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Archeology in an Emergency

The federal government's Inter-Agency Archaeological Salvage Program is 20 years old.

Frederick Johnson

Salvage archeology as a basic national policy has been spreading into numerous countries, especially during the past three decades or more. Everyone is familiar with the spectacular salvage archeology now in progress on the upper Nile in areas where a reservoir is to be created by the Aswan dam. Here, whole temples are being moved to higher levels and even more importantly archeologists are recording the long prehistory of the Nile River Valley before it goes under water. It was not common knowledge, prior to this emergency, that the prehistory of the region extends back into Paleolithic times.

Probably less well known, or at least less dramatically publicized, is the fact that, within the United States, the federal government has been conducting, since 1947, an "Inter-Agency Archaeological Salvage Program." This was designed initially to salvage materials to be destroyed by the construction of multipurpose dams in all parts of the nation. The results may not be as spectacular as those coming from work in the Old World but they are fully as valuable, for they document a significant part of the long human occupation of the New World. This program has also been supported by numerous state and local institutions. The expansion of the population and the need for services such as oil pipelines, private dams to produce power, real estate developments, airfields, and other modifications of the landscape complicate the emergency and have given rise to nongovernment projects designed to assist in the preservation of archeological data which otherwise would have been destroyed. The whole endeavor has efficiently preserved, in many parts of the United States, a wealth of evidence contributing to our knowledge of the past 9000 years. This article is a brief description of the salient aspects of the unprecedented development and accomplishment of the federal program.

The rapid expansion of the program has two aspects, the administrative and the scholarly. These are very closely related. However, for purposes of clarity I treat them separately, discussing on the one hand the administrative problems and, on the other, the features of the scholarly research which are controlled by the emergency situation and which to a large extent are still with us. An indispensable characteristic of the whole broad federal program has been the successful cooperation between these two aspects which, under other circumstances, often hold themselves aloof. One of the mechanisms which aided in the establishment of and promoted this essential cooperation was creation of a free-wheeling committee, the Committee for the Recovery of Archaeological Remains (CRAR).

I have much to say about river basins, for the reason that people have always been dependent upon the resources of these specialized regions for their main source of food, for transportation, and, in fact, for most of the things which are vital to human existence. The significance of the river valleys to human life increases as we go back of the time when our present mechanized culture began to extend our horizons. Early historic and particularly prehistoric peoples built their houses and tilled their fields close to the rivers. The remains of such human occupation are the basic data of archeology.

Federal-government plans for the development of water resources for construction of dams to form reservoirs, irrigation canals, and other public works in river valleys threatened to destroy the archeological evidence for

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very large segments of North American prehistory. For example, the Missouri River basin includes more than 530,000 square miles (1.4 million square kilometers), or about one-sixth the area of the United States. The 105 dams initially projected for this vast region would flood practically all the area known to have been inhabited by two prehistoric nations and would in addition destroy materials essential to an understanding of the prehistory of the plains and prairie provinces and of a large part of the eastern foothills of the Rocky Mountains. Prior to 1944 large parts of the area had hardly been accessible, especially for detailed examination, and very little archeological work had been done. Even the problems could not be defined with any degree of confidence. For example, it was discovered for the first time, when the salvage work commenced in the late 1940's, that the prehistoric occupation of the Missouri Valley reached back in a continuous sequence of cultural complexes for thousands of years from the time the newly identified towns of sedentary agricultural Indians were established. From these latter had sprung some of the warlike tribes of horsemen who so vigorously fought our ancestors.

Definitions

The basic data of archeology—that is, archeological "materials" or "remains"—are largely artifacts made by humans and material of natural origin, derived from plants and animals, used by humans. By their nature, and in fact because of the circumstances under which they are found, these archeological materials are very closely associated with the general environment in which they developed, and especially with factors which are responsible for their having been covered up. Archeologists cannot fully interpret prehistory from the artifacts they unearth unless they consider the characteristics of the situation in which the artifacts are found.

