sphere, at least in the future, with some pollutants to a degree at which they become harmful and indeed could lead to some permanent damages."

Frenkiel said that air pollutants may be solid particles, liquid droplets, vapors, or gases. The heavy materials usually fall near the source; the others are dispersed and often travel considerable distances. During their dispersion they may be changed chemically or physically by sunlight, rain, or fog. They may also be changed by interaction with other normal constituents of the atmosphere by interaction among or between themselves and form still other pollutants. Many are washed from the air by rain and end up on land or in the sea, others escape into outer space, and still others remain in the atmosphere for a considerable amount of time.

Pollutants usually are the undesirable or incidental consequences of industrial processes, Frenkiel said. Cities are not the sole contributors; a large number of small towns can produce a considerable addition to the pollution of the atmosphere.

The airborne cycle of pollutants begins with emission at the source; the other stages in the cycle are transfer, contact (with vegetation, animals, or man), and, sometimes, damage. At each point an effort could be made to reduce pollution. But, Frenkiel pointed out, it may be "quite impractical to get rid of atmospheric pollution altogether. A community, like a human being, breathes in clean air and breathes out pollutants. The very life of the community is accompanied by air pollution. The main problem is to prevent this companion of human activities from reaching a magnitude that becomes a great inconvenience and danger to the population."

Pollutants are dispersed by two basic kinds of air movements: the general air stream and air turbulence (both thermal and mechanical). To these are added the effects of size and weight of particles and the speed with which they fall to the ground or move upward. This vertical dispersion is affected not only by the nature of the pollutant, but also by the "stability" of the atmosphere. In a stable atmosphere, vertical air motion is at a minimum; in an unstable one, there is considerable motion upward and downward. When the normal situation is reversed, and temperature increases with altitude instead of decreasing, the resulting condition, known as an inversion, prevents almost all vertical motion and there can be no dispersion.

Frenkiel said that it is possible to construct a mathematical model in order to study the probable pollution patterns over an urban area. A simple model would include distribution of pollution sources, emission conditions, and the micrometeorological characteristics that directly effect dispersion of pollutants. It would then be possible, he said, to determine the mean concentration of pollutants due to each source and the effects of the several sources combined. It would be possible to find the mean concentration pattern of pollution over the urban areas as a function of time and the relative contributions of each of the sources of contamination at various points in the area analyzed.

The mathematical model could be used to determine (i) temporary emergency measures to be taken when pollution neared an allowable level, (ii) efficacy of plans to reduce pollution, (iii) effects of a new pollution source, (iv) pollution patterns for the urban area after expansion, and (v) effect of urban planning proposals on pollution levels.

The ultimate answer to the air pollution problem in cities may be "air zoning." "Land zoning is now an established practice to prevent deterioration of residential neighborhoods, the growth of slums, etc. Zoning the air above communities, however, would be a much more difficult problem, involving knowledge of the possible sources of pollution, local geographic and weather conditions, chemical changes of pollutants in the atmosphere, necessity for applying purification methods, and several other factors. . . .

"Zoning may be a good method to control pollution. It should be noted, however, that as far as air pollution is concerned, it is not the land that should be zoned, but the atmosphere. Such a zoning would differ from the usual land zoning since it does not have to lead to unconditional restrictions for the location of a pollution source in any desired area. . . . [A] pollution source could be given the choice among several or a combination of appropriate restrictions that would vary according to the location of the source in the community."

Higman, presenting the view of a social scientist, outlined some of the obstacles to adopting air conservation proposals: (i) Those who object to adoption of controls may argue that more research is needed. Although this is true, enough is known already, he said, to warrant the establishment of controls now. (ii) It might be difficult to determine who should take steps to reduce pollution—the biggest source or the newest one. (iii) Some will argue for local controls rather than the much broader control base needed. (iv) The public will be confronted with the necessity of mass transportation systems. (v) Disagreement among scientists may cloud the issue. (vi) Some may maintain that scientists should not become involved in public policy.

The Air Conservation Commission was established by the AAAS Committee on Science in the Promotion of Human Welfare in 1962. The 12 members of the commission represent the medical, physical, and social sciences.

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Early Man in the New World

The material complexes of the late Pleistocene cultures of North America were the focus of a three-session symposium of Section H of the AAAS. The purpose of the symposium was to present and evaluate problems of chronology, typology, and terminology in current Paleo-Indian studies. Recent research and discoveries in these earliest known complexes and their subsequent development and divergence were the main topics of the papers presented.

