

# The American Philosophical Society:

## *Abstracts of Papers Presented at 1948 Meeting*

---

### The Prehistoric Archaeology of the Tangier Zone, Morocco

Hugh Hencken  
American School of Prehistoric Research

Tangier is archaeologically important because there Europe and Africa meet, and for thousands of years people have been moving between the continents.

The Tangier Expedition (1947) of the American School of Prehistoric Research, financed in part by a generous grant from the American Philosophical Society, completed previous work of the Peabody Museum of Harvard University. The following represents work done in 1947 unless otherwise designated. The sites included both Old Stone Age cultures of the Ice Age, when man hunted his food rather than producing it, and the New Stone Age culture, which depended on the keeping of domestic animals.

The oldest site was on Cape Ashakar, south of Tangier. Here there were gravels left by streams that had flowed into the Atlantic when it was 60 feet higher than today—in other words, in the earlier part of the last warm interval in the Ice Age, possibly 150,000 years ago—and here were found a heavy flint cleaver and hand axes of Acheulean type. Another site, near the Mackay Radio Station, contained a deposit connected with the sea when it was about 40 feet higher than today, possibly 100,000 years ago. This represents a later stage (Levallois-Mousterian) in the making of flint tools. Both sites represent ancient cultures traveling across Africa from the Middle East to Europe.

The third site, the High Cave on Cape Ashakar, had been largely excavated before the war, but work was continued in 1947. This was occupied during the later Ice Age by "Aterian" hunters who used skillfully made flint darts to hunt elephants, giraffes, rhinoceroses, and hippopotamuses. These central African creatures lived in North Africa at that time, because, owing to the glaciation in Europe, North Africa was a lush, well-watered place where the animals would find food. These conditions probably ended about 10,000 years ago, leaving North Africa dry as it is today.

Among the Aterians were at least some persons of the extinct Neanderthal race of man, for a few teeth and part of an upper jaw were found that belonged to them. These Neanderthals had probably come over from Europe.

Later, this cave, and two others dug in 1947, were occupied by New Stone Age people from the borders of Egypt, where they had learned to make pottery and to keep cattle, sheep, and goats. These same people also overflowed into Europe. They arrived 5,000 or 6,000 years ago, and they still continued their simple pastoral existence in the period of the Roman Empire (1st to 4th

Centuries, A.D.). Their descendants today are the Berbers, who are as impervious to European civilization as their ancestors were in Roman times.

### Political Distortions in International Monetary Relations

Jeannette P. Nichols  
Historian

For centuries, monetary functioning has been generally regarded as a sovereign right of the state, with policies based primarily upon domestic considerations and with slight regard for international repercussions. This practice largely persists, but is it tenable?

With the rise of modern representative government, domestic political pressures for currency manipulation were sharpened. In hard times clamorous demands for hurried currency panaceas assail the ears of legislators and administrators, who for their part lack the understanding or the political strength to direct policy wisely and yet stay in office.

Simultaneously, development of highly industrialized economies has vastly increased the economic interdependence of nations; the growth of trade has given an international factor—exchange rates—a mighty influence upon national prosperity and international relations. This influence is especially felt in times of violent, rapid change, such as the period since 1914. Yet monetary manipulation continues to be governed mostly by national considerations and has become a powerful aid to military objectives.

Agonies of World War II impelled the first broad, serious effort to relinquish some monetary sovereignty in the interests of mutual peace and prosperity. From Bretton Woods emerged the International Bank and the Fund. But almost at once political conflicts (domestic and international) were allowed to dull these instruments for peace, preventing their functioning as planned. Their ineffectiveness moved the United States to forge, alone, new monetary weapons for waging peace—the "loans" and the "Marshall Plan." Whether these are sharp or clumsy instruments remains unproved.

The perilous situation challenges economists and politicians to pool their talents in the public behalf. This means, among other things, surmounting the obstacles to their mutual understanding and respect, so they can work together. Their cooperation is essential to prosperity and peace; for exchange rates and other monetary forces are affected by so many political and economic influences, in so many national and international aspects, that monetary interactions are extremely hard to unravel and even harder to control. Every nation desperately needs such practical alliances between people of thought and action, to plan and implement domestic monetary policies which

shall take fair account of international monetary dependence. Without such joint efforts, the world may not find the needed monetary compromise between national sovereignty and international welfare.