Salvage archeology is preservation of archeological materials from destruction by modern construction, and, as a rule, it is archeological research accomplished under some kind of emergency situation. The rush to get the fieldwork done ahead of the bulldozers and power scoops creates special problems. The locations of large-scale archeological projects, especially during the 1940's and 1950's, were determined by the location of multipurpose dams and comparable public works. In large measure the areas which had to be investigated were very poorly known, and archeologists often went to work without benefit of adequate problem orientation. Reservoir areas were surveyed and sites of prehistoric occupations were chosen for intensive examination without benefit of firmly grounded opinion concerning what the character of the results might be. Archeological exploration under such circumstances is difficult because one hardly knows what to look for and where or how it may appear. Lack of time complicates the frustration. The salvage record shows repeated instances of restudy of localities because of discoveries made subsequent to the original surveys. There are other instances where excavations of sites expected to produce evidence of a single period have brought to light a sequence of periods of occupation. To be sure, this is a common and rewarding experience in much archeological work, but to have this happen in the midst of an emergency creates problems in financing, logistics, and scholarly research for which no one can be prepared. As a consequence of these conditions, in some areas masses of materials accumulated which could not be properly interpreted until additional knowledge, rounding out the background, had been secured.

Normal expansion of archeological research, combined with the great progress in the salvage work, has in a large measure corrected this situation. Our ignorance of North American prehistory is still great, but during the past 20 years field investigation and laboratory research have left no major region of the continent, except possibly the subarctic, untouched. Therefore, properly oriented archeology, even under the pressure of a salvage situation, is now possible in any area, whereas it was not when the program was established.

A program designed to preserve archeological remains was, and continues to be, necessary in the United States because of the expansion of the population and the great increase in use of the land. Before about 1940 extensive areas were not being exploited to a degree which modified the landscape, and such lands were available for archeological examination. This work was proceeding at a rate commensurate with the resources available, particularly those available to private and state organizations. Under such conditions the loss of a site was to be deplored, but there was a very good chance that a near duplicate could be found, perhaps even nearby. Developments beginning with World War II were to change this situation drastically.

The quantity of archeological materials which must be collected in order to complete an adequate record of preservation in a given area is difficult to determine. When time and resources are limited, only a bare minimum can be expected, but it is difficult to decide what this minimum is. The Committee for the Recovery of Archaeological Remains has mentioned 10 percent as a general figure, by way of indicating the small relative size of this minimum. However, there is no measure as a basis of comparison; one can only guess what the total quantity of available data might be. In districts which supported a sparse prehistoric population it has been found that a minor excavation will provide all the record necessary. This is not true of areas that supported thriving communities over long periods. In such a locality one may collect only a small proportion of the available record, but to do so it is, nevertheless, necessary to excavate enough houses of all types to outline the towns. Also, temples, mounds, and early village and camp sites must be excavated. This is a major operation, but it is necessary if one is to be confident that there have been made a collection representative of all types of cultural remains and a full record of their relative positions in the ground.

Salvage before 1942

The idea of preserving archeological materials has had a long history in the United States, and the present trend toward conservation of archeological remains has grown from numerous roots. The early archeological work of the Smithsonian Institution, founded by Congress in 1846, and of its Bureau of American Ethnology, established in 1879, was not salvage work in the modern sense. However, there was an urge to preserve knowledge. Of even greater importance were two acts of Congress, the Antiquities Act of 1906

and the Historic Sites Act of 1935. The Antiquities Act was directed toward preservation of prehistoric sites on federal lands. Importantly the Historic Sites Act enlarged this concept by recognizing the need for preserving archeological sites of national significance without regard to their location. The preamble of this Act is a major statement of national policy which reads as follows (*1*): "*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled*, That it is hereby declared that it is national policy to preserve for public use historic sites, buildings and objects of national significance for the inspiration and benefit of the people of the United States." Archeological sites are included in the interpretation of the Act, and the task of and responsibility for preserving them have been entrusted to the National Park Service. The Park Service, in accepting this trust, has made it a worthy and actually necessary policy to conduct basic research on archeological and historic sites, so that their significance to the history and culture of the United States may be set forth for all who are interested.

When the Tennessee Valley Authority commenced its extensive development of the Valley in 1933, salvage of archeological materials to be destroyed by damming and flooding became imperative. The program evolved very rapidly and several divisions of it covered the whole area. A large part of the labor for both excavation and laboratory work was provided by the New Deal relief agencies, particularly the Works Progress Administration (WPA). Thanks to the energy and administrative ability of the late William S. Webb of the University of Kentucky, to mention one of the most prominent figures, a huge quantity of data was preserved, and, most remarkably, published. This phase ended with our entry into World War II, which saw the end of WPA.

