part on the methods of teaching this science. It is generally regarded as a hand maiden of medicine, thought and research being concerned largely with the physiology of the diseased man rather than with that of man in his everyday life. Hence, it is natural for medical men in industry to devote much of their energy to care of traumatic injuries, to safeguarding the interests of the company in so far as insurance is concerned, and to supervising toxicologists and hygienists who are responsible for control of industrial hazards.

The fields in which physiology, as applied to man at work, is making itself felt in recent years are nutrition, energy ex-

change (as related to fatigue, rest periods, and hours of work), temperature regulation (e.g. the roles of salt and water in reducing heat casualties), and various aspects of the physical environment, including particularly illumination, color, noise, and vibration. Research in these fields could be applied by both labor and management to their mutual satisfaction.

Research in human physiology deserves the support of both industry and labor. In war and in peace the expenditures for physiological research in this country have been trifling when considered in the light of the gains in the physical fitness and productivity of labor. The following questions require long-range research for even an approximate solution: To what extent does the health and well-being of workers depend on the physical environment? What is the relation between physical fitness, the quantity of food eaten, the distribution of meals, and the amount of exercise? Are physical standards of our population lowered by wearing poorly fitted and designed shoes, particularly during childhood and youth? Are there potential hazards in luxus diets that are unnecessarily rich in vitamins, sugar, dairy products, or calories?

Benjamin Franklin, The American Philosophical Society, and the Russian Academy of Science

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Very little is known about American-Russian cultural relations in the 18th Century. Their beginning is linked with the name of Benjamin Franklin and the American Philosophical Society.

Franklin's name was first mentioned in the Russian press in 1752, and the "Minutes" of the American Philosophical Society mentioned the Russian Academy for the first time in 1771; but the fact that Franklin was in direct contact with Russian academicians was ignored until recently, when Dr. Dvoichenko-Markoff discovered documents containing irrefutable data, bearing witness of the continued relationship between Franklin and several Russian scholars. These documents establish the probability of Franklin's contact with the Russian academicians, Epinus and Braun—the first scientific connection between America and Russia.

In 1773 and 1777, respectively, Franklin became personally acquainted with two Russian scholars, Baron de Klingstedt and Prince D. Gallitzin. Baron Klingstedt became the first Russian member of the American Philosophical Society.

On the basis of letters discovered in the Archives of the American Philosophical Society, Dr. Dvoichenko-Markoff established the year 1781 as the date of Franklin's personal acquaintance with Princess Dashkaw, president of the Russian Academy and the second Russian member elected by the American Philosophical Society, in 1789, on Franklin's recommendation; the same year Franklin was elected as the first American member of the Russian Academy, on Princess Dashkaw's recommendation.

The impetus given by Franklin and Princess Dashkaw to Russian-American cultural relations continued to bear fruit even after their death, and the American Philosophical Society remained in close and constant contact with Russian scientific societies and with individual representatives of the cultural elite of Russia.

Reinterpretation of the Glacial History of Iowa Based on Studies in Greenland

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Glaciers which, in Pleistocene time, blanketed northern North America left deposits which heretofore have been interpreted as though the glaciers which laid them down had been enlarged examples of the small Swiss glaciers, those best known when the theory was first promulgated a century ago.

Glaciers of continental dimensions which must resemble the Pleistocene examples are, however, today over Greenland and Antarctica. Studies carried out by expeditions from the University of Michigan on and about Greenland glacier in the years between 1926 and 1932 show them to be essentially different in their nature and in their deposits from the Alpine ones. This newly acquired knowledge has made it necessary to reinterpret the Pleistocene glacial history, with results quite different from those which have heretofore been accepted. Both the number of successive glaciations and the areas which each covered have had to be altered materially.

The present study, first undertaken in 1943 with aid of a grant from the Society, treats especially of glaciation within and around the state of Iowa.