## The Chinese Language in the Light of Comparative Semantics (A New Approach in Historical Linguistics)

Erwin Reifler  
Washington University

In the course of researches carried on over a number of years, the fact has emerged that the Chinese language, because of its peculiar writing system, is a treasure mine for semantic research to a degree which has not been suspected previously. In this respect it surpasses all other sources of linguistic semantic material. However, while all other branches of Chinese historical linguistics—especially the study of phonology and epigraphy—have made great strides in the past, Chinese semasiology has lagged far behind. This appears to be due to the failure to either realize or consistently apply certain principles in our study of the growth of the Chinese language and its writing.

However, once these principles were realized and consistently applied, a very large number of semantic problems found their obvious solution without recourse to any source of relevant knowledge outside the Chinese language.

Nevertheless, there still remained a fairly large number of cases which, in spite of all phonological, graphological, and semasiological data supplied by the Chinese language and its writing, defied all attempts at an objective solution. And it is in many of these cases that the importance of Comparative Semantics has been realized.

Our treatise endeavors to substantiate this claim in two parts, the first dealing with the problems involved in the semantic analysis of the Chinese language, the second giving a demonstration of our solution of Chinese semantic problems.

One of the many examples adduced in this demonstration is supplied by the Chinese words for “to shoot” and “to dismiss,” which show a remarkable phonological and graphic agreement. A common origin of these words was, nevertheless, hitherto not envisaged because of their seemingly incompatible meanings. However, the analogy of English “to fire” shows that such meanings can be homogeneous.

## Some Problems of Small Nationalities in Europe

Fred N. Robinson  
Harvard University

This paper will not be concerned with the smaller independent nations like Switzerland, the Scandinavian countries, and the Netherlands, or with the racial minorities in Central and Eastern Europe, whose treatment was a matter of such violent controversy just before the recent war. There are many similarities, to be sure, between the situations in these latter countries and those to be dis-

cussed. But the paper will deal primarily with certain groups that have long formed part of larger political units but have preserved, in greater or less measure, separate languages and cultural traditions. During the past century, when the major political and social forces seemed to make for the diffusion and dominance of a few leading civilizations, there were in various parts of Europe movements for the revival of declining or vanishing nationalities. Some of these *mouvements régionalistes*, to give them the French name by which they have been most commonly known, aimed at political independence, and others were mainly cultural in purpose. Nearly all their phases appear in the nationalistic struggles of the Celtic-speaking inhabitants of the British Isles and France. The Gaelic revival in Ireland is the one best known in America, and partly for that reason the similar revival in French Brittany will be chosen here to illustrate the general problem. After a brief survey of the history of the movement some account is given of the present state of Breton nationalism and of the questions at issue between the regionalist patriots and the central government of France.

## An Unfamiliar Mechanism of Disease Transmission

Richard E. Shope  
Rockefeller Institute for Medical Research

While it is well known that many diseases are transmitted by insect intermediate hosts, it is not so well known that a small group of infectious agents are carried by helminth (worm) intermediate hosts. The three helminth-transmitted diseases to be discussed are blackhead of turkeys, salmon poisoning of dogs, and influenza of swine.

The causative agent of blackhead is the protozoan, *Histomonas meleagridis*, and the intermediate host of this parasite is the common cecal worm, *Heterakis gallinae*.

The exact nature of the causative agent of salmon poisoning is not yet known, though a virus is suspected. Its transmitting host is the fluke, *Trogloctrema salmoneola*.

Swine influenza is caused by the concerted activity of a bacterium and the swine influenza virus. The virus has as its intermediate host the common swine lung-worm.

It is believed that the three diseases now known to be transmitted by helminths represent only a portion of a larger group and that further investigation of diseases whose epidemiology is still not completely understood will enlarge the group.