In the TVA salvage work, insofar as conditions permitted, labor was properly though not always adequately supervised. In other regions, on the whole, the amount of reasonably reliable archeological work done with WPA labor was unprecedented. There was another side to the picture, however. Archeological work provided a heaven-sent source of work to managers of relief programs who were supposed to find jobs for hordes of untrained people. In numerous instances archeological work under these relief programs got out of hand and archeologists became alarmed at the damage being done. There was considerable possibility that the improperly directed crowds of men, armed with shovels, would completely obliterate all evidence of prehistory in some areas.

In order to discover a means of coping with this situation and in the hope of giving the work some direction, the National Research Council, in 1939, established a committee to study the basic needs of American archeology. This committee published a statement of objectives after its first meeting in 1939 (*2*), and in subsequent meetings it discussed ways of improving the archeological work of federal agencies. In January of 1942 the committee was notified that all WPA projects would be suspended because of the war emergency. The committee then assisted, insofar as it could, in closing out archeological projects in at least 17 states. All archeological work was severely curtailed by the war, and the prospects for the development of salvage archeology were not again seriously considered until the winter and spring of 1944.

Salvage after 1944

Informal discussions among archeologists during 1944 in Washington were stimulated and given considerable direction by the discovery that the Bureau of Reclamation and the Corps of Engineers were going ahead with their plans to construct multipurpose dams in most of the important river valleys of the country. The need for archeological salvage in such areas led to discussion of the means of establishing what inevitably would be large-scale, government-supported projects. Consideration of past experience with government-conducted archeology, particularly under WPA, led to a decision that establishment of a nongovernment committee to investigate the situation was desirable, and so, on 20 July 1944, the president of the Society for American Archaeology appointed the Planning Committee. The idea of forming this committee was supported by the NRC's Committee on Basic Needs, which, in practice, it superseded. The Planning Committee proceeded to investigate the accomplishments of the WPA program and, among other things, pointed out difficulties which must be avoided in organizing new, large-scale archeological programs (*3*).

While the Planning Committee was at work, archeologists were learning more about the federal government's plans to conserve, control, and use the nation's water resources. Realization of the plans for the Missouri Valley, to mention the largest single unit, would, because of the special geography of the basin, wipe out almost all that archeologists could ever learn of the prehistory of a region which directly influenced the aboriginal human occupation of two-thirds of the continent. Developments in other regions created similar emergencies, and the threatened destruction in a great number of river valleys constituted a serious threat to a large body of knowledge.

In order to cope with this situation, the Committee for the Recovery of Archaeological Remains was formed. Continuity with previous committees and with the long and complicated discussions and planning was maintained by the appointment of the late William S. Webb, Frederick Johnson, John O. Brew, and the late Alfred V. Kidder. The committee established itself as an independent unit and elected Webb chairman, Johnson secretary, the late W. Duncan Strong liaison member for NRC, and the late Frank H. H. Roberts, Jr., liaison member for the Smithsonian Institution.

The general and broad objectives of this committee were those of making certain that "archeological remains threatened with destruction are preserved." The Committee believes, read a statement of its secretary (*4*), "that preservation includes complete and permanent documentation of all aspects of the process of collection together with published syntheses and interpretations of the data. These aims necessitate the development of projects which permit the survey of areas, the excavation of important Indian villages, or other sites, the institution of laboratories and other repositories and, what is very important, the publication of the results." The committee's expenses were met at first by subventions, notably from the Viking Fund (Wenner-Gren Foundation), and by appropriations from the Society for American Archaeology and the American Anthropological Association. Later the National Research Council, the Social Science Research Council, and the American Council of Learned Societies were

to contribute, and the ACLS has continued to provide major support, with some assistance from the American Anthropological Association. This diversified support provided a broad and solid base for the committee which was representing the field of archeology.

Necessary arrangements were made permitting the committee complete mobility and freedom of action. To do this required, much to the dismay of some, that this committee have no formal, fixed responsibility. From the outset it was recognized that the members of the committee must be able to range freely from the offices of government officials in Washington to excavations in the field in order to give advice, search for sources of trouble, and aid in development of the program. In a rather unique fashion and with the great assistance and support of Waldo G. Leland, then president of the ACLS, responsibility was fixed in the committee itself. As the principal letter describing this says (*5*):

> . . . it was believed essential that the CRAR be organized as a "floating committee"; by maintaining complete independence, the members of the committee would be able to accomplish a great deal more. This independence has proved to be of considerable advantage. . . . The members of the Committee can bore into the heart of any problem with no fear that their activities will embarrass any government agency or any organization which has connections with the government. It is recognized that responsibility for the activities of the CRAR is not well established. The only check the Committee has. . . . is that which might be imposed by the organizations sponsoring the individual members. It is also true that each member feels a considerable personal responsibility for his own actions and for that of the committee. From my own experience, this type of check is far more powerful than any other that can be devised.

