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A National Research Laboratory in the Late 20th Century: U.S. Geological Survey's Paleontology and Stratigraphy Branch as a Case Study

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Government agencies involved with natural history research play different roles from those of museums, academic departments, or industrial laboratories. They share similar interests in systematic biologic research and its application to problem-solving, but emphasis is placed on different aspects of the scientific enterprise. Traditionally, museums were mostly pure research laboratories and commercial labs were almost entirely applied, whereas organizations like the U.S. Geological Survey (USGS) fell somewhere in between.

This paper traces the post-World War II history of the Paleontology and Stratigraphy Branch (P & S) of the USGS from its phoenix-like revival in 1948 under Branch Chief Preston E. Cloud, Jr. (Fig. 1) to its elimination as a functioning unit in 1998, reorganized out of existence during Gordon Eaton's directorship of the Survey.

During the half-century that followed the end of the Second World War and to 1998, when the USGS was reorganized during the tenure of Gordon Eaton as Director, the Paleontology and Stratigraphy Branch (P & S) grew from a handful of aging scientists left over from World War II, to nearly 75 active researchers in three Survey centers (Washington, Denver, and Menlo Park, California). At the height of activities in the 1970s and 80s, more than 100 geologists, paleontologists, technicians, photographers, artists, and other support staff made it the most talented and diversified paleontologic research "institute" in the world.

Systematic biologic expertise covered most of the animal and plant phyla and biostratigraphic syntheses of fossil assemblages in each of the Phanerozoic systems were published. A wide range of paleontologic applications came under investigation, including evolution, paleoecology, environmental analyses, modern reef analogues of ancient reef systems, fresh-water lake assemblages, coal-swamp features of the Carboniferous, etc.

Two developments in the 1990s led to the demise of the P & S Branch: 1) the Federal initiative for "out-sourcing" many scientific research activities, which were looked at by middle managers as money-sump "losers"; and 2) a reorganization of Agencies in the Department of the Interior resulting in the elimination of subunits in the USGS, driven by budget, program and personnel realignments.

Beginnings (1940s–1950s)

In the process of reinventing government after World War II, the USGS was among those Federal Bureaus that reorganized their internal structure and programs to meet the challenge of a

nation that was devouring its natural resource base at an exponential rate.

An essentially individual research-project oriented agency before the War, the Paleontology Section was a loose-knit group of scientists with John B. Reeside (Fig. 2) as Chief Paleontologist. Edward O. Ulrich (Fig. 3) was responsible for the "Lower Paleozoic," and George H. Girty (Fig. 4) headed the "Üpper Paleozoic" research. Julia Gardner (Fig. 5), the first woman paleontologist on the Survey, was a Tertiary mollusk specialist, and Roland Brown (Fig. 6) handled paleobotany and shared responsibility for the Mesozoic with Reeside.

During the war years, the Survey rallied around with emergency programs to fulfill wartime needs for strategic studies of metals, nonmetals and fuels, and terrain analyses for military purposes, and basic paleontologic studies came to a standstill.

FIGURE 1. Preston E. Cloud, Jr.

The post-War Survey revamped its research goals in most of the basic earth science disciplines. This specifically involved developing laboratories to work on all aspects of field research. Among a handful of others, the work in paleontology, stratigraphy, and sedimentology was the responsibility of the Paleontology and Stratigraphy Branch which was placed in the hands of Preston E. Cloud, Jr., recently a professor at Harvard University.

In 1948, Cloud began an ambitious plan to build a research organization in the soft-rock geology area, second to none. His approach was an eclectic one. He had inherited a handful of older paleontologists from the pre-War 1930s, whom he called on to lead subunits in his Branch Organization Chart. These units were responsible for logical subdisciplines, largely based on the fossil collections that had been assembled over more than 50 years of USGS work across the nation. Most of these collections were being curated by an individual or a small group of scientists housed in the Museum of Natural History in Washington. Although not legally linked, a common community of interest had drawn both Museum and Survey paleontologists into a loosely-knit, collections-oriented, informal research institute.

The P & S Branch of 1950 had 5 subunits: Lower Paleozoic, Upper Paleozoic, Mesozoic, Tertiary, and Paleobotany/Vertebrate Paleontology. Old-timers in these subunits were unofficial assistant Branch Chiefs who acted collectively as the Branch Chief's staff for program, budget, performance evaluations, etc. At the outset, these men were: LP — Charles Merriam, UP — James Steele Williams, Mes. — J.B. Reeside, Tert. — Druid Wilson, and Paleobot/VP — Roland Brown.

Cloud, with the backing and blessings of Chief Geologist Bill Bradley, began to build research strength in these areas by searching the Survey roles for permanent employee paleontologists who had been on various wartime projects. Thus, within a few years, the Branch inherited, or dragooned: Josiah Bridge, Jean Berdan (Fig. 7), Israel Gregory Sohn (Fig. 8), Helen Duncan, Mackenzie Gordon (Fig. 9), Julia Gardner, Esther and Paul Applin, Ralph Imlay, Bill Cobban, and

FIGURE 2. John B. Reeside, Jr.