Zebulon Montgomery Pike and the Wilkinson-Burr Conspiracy

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For more than a century and a quarter American historians have been intrigued with the southwestern expedition of Zebulon Montgomery Pike and its relation to the famous Wilkinson-Burr conspiracy. Lt. Pike was ordered to explore the sources of the Arkansas and Red Rivers by Gen. James Wilkinson, military governor of Upper Louisiana in 1806. The United States had recently purchased Louisiana, and Jefferson had sent Lewis and Clark into the far Northwest on a scientific and exploratory expedition. Pike's journey into the Southwest, ostensibly for the same purpose, was ordered by Gen. Wilkinson and not by Congress or the Executive.

When Pike's party was discovered by the Spaniards encamped on the west bank of the Rio Grande, the men were arrested and taken to Chihuahua. The Spaniards eventually released them, and Pike returned to the United States in July 1807, only to learn that his friend and promoter was involved in some way with the Burr conspiracy and at that time was a star witness against Burr at the trial in Richmond, Virginia.

Wilkinson's reputation suffered to such a degree that he was never able to remove the cloud of suspicion surrounding his motives in the Southwest and his relationship with Aaron Burr. Pike was suspected of collaboration with the General by allowing himself to be captured by the Spaniards in order that he might better obtain information that would be helpful to the schemes of Burr and Wilkinson. There is sufficient proof against Wilkinson to convict him of treason, but Pike can only be convicted upon circumstantial evidence.

Many people then and now believe that the young explorer knew more about the affair than he pretended. Several ques-

tions with regard to his conduct are yet to be answered, but a careful examination of all of the available materials leads one to the conclusion that his greatest fault was his lifelong friendship for Gen. Wilkinson. Insufficient proof exists that he was knowingly connected with the Wilkinson-Burr episode. After 19 years of creditable service in the U. S. Army, Pike was promoted to the rank of brigadier general in 1813, only to lose his life a short time later in the siege of York. He was 34 years of age at the time of his death.

High-Altitude Research With V-2 Rockets

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The high-altitude research program utilizing V-2 rockets, which has been going on at White Sands Proving Ground in New Mexico during the past year, is discussed in some detail. The method of recovering data including telemetering, parachute, and physical recovery is reviewed. Data obtained to date in the fields of cosmic rays, solar spectra, pressure and temperature of the upper atmosphere, and ionosphere measurements are emphasized.

The experiments in cosmic rays have verified the presence of a large, hard component in the primary radiation. In addition, a component has been found at high altitudes, consisting of a soft radiation presumably due to upward-moving particles. The possible presence of other components in the primary radiation is also discussed.

Solar spectra have been obtained on two different V-2 flights, both of which extended the solar spectrum down to about 2,200 A. The significance of these data and their bearing on such things as the black body theory of the sun, the ozone content of the atmosphere, etc. have been analyzed in part.

Pressure measurements have been taken up to about 100 kil. These measurements have involved mainly the use of bellows, Pirani, Philips, and ionization gauges. Ambient temperatures of the atmosphere at various altitudes have been obtained mainly from pressure data. Skin temperatures at various points on the rocket have been measured throughout most of the V-2 trajectory.

Measurements of ion density in the E layer of the ionosphere were made by means of a phase beat method. Two harmonically related frequencies, one near critical, are radiated from the missile to a ground station. The beat between two received frequencies on the ground is a measure of the ion density at the transmission point. The significance of the results so far obtained are discussed.

The Genesis and Reception of Jefferson's *"Notes on Virginia"*

Marie Kimball

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Early in 1781 Jefferson received from the Marquis de Barbé-Marbois, secretary of the French legation, a paper containing "sundry inquiries into the present state of Virginia." After his retirement as governor in June, Jefferson set about ordering the loose memoranda he had been collecting for years and preparing answers to M. Marbois' questions. The result was not a series of hasty observations but a learned treatise on his country. Everything that could be said or known about Virginia in the last quarter of the 18th Century is embraced in this slender but compact little volume.