One very important feature of the functioning of the committee was its ability to communicate with the many government agencies which quickly became involved in the expanding salvage program. Lacking formal entanglements, the committee was able to assemble members of various agencies for discussion or planning without going through "channels." Matters of policy and details of administration could be worked out informally through the committee, so that official adoption or acceptance by several otherwise unrelated agencies was quick and final.

Organizing the Program

The nature of the existing situation dictated recognition of responsibility and minimum objectives as follows.

1) The archeological materials were recognized as one of the country's natural, cultural resources. It was believed that the government was responsible for their preservation. In addition, it was true that federal projects were the major cause of destruction, and, as in the Old World (including the Soviet Union), salvage work must be included as part of the construction project. Also, private and state institutions could not, in the time available, do the amount of work necessary without major financial assistance and a large increase in their staffs.

2) The program should be properly administered by an experienced agency. This was particularly necessary at the policy levels.

3) The highest scientific standards should be maintained. This was the last chance to secure some kind of data. It was necessary, therefore, to collect as much material as was needed and to make a complete record that would be dependable and usable in the future. This meant that the work must be done under the direct supervision of competent professional archeologists.

4) Provision for publication must be included in the program. It was generally agreed that publication of the record was truly the act of salvage, in that it made the data available.

Such needs added up to the establishment in the federal government of an interagency program almost without precedent. CRAR had some initial difficulty finding a favorable reception by government agencies until the day when the outline of a suitable program was discussed with Arthur E. Demaray, then associate director of the National Park Service. He immediately saw the need and, not being deterred by its unusual aspects, went into action. The results of his clear and decisive understanding set in motion several trends of development which established the program in a firm and efficient fashion. It is a tribute to him that nearly 20 years later some of Demaray's initial ideas are still extremely useful.

Work commenced under memoranda of agreement between the National Park Service and various agencies. The first, sparked by Demaray, was with the Smithsonian Institution, which after signing an agreement assigned the task of carrying out the scientific work to Frank H. H. Roberts of the Bureau of American Ethnology. Roberts organized the "River Basin Studies," an administrative unit which was to be responsible for the archeological work, using funds transferred from the Park Service. Other agreements were made with the Bureau of Reclamation, through which appropriations for the work came originally. Shortly, however, it was ruled that the program came within the purview of the Historic Sites Act and that appropriations should be requested by the Park Service. Overseeing the Park Service's part in the program was Ronald F. Lee, then chief historian. Lee had the combination of wisdom, vision, and knowledge of administrative problems which was essential, especially in the early days when everyone was cutting a new path through the maze of federal regulations. Lee understood the part the Park Service was to play in establishing in the government a cooperative organization which could include private institutions and which would combine efficient administration and the proper atmosphere for the highest grade of archeological research. Continually in the background was the knowledge that, once the reservoirs were filled, the prehistory of enormous areas could never be reconstructed.

In the late 1940's the government was beset by uncertainties concerning the direction in which it was going. It was committed to the construction of multipurpose dams and associated works. However, questions concerning the way in which development of the river valleys, water resources, and so on, was to be administered were not answered for some time. Thus the administrators of the archeological program did not know whether they would have to work eventually under a series of valley authorities analogous to TVA or whether administration would remain under established agencies. The uncertainty at the beginning kept the program flexible which, though troublesome, actually enhanced its vitality.

It is a remarkable fact that the "principle of salvage archaeology" (*1*) can be said to have infiltrated the government without benefit of congressional action or comparable fiat. The idea was not entirely new, for the Park Service and the Bureau of Indian Affairs had cooperated in salvaging arche-

ological materials that would otherwise have been destroyed by Department of the Interior road building on Indian reservations. Since 1945 the Department of the Interior has been a staunch supporter of the salvage program. The Secretary has been interested, and the Bureau of Reclamation has always been cooperative.