## International Developments and the American Economy

Simon Kuznets  
University of Pennsylvania

The rest of the world exercises its effects on the domestic economy of the United States via either the peaceful channels of migration, foreign trade, and international capital movements or the warlike types of contact, of ag-

gression and defense. Prior to World War I, the economic development of this country was accompanied by free migration; by a restricted, but undiminished, rate of participation in world commodity trade; by a limited, but consistent, net debtorship position on international capital accounts; and by freedom from participation in major wars, despite a striking expansion of territory. After World War I, the character of economic relations of this country with the rest of the world changed drastically; migration was restricted in the 1920s, came to a virtual standstill in the 1930s, and was not resumed on any significant scale; the share of foreign trade to domestic output, after a brief expansion in the 1920s, suffered a reduction that has not been made up since; the country shifted to a net international creditorship position; and participation in both World Wars, if belated, could not be avoided. Most important, the expansion in the world of free enterprise and of political democracy that were characteristic of the 19th and early 20th Centuries and that provided a favorable international climate for the development of the United States (and of other countries with similar social institutions) gave place, after World War I, to opposite trends. The problems created by the impact of current international relations on the domestic economy of this country result from a conjunction of three circumstances: (a) emergence of the United States to a status of economic leadership; (b) recession across the world of free enterprise and of political democracy, and the vigorous growth of opposite tendencies; (c) acceleration of technical changes in transportation and communication, which raise the technical potential in overcoming space and other obstacles and thus permit competing national units closer contact, of a peaceful or warlike character.

## The Impact of International Developments on the American Economy

Friedrich A. Lutz  
Princeton University

The most important economic issue of our time is that between the free market economy as it exists in the United States and the centrally planned economy which now exists all over Europe. The outcome of the struggle between these different systems hangs in the balance. Whether the ideology of central planning will triumph over the capitalistic ideology or whether the reverse will happen will depend largely on the actual performance of the two systems. If the American economy should again pass through a severe depression and mass unemployment, central planning, which seems to provide security of employment, will appear to the American public something worth imitating, and control of the economic processes is bound to make rapid progress, even in the United States.

The present international political tension has altered profoundly the character of American foreign trade and foreign lending. Foreign lending is now done by the Government and is dominated by political considerations.

"Dollar diplomacy" is the rule. Similarly, exports of commodities to potential enemies can be, and are, prevented today. In any event, American exports are now largely determined by the import controls imposed by foreign countries. Thus, the free market principle no longer applies to foreign trade or foreign lending.

Internally, the American foreign aid program will in the immediate future cause shortage of certain commodities and is likely to strengthen inflationary tendencies. In the longer run, the American economy will be profoundly affected by (1) the revival of foreign agriculture, which will require as its counterpart a contraction of American agriculture; (2) the industrialization of undeveloped countries, which will necessitate structural adjustments in American exports and imports; (3) the repayment of American loans, which will reverse this country's balance of trade. All three factors will strengthen the protectionist forces in this country, and the United States may cease to be the champion of the policy aimed at reducing trade barriers. In this case, the hope for freer international trade, which now rests primarily on the efforts of the United States, will vanish.

## The Impact of External Affairs on American Public Opinion

Carroll Binder  
Minneapolis Tribune

It took three wars and the imminent threat of a fourth war to make the American people realize the full implications of their status as a super power.

Victory over Spain signaled the emergence of the United States as a great power half a century ago. World War I transformed the United States from a debtor to a creditor nation and left Great Britain too weakened to vie with the United States in naval or financial power.

Only a minority of the American people comprehended the epochal significance for themselves and for the rest of the world of these changes in their status. During the first decade of great powerdom Theodore Roosevelt, John Hay, and a few other leaders exercised America's newly acquired influence in world affairs with far-reaching consequences, but the great body of American people were too unfamiliar with the forces at work in Europe and Asia to appreciate their bearing on their individual and collective well-being.

Most Americans pursued the even tenor of their way as though the United States was still in the 19th Century and there would always be a Britain strong enough to hold the sea lines against any European power's attempt to extend its sway to the western hemisphere, and prosperous enough to pay cash for the surplus products of America's expanding agriculture and industry.

Because World War I was oversold to them as a crusade to make the entire world safe for democracy and to end war for all time, the great majority of Americans were sadly disillusioned by the aftermath of that conflict.