In 1962 Juan Armenta Camacho and Cynthia Irwin-Williams conducted archeological investigations in the Valsequillo Reservoir region near Puebla, Mexico. These investigations were designed to provide concrete evidence for or against the association of man-made artifacts with the large extinct faunal assemblage of the Valsequillo gravel formation of the late Pleistocene period. The assemblage includes mastodon, mammoth, horse, camel, dire wolf, and other extinct ungulates and

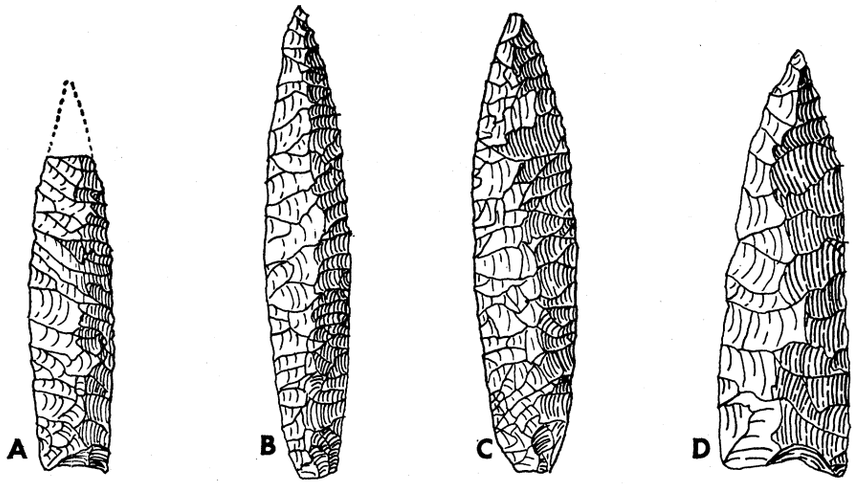

Fig. 1. Paleo point types. (*A*) Angostura; (*B*) and (*C*) Agate Basin; and (*D*) Frederick. [Drawings by Shirley East]

carnivores. After intensive preliminary reconnaissance, four sites yielded definite evidence of association. One of these, El Horno, proved to be a mastodon-kill site or butchering station. The lithic assemblage recovered in the preliminary excavations comprised two probable projectile points and a series of unifacially or bifacially worked scrapers, perforators, and cutting edges.

Blackwater Draw, the most productive mammoth-kill site found to date, was discussed in a paper by George A. Agogino and Irwin Rovner. Salvage excavations of a new discovery at the Clovis type-station, Blackwater Draw Locality No. 1 in eastern New Mexico, yielded by far the largest artifact assemblage recovered for this complex. The remains of four mammoths uncovered by commercial gravel quarries were recovered along with well over 150 butchering tools and fluted projectile points characteristic of the Clovis horizon. In addition to revealing a large number of tools manufactured on flakes, the grouping showed that significant use had been made of true blades (struck from prepared cores) and bone tools. This was also true during the Old World Upper Paleolithic period. A radiocarbon date of slightly more than 11,000 years ago for the Clovis mammoth-hunter level is in complete agreement with other major accepted dates and more firmly establishes the Clovis complex between 11,000 and 12,000 years ago.

Excavations in the 10,000-year-old Folsom level produced a rich collection of artifacts for this horizon of fluted points. Comparison of these artifact assemblages separated stratigraphically at Blackwater Locality No. 1 showed significant typological changes. Technology of tool making in the Folsom horizon showed generally greater control of retouching, greater use of bifacial knives, and a greater predominance of flake rather than blade tools. A full range of Folsom point types was obtained—the classic bifacial fluted, single fluted, and unfluted types. A fragment of notched bone disk from Blackwater Draw similar to types found at the Lindenmeier Folsom Site in Colorado was discussed by Carl Schuster, who suggested possible connections with forms of the Upper Paleolithic of Eastern Europe and Siberia.

Commercial operations at Blackwater Draw have recently uncovered firm evidence for the presence of at least seven post-Folsom Paleo-Indian horizons previously unrecorded at the site. Since the continuation of commercial operations has prevented any scientific investigations of these components, this symposium unanimously adopted a resolution urging action to permit archeological investigation of this uniquely significant find.

Recent studies of the eastern fluted complexes were the topic of papers presented by William A. Ritchie, Maurice Robbins and George A. Agogino, James E. Fitting, John Witthoft, Olaf H. Prufer, Raymond S. Baby, Irwin Rovner and George A. Agogino, Douglas Jordan and Carl F. Miller. Current investigation and reevaluation of this tradition produced evidence for a greater antiquity of these eastern fluted complexes typologically similar to the western fluted tradition; this was exemplified by the finds from the Blackwater Locality No. 1. The age of the eastern tradition was proposed as being at least contemporary with the western Clovis and Folsom horizons rather than younger as previously proposed.

In a paper by Richard A. Wheeler, one of the most disturbing typological problems in Paleo-Indian studies was resolved. Confusion as to the distinguishing features of the Angostura and Agate Basin point types had caused subsequent finds of these unique types to be misnamed. Wheeler reported the results of his investigation of the points from the Agate Basin type-station in eastern Wyoming and from the Angostura type-station in western South Dakota. This comprehensive research revealed distinctions between the two types (Fig. 1).