Many other government agencies have been involved in one way or another. The Corps of Engineers loaned equipment and made land on which archeological sites were located available at crucial times. The Federal Power Commission has made stipulations in its licenses so that salvage work has been accomplished, especially in the southeastern United States. The U.S. Geological Survey has participated by doing geological research on areas where archeological sites were located, and the Bureau of Land Management has issued permits facilitating work on a number of projects. The Department of Defense has cooperated by curtailing looting of sites by troops stationed nearby. The Civil Aeronautics Authority has sent out instructions concerning the protection of archeological sites in cases of airport construction. The Bureau of Public Roads, through agreements with state departments and designated cooperating agencies, has facilitated salvage operations on sites to be destroyed by road construction. Very significantly, the Bureau of the Budget has recognized the need for salvage archeology. Rather recently the Atomic Energy Commission has decided to support salvage projects on its land in Nevada. NASA is establishing a salvage project at Cape Kennedy. The Bureau of Prisons moved the site of a projected building in order to preserve an Indian mound in West Virginia. Perhaps the most unexpected instance of cooperation was the action of the Bureau of Mines in directing that archeological sites be salvaged on lands from which huge amounts of dirt are to be bulldozed into century-old coal-mine fires in order to extinguish them. The Department of Urban Renewal is also interested in the preservation of prehistoric and historic sites, and a number of such projects will be included in some of its programs. In all, John Corbett and Zoro A. Bradley of the Division of Archeology of the Park Service, which now administers the program, list about 18 agencies as cooperators in the work. This is a far cry from the first efforts in 1945, when one small party under the leadership of Waldo R. Wedel of the Smithsonian Institution went to work out of Lincoln, Nebraska. Funds were inadequate, and during the first years the men drove their own automobiles thousands of miles in order to provide a properly organized and useful archeological survey of the poorly known region.

In the beginning, the Smithsonian Institution accepted responsibility for the scientific results of the program. It set up field offices with the assistance of the State Universities in Lincoln, Nebraska, in Eugene, Oregon, and in Austin, Texas, and much was accomplished through them. However there were periods, especially early in the history of the program, when the supply of trained archeologists was short and the program suffered from lack of personnel. Private and state institutions recognized the shortage and related difficulties and, often at some sacrifice, engaged in the salvage work. Also, the Park Service set up a system of contracting for salvage work with museums and archeological departments in universities so that they could take the field.

One rather interesting ramification of this is the fact that expansion of the program stimulated the foundation of departments of anthropology in universities where none had been before. In some instances, too, men retained to do the salvage work stayed on to become members of expanded departments. The value of the cooperation provided by nongovernment institutions cannot be overestimated. This, more than anything else, indicates the basic interest ordinary citizens have in the prehistory of the locality in which they live. Ten years ago more than 35 such institutions were engaged in the work. Certainly more have participated in recent years.

Before mentioning what has been done, I should note that there have been some failures which have been near-catastrophes. In a number of cases there just was not enough money available in time to permit excavations before a number of reservoirs filled. There are other troubles. The waters of reservoirs cut new shore lines, and erosion and water seepage can be extensive. A problem now is that of "policing" some of the reservoirs to make sure that a valuable record that was thought to be safely above water is not lost in a slumping bank.

A judgment of the contribution made by salvage archeology is complicated by the fact that great progress has been made in archeology in general during these years. Of about 500 papers which have been published since 1947 by participants in the program, an estimated 10 to 15 percent are full-length monographic descriptions and some 30 percent are journal articles describing important and useful details of the work. The rest may be described as a useful collection of reports and notes of more or less passing significance. How this publication record compares with that for routine archeological work is difficult to determine. There is a good possibility that the rate of production of significant publications is relatively lower for the salvage archeologist than for the academic research man. There are some acceptable reasons for such a difference—lack of financial support for a publication project, for example. But, by and large, the record of publication of results of the salvage program is good enough. However, there is a great lag between the time of completion of fieldwork and the preparation of definitive reports. Where there is no good reason for it, such a lag is deplorable. It is my understanding that recently a concerted effort has been made to correct this situation, and that we can look for improvements shortly. As I have said, a great deal of the work has been done in areas about which there had been little or no archeological knowledge. Under these circumstances the best we can expect is careful descriptive monographs or, as they are called, "site reports." Initial interpretation is valuable and useful, but it will be years before some of the material collected is fully understood.