On his election to the Council of the Philosophical Society this same year, Jefferson wrote Charles Thomson that "in framing answers to some queries Mr. Marbois sent me, it occurred to me that some of the subjects which I had then occasion to take up might, if more fully handled, be a proper tribute to the Philosophical Society." Thomson replied that he was persuaded that Jefferson's reflections "would be a very acceptable present to the Society." "This country affords to philosophic view an extensive, rich and unexplored field," he writes. "The mind of man is just awakening from a long stupor of many ages . . . and I congratulate posterity on the advantage they may derive from your philosophical researches." Thomson's subsequent comments on the *Notes* were ultimately printed as an appendix.

The demand among his friends to see the *Notes* was such that Jefferson decided to print a few copies. Finding this impossible in Philadelphia, he carried them with him to France, and the first printing was completed in May, 1785. A threatened pirated edition in French led to a translation by the learned Abbé Morellet. He proposed a map, which Jefferson prepared, and the French edition appeared in 1787. An English one, sponsored by Jefferson and published by John Stockdale, came out in the same year, as did an unauthorized one in America.

The *Notes* met with a warm reception, but contemporary published comment is not abundant. The *Monthly Review* of London (1788, Vol. 77) contained a somewhat condescending notice. A careful reading of the leading French scientific journals of the time has failed to reveal any notice of the work. The *Mercure the France*, however, the leading periodical of the French capital, in its issue of June 2, 1787 and the following one, devotes 23 pages to a review, which has not hitherto been brought into conjunction with the *Notes*.

Are the Jews a State or Are They a Religion?

Lessing J. Rosenwald

Chairman of the Trustees, Rosenwald Fund

The struggle in which the world finds itself engaged—that between the forces making for a "one world" concept and the forces of fragmentization in terms of racial, religious, and nationalist divisions—is reflected among Jews. In the near future, a choice will have to be made by Jews themselves and by the world at large with regard to what the status of the Jew is to be. The choice is between a universal concept of Jews as free and equal citizens throughout the world, adhering to an ancient religion, and that of Jews as a nation centered in Palestine.

The basic elements in that choice go back to the days of destruction of the Hebrew Commonwealth in Palestine. During the centuries that Jews were confined to the ghettos of Europe they had no choice. Only the gradual removal of their disabilities following the French and American revolutions and the expanding concept of democratic ideas gave the Jews freedom of action on that choice.

For a long time there was every indication that the choice would be in behalf of the universalist concept. Two forces, however, emerged to reverse this trend. One was the development of a different concept of society: the racialist, tribalist, blood-and-soil concept that developed in Germany. The other

was the continuance of anti-Semitism, which led to a sense of defeat and hopelessness among Jews.

The Palestine problem is a culminating manifestation of the conflict. It has been complicated by the agonizing experience of the Jews of Europe: by their savage destruction under the Nazis and the sorrowful existence of Jews among the Displaced Persons. The conflict, however, remains based upon two divergent concepts, and its resolution must be made primarily by Jews themselves. The non-Jewish world can contribute to a wise choice by Jews by a thorough understanding of the real issues, by helping in the solution of the Displaced Persons problem, and by fighting the illiberalism of anti-Semitism.

The Future Industrial Position of Oxygen

Earl P. Stevenson

President, Arthur D. Little, Inc.

Oxygen can lay claim to being the most useful as well as the most abundant of the chemical elements. The ingenuity of the chemist and the engineer has made oxygen available during the past 50 years in forms other than that directly supplied by nature, and there have been recent significant advances in this art which will open up other man-made uses. Air and water are the major industrial chemicals; no element rivals oxygen in industrial importance.