Had the rank and file of Americans realized that they had to join in the war against Imperial Germany because

Germany otherwise would have won that war and they would have been the next victims of German aggression, without powerful allies to help them resist, they would have been better prepared to cooperate in the making and maintenance of a decent peace. Had they been better versed in the economic facts of life, they would have avoided the painful losses they sustained by rash overseas lending made without thought of how it might be repaid or how injuriously the loans might be employed.

It took the fall of France, the battle of Britain—and Pearl Harbor—to convince the American people as a whole that the United States was too challenging a citadel of freedom, prosperity, and potential power to be left undisturbed by any power bent on world conquest.

When the American people realized that it was up to them to determine whether they and their allies or the axis would survive, they astonished the world by their war effort and decided the issue of that battle for the world.

Once again, the outcome of a costly war effort is disappointingly short of what the American people expected to achieve. Having spent 400,000 American lives and \$354,000,000,000 to defeat one totalitarian menace to their freedom and security, they are deeply resentful that their peace and security are menaced by another totalitarian regime—a regime to which they gave enormous material assistance and to which they made costly strategic concessions in the hope of enlisting its permanent cooperation in the making of a decent and lasting peace.

World War II and its aftermath has taught the American people that they no longer can afford to remain indifferent to what goes on in Europe and Asia. It has taught them that their peace, freedom, and security depend on their strength and wisdom rather than on their geographical position and some other power's holding the lines against aggressively-minded totalitarianism.

The American people have learned the hard way that they are permanent members of the world community and that, as possessor of half the industrial capacity, financial resources, naval, military, and air strength of the postwar world, they must take the lead in mobilizing the freedom-loving nations of the world to resist Russian attempts to sovietize them by infiltration, by the creation of chaos, or by armed aggression.

American thinking has traveled far in power politics during the last 50 years under the impact of external events. We have much to learn. We still make costly mistakes because of our inexperience. But we no longer live in a fool's paradise.

## Repercussions of Foreign Affairs on the American Tradition of Civil Liberties

Robert E. Cushman  
Cornell University

The United States emerged from World War II a dominant world power inextricably involved in world affairs. This new international position has had two sharply differing repercussions upon the American tradition of civil liberties. First, we stand as the world's leading exponent

of a liberal democracy, in which the adequate safeguarding of civil liberties is implicit. We have assumed leadership in the movement for an International Declaration and Covenant on Human Rights. Trying to pose, however, as an example to the rest of the world has made us aware that we do not fully practice what we preach, that we are not, for example, extending justice and equality to our racial minorities. Our new international position is exerting a wholesome influence in the direction of leading us to live up more fully to the American tradition of civil liberty in order that that tradition may be more effectively spread throughout the civilized world.

On the other hand, the hostility of Soviet Russia, the unpredictability of atomic warfare, and the frightening disclosure of espionage in Canada, have created a form of hysteria and fear on the domestic scene which is seriously undermining the civil liberties protected by the First Amendment. We are actively engaging in loyalty tests, investigations of "subversive" and un-American activities, which in some cases tend to deteriorate into witch hunts. These affect civil liberties directly in their impact upon the persons immediately concerned, and indirectly by producing an erosion of popular loyalty to the traditional principles of freedom of speech, press, and assembly. The American public is being educated in bigotry and intolerance.

## Trends in the Traditional Relation Between Military and Civilian

Harold Sprout  
Princeton University

The history of civilian-military relations in the United States reveals many contradictions and inconsistencies. Traditional civilian attitudes include: distrust of military leadership, vague fear of military domination, and avowed support for the principle of civilian supremacy over the military in policy-making and administration. In practice, however, the American people have accepted an amount of military participation in public affairs inconsistent with their avowed traditions.

The past record of Congressional relations with the Armed Services is a mixture of sincere patriotism, mutual distrust, military careerism, lobbying, propaganda, log-rolling, and pork-barrel politics. Conditions have improved in recent years, but not enough to insure adequate Congressional appraisal of military needs and programs, and the elimination of local and partisan considerations in the enactment of military legislation.