The form of the Agate Basin type was defined as medium to large, unstemmed, and lanceolate. It has a long slender or short blunt tip and a narrow, straight to convex base. The blade is flat-lenticular in longitudinal section and lenticular to sometimes diamond-shaped in cross section. All or most of both faces bear parallel, horizontal flaking which can be narrow and shallow (ribbon-like) or broad and medium-deep and runs from the lateral edges to the midline. In a few cases, parallel, oblique ribbon-flake scars oriented from upper right (tip) to lower left (base) occur on one face together with parallel, horizontal flake scars. Lateral edges are minutely retouched and basal edges are thinned by the removal of flakes longitudinally from base to tip or transversely just above the base on both faces. Lateral edges are usually ground at the proximal end for a distance of one-quarter to one-half of the total length of the point.

The Angostura-type form was defined as large, narrow, unstemmed, and lanceolate with a long slender or short blunt tip, and a narrow, concave to straight base. Characteristically, the lateral edges contract slightly toward the base at or above the midpoint. The blade is flat-lenticular in longitudinal section and rhomboidal in cross section. Considerable portions, if not all, of both faces bear narrow, oblique, parallel ribbon flaking. The flaking is typically oriented from upper left (tip) to lower right (base) and runs from the lateral edges

to beyond the midline on alternate faces, thus producing the rhomboidal cross section. There is little or no evidence of fine retouch on the lateral edges, although basal edges are usually thinned by the removal of small flakes longitudinally from the base toward the tip.

A third distinct type, the Frederick Point, newly discovered in a habitation location at the Hell Gap Site in eastern Wyoming, was discussed by Cynthia Irwin-Williams. This type, showing some affinities to the Angostura point, may represent regional variance of the Angostura type or a chronological development involving the Angostura, the Frederick, and the Jimmy Allen types. Since the Frederick Point, though distinct, bears more similarities to the Angostura than even the Agate Basin type, the diagnostic features of the Frederick point were carefully outlined.

The Frederick-type form is defined as large, wide, unstemmed, and lanceolate with a long slender tip and a wide concave base. Characteristically, the lateral edges run parallel at or above the midpoint. The blade is flat-lenticular in longitudinal section with a laterally asymmetrical "diamond" shape in cross section. The bifacial flaking is typically wide, shallow, oblique, and parallel, but with significant variation which includes both horizontal and oblique collateral orientation. The flaking runs from the lateral edges commonly beyond the midline from the same side and produces the common asymmetrical diamond cross section. There is frequent evidence of fine retouch on the lateral edges; basal edges are usually thinned by the removal of small flakes longitudinally from the base toward the tip. The base and proximal portions of the blade are commonly heavily ground.

Over 100 students and scientists attended the Paleo-Indian sessions, which consisted of 14 30-minute papers and three panel discussion periods. The panels were limited to discussion of the topics of Paleo-Indian problems in typology, terminology, and chronology. For the first time there seemed to be widespread agreement on most of the basic problems confronting early man research in the New World.

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Radiation Accidents and Emergencies

Local emergencies, small accidents, and major catastrophes involving ionizing radiation were the main topics of discussion at a symposium on radiation accidents and emergencies in medicine, research, and industry held in Chicago, 19–20 December 1963.

All pertinent aspects of a pure emergency situation were covered—accident dosimetry, handling of spills, medical aspects, mass survey problems, control of post-accident exposures, psychological and legal considerations, public relations, and others.

In most accident or emergency situations (that is, incidents resulting from accidents where prompt action is necessary), the intelligent attention and full capacity of the emergency worker should be directed to the following sequence of action: (i) The saving of lives (rescue operations, protection from further injury, and directing the victims back to active, useful lives); (ii) containment measures and prevention of further injury or threat of injury; (iii) salvage of equipment and materials; and (iv) turning the disaster site over to persons interested in or responsible for restoration.

The type of emergency action taken in an area where radiation has been released will depend on whether or not there is a reasonable expectation that anyone is present and alive. In either case, the course of action to be pursued should be determined by the person designated as responsible for the emergency action (E. Vallario and R. Catlin, U.S. Atomic Energy Commission). The risk to the rescue workers should be weighed against the probable success of the rescue action. Attempts to rescue victims should be regarded in the same context as any other emergency action involving the rescue of victims, regardless of the type of hazard involved. Any rescue activity that may involve substantial personal risk should be performed by volunteers, and all emergency workers should be advised of such risks prior to their participation.

From the legal point of view, Forgotson (Walter E. Meyer Research Institute of Law, Washington, D.C.) pointed out that a particularly complicated situation is presented when, for the purpose of attempting or effecting a rescue of persons involved