According to estimates, the program expended, during some years, more money on archeological fieldwork in the United States than the sum total spent by private and state institutions. In view of the efficiency of the operation in the Park Service, the Smithsonian Institution, and the other agencies involved, this indicates that an impressive record has been amassed.

What have we got? In the Missouri Basin and from the Columbia-Snake River drainage area there has been preserved a vast amount of knowledge

of ancient communities whose existence had hardly been suspected in 1945. One can say almost the same thing for areas in Texas and California, except that in these localities there had probably been some knowledge of ancient communities prior to 1945. In the Southeast, additional crucial information has been added to that collected by TVA, by WPA, and by private institutions. Historic sites have been excavated and recorded, and new details added to our knowledge of the early fur-trading posts and army posts. On the whole, the record is a fine one, and much credit goes to the National Park Service, the Smithsonian Institution, and the numerous public and private cooperating agencies. The program is far from being at an end. In fact, it is expanding so rapidly that it is sometimes difficult to keep track of it. Water resources are still being developed, and there will be need for archeological salvage in reservoir areas for many years to come. We are faced with added problems due to the expansion of the population. The rebuilding of cities, the increase in the size of airports, the need for factories, real estate developments, and analogous operations threaten to destroy the evidence of the past upon which these works of the present are founded. It is not possible to relax, for there is an increasing amount of work to be done.

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The Training of an Astronomer

The dilemma of graduate schools in astronomy is best solved by establishing telescopes in good climates.

John B. Irwin

The topic "What's wrong with American astronomy and what to do about it" is one that has been helpful in years past to astronomers whiling away the long night hours in a cold dome, waiting for the clouds to go away. Such discussions are more than an idle parlor game, for out of them have been forged the knowledge, desires, and decisions that have led to larger telescopes, better instrumentation, new research ideas, and great discoveries. I suspect, however, that the average citizen in past years couldn't have cared less about this topic—this, despite the fact that news of new astronomical happenings arouses a public interest perhaps second only to that inspired by new medical discoveries.

But whatever else one may say now, this topic is no longer a matter of indifference to the federal government, with its deep concern for the future of all sciences. For example, the government space programs necessarily require hundreds of thousands of highly trained specialists of all kinds. Although Space is not completely synonymous with Astronomy, the link is a very close one, and a goodly number of these specialists are, will be, and should be Ph.D.-trained astronomers. If there are critical shortages of such specialists—and there are—three things will happen: (i) the already high costs of the space programs will go even higher; (ii) it will take longer to reach designated goals; and (iii) considerably less will be learned or discovered than would otherwise be the case. The stakes are very high indeed, and just as a matter of "insurance," therefore, it would seem desirable that an amount of money equal to only a few tenths of 1 percent of NASA's budget should be devoted to the training of new astronomers in all its many aspects.

Astronomers are greatly indebted to the Whitford report (*1*) for its repeated and carefully delineated emphasis of the value of ground-based observational astronomy, for its lengthy and thoughtful discussions concerning the shortage of astronomers and the severe lack of enough telescopes of all sizes in dark-sky locations, and especially for its pointing up of the incredible dilemma of the astronomy graduate school in 1964—and beyond. The report's total recommended 10-year budget is $224.1 million. In what follows I discuss a $3.2-million budgetary item which is connected with the training of graduate students in optical astronomy and suggest, for reasons given in part in the preceding paragraph, that the importance of this item is all out of proportion to the relative size of 3.2 to 224.1.

In 1957, the year of the first Sputnik, the top graduate schools in astronomy were, in order of numbers of graduate students, Harvard, Georgetown, California (Berkeley), California Institute of Technology, Michigan, Indiana, Colorado, Chicago, and Princeton, with Columbia, Ohio State, Stanford, and Yale (five students each) in a four-way tie for tenth place. These top 13 accounted for 150 of the 168 graduate-student total. The Whitford report's estimated top-ten ranking for 1966, in order of numbers expected, is: California (Berkeley), Harvard, Maryland, Colorado, Georgetown, Michigan, California (Los Angeles), Yale, Arizona, and California Institute of Technology (the last two being tied for ninth place). These ten would account for "only" 460 of an expected total of 793. In 1957 only six graduate schools had more than seven students; in 1966, 28 schools expect to have more than this number, and 12 of these expect to have at least 30 students or more—and this is only the

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