In World War II, the military gained an ascendancy never previously attained in the United States. But efforts to extend full military control over the national economy encountered stubborn and partially successful civilian resistance.

One phase of this struggle centered on manpower, with higher education caught disastrously in the squeeze between conflicting interests. The result today is an acute shortage of teachers and research personnel in both science and the liberal arts. Other states, including the Soviet Union, followed the opposite policy, carefully

maintaining a flow of talented youth through their universities, despite military and industrial demands for men. To the extent that national strength depends upon trained personnel, the American policy was shortsighted and places a mortgage on our future power and capacity for world leadership.

The war wrought significant changes in the relations of the military with civilian agencies responsible for foreign policy. Steps have been taken to bring military policy into better balance with political aims and commitments. In the process the military services have gained a larger share in policy-making. Under present conditions their influence on foreign policy will certainly not diminish; it will probably increase. In case of full-scale war, the military might well come to dominate every important function of American society, economy, and government.

In their present temper the American people have gone far toward embracing military viewpoints and solutions. This may be attributed in large degree to the crisis in Soviet-American relations. The trend of Soviet policy is disquieting from any point of view. The creeping advances of revolutionary communism, its insidious growth in our own society, and the mental image of American cities bombed to smoking rubble, can be morally devastating, especially to minds long habituated to the comforting thesis that "it can't happen here."

But there is real danger that Americans may place too much faith in the ability of military therapy to cure the disease of our time. Military power has an important role to play in bringing order out of the present chaos—a role for which there is no adequate substitute. But American democracy cannot survive by military power alone. Any policy based too exclusively on preparation for an "inevitable" third world war exposes all nations, our own included, to frightful devastation, destruction of democratic society, and the possible suicide of our civilization. Only a wise combination of firmness with conciliation, which brings to bear all the tools of statecraft—political, economic, and moral, as well as military—will enable the United States to play a constructive world role.

### The Decline of Tuberculosis as the Chief Cause of Death

Esmond R. Long

Henry Phipps Institute, University of Pennsylvania

Tuberculosis has been the principal cause of death in the world until recent times and is still the chief cause in the Orient and other regions. Its history as an endemic disease can be traced in the western world from a combination of written records and knowledge of former living standards. It was widely prevalent in ancient times and reached its peak in Europe with the industrial revolution. It has declined throughout the western world with the rise in standards of living and application of specific measures for tuberculosis control. In the United States the tuberculosis mortality rate has dropped 80% in the last 50 years. Education of the public on the con-

tagious nature of the disease, establishment of tuberculosis control units in health departments, extensive hospitalization for the isolation and care of tuberculous patients, rapid methods of case-finding, and effective methods of treatment of the disease have all been important factors in the decline. The war seriously interrupted tuberculosis control in Europe, but recovery has begun. With the normal operation of public health programs the mortality should decrease steadily, but the future cannot be predicted as long as political, economic, and social conditions remain unstable.

### Franklin's Return From France, 1785

Charles F. Jenkins

Historical Society of Pennsylvania

Franklin sailed for France in September of 1776 and did not return until September of 1785. For 8½ years his home was in the suburban village of Passy, two miles out of Paris. Shortly after the surrender of Cornwallis, Franklin urged Congress to allow him to return. He was tired, ill, and homesick. In May of 1785 he received his discharge and immediately preparations were under way for the return voyage. Because of his malady he could not walk, ride horseback, or even ride in a carriage. Various plans were considered, including the fantastic one of riding in the basket of a balloon fastened to a cart to direct its progress. The problem was solved by the offer of the royal litter. This was a curtained couch, suspended between two large mules, front and back, with the muleteer riding the lead. The 127 pieces of baggage were sent down the meandering Seine by barge. It was 146 miles by road to Le Havre, and 5 days were required to make the journey.

At Le Havre a ship had been taken for Southampton, England, where the "London Packet" had been chartered to bring them to Philadelphia. Here Franklin bade a last farewell to his son, Governor William Franklin, and negotiated the purchase of the latter's lands in America to be conveyed to William Temple Franklin. The "London Packet" was a new Philadelphia-built ship of 300 tons, commanded by Captain Thomas Truxtun, who later achieved renown as a Commodore in the American Navy. Also on board was the celebrated sculptor, Houdon, who was coming over to make a statue of Washington for the state of Virginia.