With the application of rectification to liquid air by Linde in 1902, oxygen of high purity became available and, in this form, has assumed increasing importance in industry in the intervening years. Tonnage uses in the process industries have not developed, however, for highly concentrated oxygen (99–99.5 per cent) because of the high investment and operating costs involved in the liquefaction and separation of air. Yet the theoretical minimum work requirement for separating oxygen from the air is insignificant, being only .032 hp/pound of oxygen/hour. The difference between theory and practice has been a challenge to which the engineer until recently has not been too responsive. Development work undertaken during the war advanced this art, and several very important industrial applications for tonnage oxygen are now in immediate prospect. These will involve the construction of very large separating plants. Single plants in some of these new applications will equal in producing capacity the total of the prewar production of oxygen in this country. These applications are among the most exciting new developments in industry with both evolutionary and revolutionary portent. At the same time there is a steady growth in the general industrial uses of oxygen.

Uses of the Separated Stable Isotopes of Oxygen

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Oxygen exists in three stable isotopic forms of masses 16, 17, and 18 with natural abundance of 99.76, 0.04, and 0.20 per cent, respectively. Only the isotope of heaviest mass (18) is thus far significant for isotopic studies. Oxygen is one of the most important and frequent elements in inorganic, organic, and biological compounds. The heavy isotope can be used to test the stability of oxygen bonding with other elements in inorganic compounds containing such oxyacids as carbonate, sulfate, sulfite, phosphate, phosphite, etc. Heavy oxygen can be used as an important tool to study the activity of catalysts in oxidation processes. In organic chemistry the heavy oxygen isotope can be used to test the relative strengths of the two bonds which oxygen makes with any two other atoms or groups, as generalized by the formula R—O—R′. In this way, old controversies concerning the mechanism of formation and hydrolysis of esters have been solved. As an important constitutent of sugars, carbohydrates, amino acids, and proteins, oxygen, in its heavy species, can be used to test hypotheses of biological importance. An illustration of this use is the investigation of photosynthesis by plant life, from which it is concluded that the oxygen in the carbon dioxide is built up into the plant structure, whereas the oxygen in the water consumed is given off by the plant as elementary oxygen. In the whole field of growth generally, the use of heavy oxygen will play an increasingly larger role.

Hitherto, the amounts of heavy oxygen available have been pitifully small and the difficulties of research correspondingly magnified. The techniques of isotope separation developed by the Manhattan District permit the separation of heavy oxygen with ease, efficiency, and in large amounts whenever a decision to proceed is made and the expense involved is underwritten. Since radioactive isotopes of oxygen are not available, the problem of large-scale separation of the stable isotopes of oxygen is of major importance for the further rapid progress of tracer work with oxygen in biological systems, and should be special objects of concern to those interested in the problem of growth.

The *Kline* of Sarapis

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Our information concerning the *kline* or cult banquet of Sarapis is meager. The documentary material, consisting of papyri and inscriptions, is limited in scope, and the literary allusions are vague. The invitations to private *klinai* at Oxyrhynchus are noncommittal; the expansive eulogy of Aristides consists almost entirely of enthusiastic acclaim of the god's fellowship. A hitherto unedited papyrus of the early 3rd Century A.D. from Karanis, now in the Michigan collection, makes a substantial contribution to our knowledge of the institution. It is a letter written by a young man away from home, probably living at the Serapeum in Memphis, to his father, who resided in Karanis. The writer informs his father and mother that the *kline* of Sarapis, sponsored seemingly by the priesthood of the temple, is open to him at the cost of 22 drachmae for his place at the banquet and 24 drachmae for participation in the mysteries. The association of mysteries with the banquet rests on an interpretation of an uncommon adjective derived from a common Greek noun, taken together with Aristides' brief references and the logical implications of Sarapis' commanding position in the religious world at this time. The banquet is stated to be two months off, and the writer obviously intends to remain at the temple until that time. In order to avoid payment of the fees he will perform certain services. This situation raises a number of questions, for which an answer is sought, regarding his status at the temple and a possible connection of the *kline* with the *katoche* of Sarapis, an institution well known to us at the Serapeum of Memphis in the Ptolemaic era.