The voyage lasted 48 days. Franklin had agreed with his friends that he would use the time in writing his autobiography, but instead he wrote three scientific and philosophical articles which were later read at meetings of the American Philosophical Society, of which he was founder and president. The arrival of the "London Packet" in Philadelphia on September 14 was acclaimed by salutes from cannon, the ringing of church bells, and the ships in the river with their flags flying. A great crowd assembled at the Market Street wharf to welcome him and follow him to his home in Franklin Place.

Franklin's health had improved on the way home, and, although his malady continued with him to his death, he lived for 5 years to become president of Pennsylvania for

three successive years and a delegate to the Constitutional Convention in 1787.

A Committee of Congress is considering the possibility of restoring his home and garden in Franklin Place, now Orianna Street, between Market and Chestnut Streets.

## Public Spirit and American Improvements

Carter Goodrich  
Columbia University

In 1769 the Committee for American Improvements of the American Philosophical Society investigated the possibility of a canal from the Chesapeake to the Delaware, aided by a subscription by the merchants of Philadelphia, who responded to an appeal to their known public spirit.

Similar attitudes persisted throughout the movement for internal improvements between the Revolution and the Civil War. The extent of government activity and the curious combinations of public and private investment in "mixed enterprise" corporations cannot be understood without realizing that the road and canal and early railroad enterprises, whether public or private or mixed in ownership, long continued to be thought of as "public-spirited undertakings."

This public spirit was often the self-interest of a locality, a section, or a state. The rivalry of the seaboard cities for the western trade played a large part. The Pennsylvania Railroad began as a mixed enterprise representing part of the competitive effort of Philadelphia. But broader motives of national interest and unity were of continuing importance.

Gradually "public duty" and "private interest" became more sharply separated, partly because of opposition to the use of public money to aid private profit-seekers and partly because of opposition to public participation in fields which private enterprise could occupy with profit. The intermingling had been largely the result of the inability of private business to raise enough capital for the larger undertakings. Yet even today it is worth recalling the part played in the development of transportation by community planning and the conscious pursuit of public ends.

## The Light From Distant Galaxies

Joel Stebbins and A. E. Whitford  
Washburn Observatory, University of Wisconsin

With a photoelectric photometer on the large telescope at Mount Wilson, measures have been made of the total light and color of external galaxies down to the 18th magnitude, near the limit of what can be seen visually through the 100-inch telescope. The quality of the light is what would be expected from mixtures of many stars both hotter and cooler than the sun. Also, the distant galaxies are distinctly redder than near-by ones. The reddening is proportional to the shift of the spectrum lines and has been followed from the nearest examples, comparative neighbors of the sun less than 1,000,000 light-years away, to a member of a cluster in the constellation Boötes at a distance of 200,000,000 light-years.

Hubble and Humason's measure of red-shift of the spectrum lines of this galaxy indicate an apparent outward velocity of 24,000 miles per second, or 13% of the velocity of light.

About half the measured reddening can be explained by the effect of the red-shift, but the remainder is unaccounted for. The unexplained reddening could be a distance-effect caused by selective absorption in space between the galaxies, such as is produced by dust between the stars in our own galaxy. Or the reddening could be a time-effect, if the galaxies which we see as of 200,000,000 years ago were actually redder than those we see close at hand now. But, whatever the cause, the reddening has the effect of making the nebulae appear fainter to the photographic plate, and many nebulae which could otherwise be reached photographically are thereby lost. Therefore, the counts of faint nebulae and the inferences from them concerning the remote depths of the observable universe must be re-examined.

## Variable Stars—A Study Completed

Cecelia Payne-Gaposchkin and Sergei Gaposchkin  
Harvard University

The study of the 1,500 brightest variable stars, begun 9 years ago, has been completed. Light variations, periods, ranges, and other properties have been obtained for 400 long-period and 400 semiregular variables, 150 Cepheids, and 50 cluster-type stars. The data permit a study of physical properties of these stars, both as individuals and as representatives of the stellar populations to which they belong.

The Cepheids partake of the rotation of the Galaxy and are the characteristic intrinsic variables of our neighborhood. By reference to the well-determined properties of the Cepheids in the somewhat similar environment of the Magellanic Clouds, it is possible to study the absolute properties of these stars and the deviations of individuals from the normal.

The cluster-type variables are interlopers in our neighborhood and represent the population characteristic of the galactic center. By comparison with those in globular clusters, the properties and anomalies of the cluster-type variables in our vicinity can be studied.

The long-period variables comprise two overlapping groups, both intermediate in properties and affiliations between the Cepheids (Population I) and the cluster-type stars (Population II).

The semiregular variables (for many of which the character of the variation is now established for the first time) also represent two intermediate groups, but the Population I group predominates; semiregular variables of Population II are of distinctive behavior.

An important part of the investigation has been the redetermination of the apparent brightness of the groups of stars before mentioned, previously ill determined and inhomogeneous. It is thus possible to revise previous findings as to their absolute brightness. The enormously interesting question concerning the physical differences between the stars that inhabit the inner and outer por-

tions of our galactic system can now be approached on a quantitative basis.

About 400 eclipsing stars are included in the study. Discussion of them, which will be lengthy, will eventually contribute greatly to our knowledge of the physical properties of stars and will give especially full and important information on the frequent and unexplained changes of revolution periods for these double stars.

### An Attempt at Perspective (R. A. F. Penrose, Jr., Memorial Lecture)

Robert B. Warren

Institute for Advanced Study, Princeton, New Jersey

Some of the difficulties of appraising the problems of our time lie in the impossibility of seeing our own time in its historical perspective. We shall try, nevertheless, in the hope of throwing some light on the present.

Lord Acton once said that the 15th Century, which saw the discovery of the New World and the recovery of the Ancient World, marked the transition from the Middle Ages to the Modern Times. These discoveries set in motion forces which shaped the following four centuries. Among these consequences were the enlargement of the area of Christianity and the gradual ascendancy of Europe to world hegemony. The gold and silver of America changed the characteristic form of wealth from land to pecuniary capital. The Renaissance reoriented intellectual activity; in antiquity, it had been centered on philosophy; in the Middle Ages, on theology; after the Renaissance, on the material *sciences*. The supremacy of what Gibbon called the "Republic of Europe" was not primarily military, but cultural. Its cultural patterns were not imposed on the world; the world copied and emulated these patterns. This culture was predominantly materialistic. The previous age has been charged with superstitious religion; possibly the character of the recent age is superstitious materialism.

The conspicuous consequence of the discoveries was America itself. What difference has America made?

One of the great contributions was the undermining of the concept of hereditary status as the basis of social structure. It seemed at one time that the elimination of status would lead to the brotherhood of man.

If an historical period has a beginning, it must by definition have an end. There are reasons to imagine that the historic epoch initiated by the Great Discoveries has closed. The world supremacy of Western Europe has been ended by two internecine wars and by the revolt of Asia. The area of Christendom has been reduced by half, with the secession of Russia. Islam, after four centuries of lethargy, is once again a living factor.

The nation-state as the typical political form is not characteristic of the present. It appears to be in process of supersession by cultural federations whose political forms have not yet crystallized. The present political configuration of Western Europe appears like an anachronism in the contemporary world, but it is not impossible that Gibbon's "Republic of Europe" may become a political reality.

Another sequel to the Discoveries was the increase in world population. Up to recent years, an increasing population found fresh sources of food supply in new and empty lands. There are no such lands now, but population continues to increase; the traditional expedient is no longer available.

The elimination of a social structure based on traditional status and the intense preoccupation with material welfare have not produced the brotherhood of man but have given us, rather, two characteristic features of contemporary society—the class struggle and the magnified state. The state is no longer merely one of the agencies of society; it has become the dominant or even exclusive agency of society.

These examples suggest that the world which followed the Great Discoveries has already receded into history. We are moving toward a new world, but this new world has not yet lifted above its horizon.

Time as well as space has its voyages of discovery. On one of these we are now embarked.