FIGURE 3. Edward O. Ulrich

FIGURE 4. George H. Girty

FIGURE 5. Julia Gardner

FIGURE 6. Roland W. Brown

FIGURE 7. Jean M. Berdan

FIGURE 8. Israel Gregory Sohn

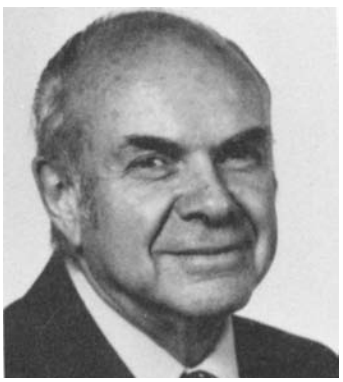


FIGURE 9. MacKenzie Gordon, Jr.

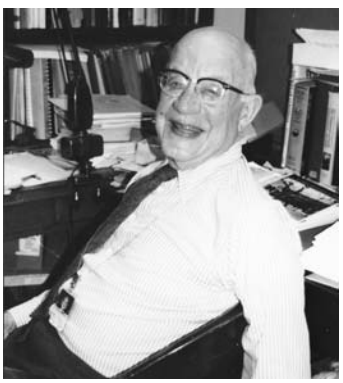


FIGURE 10. Frank C. Whitmore, Jr.

others. This trend continued through the 1950s with the addition of: Jim Schopf, Harry Ladd, Wendell Woodring, Frank Whitmore (Fig. 10), Ruth Todd, Charles Read, Ed Lewis, Chuck Repenning, John Huddle, and others.

Cloud had the idea that any viable research group, within the USGS framework, should have experts in all areas of soft-rock geology that might be the focus for "service" requests from the Survey itself, state surveys, academia, other federal programs, and the general public. He thought that each major group of animals and plants should have an expert systematist and that each geo-

logic system needed at least one biostratigraphic specialist. Some of these areas could be combined in a single paleontologist, of course, but his Table of Organization had slots for each of these specialties.

Consequently, in more than the decade of P and S growth under his aegis, Cloud kept his eye open for young paleontologists who fit into his organizational scheme and who were interested in Federal Service. His wide circle of associates in academia and industry enabled him to hire during that decade: Pete Palmer, Rube Ross, Art Boucot, Tom Dutro, Bill Oliver (Fig. 11), Rich Boardman, Norm Sohl (Fig. 12), Ray Douglass, Serge Mamay (Fig. 13), Ellis Yochelson (Fig. 14), Norm Silberling, Estella Leopold (Fig. 15) and Bob Neuman. This trend continued through the 1960s and 70s when these younger scientists were added: Warren Addicott, Tom Ager, Gus Armstrong, John Barron, Blake Blackwelder, Platt Bradbury, Laurel Bybell, Ray Christopher, R. M. Forester, John Hanley, Anita Harris, John Pojeta (Fig. 16), John Repetski, Joe Hazel, Fred May, Wylie Poag, Bill Sliter, Mike Taylor, Page Valentine, and Lucy Edwards, among others.

Thus, within a quarter-century after Cloud had retired in 1962, his dream of a "National Laboratory" was in place. Two fine office/laboratories, opened in the 1950s, grew into regional centers in Denver and Menlo Park, California; with small outlying special purpose labs (at various times) in Columbus, Ohio, Albuquerque, New Mexico, Flagstaff, Arizona, Laramie, Wyoming, Woods Hole, Massachusetts, in Florida, and at Santa Barbara, California.

People from Washington who initiated the two main centers were: Rube Ross, Bill Cobban, Norm Silberling and Ed Lewis in Denver; and Charlie Merriam, Mac Gordon and Dave Jones in

FIGURE 11. William A. Oliver, Jr.

FIGURE 12. Norman F. Sohl

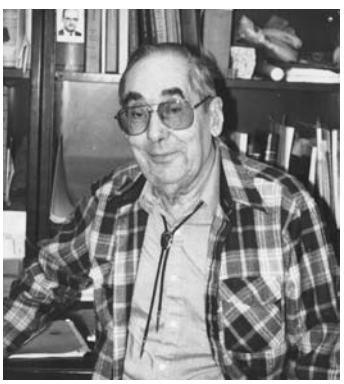


FIGURE 13. Sergius H. Mamay

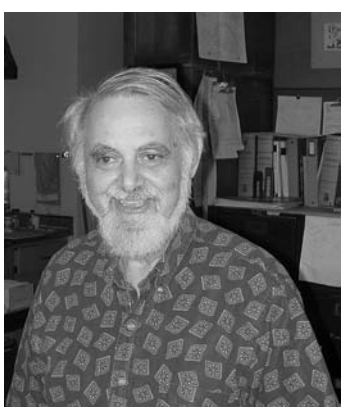


FIGURE 14. Ellis L. Yochelson

FIGURE 15. Estella B. Leopold

FIGURE 16. John Pojeta, Jr.

Menlo Park. Both centers grew by adding new scientists and, at about the time of the USGS Centennial Celebration in 1979, the P & S Branch (institute) was near its zenith. This was also true for other Branches with nationwide impact: isotope geology, volcanology, petrophysics and remote sensing, analytical labs, global seismology, rock mechanics, astrogeology, tectonophysics, and military geology, among others.

In the late 1980s and early 1990s, two trends in the USGS began to erode away this ideal situation: 1) loss of budget and program control at the Branch level, and 2) a Federal Executive move to "outsource" all non-profitable projects and services.

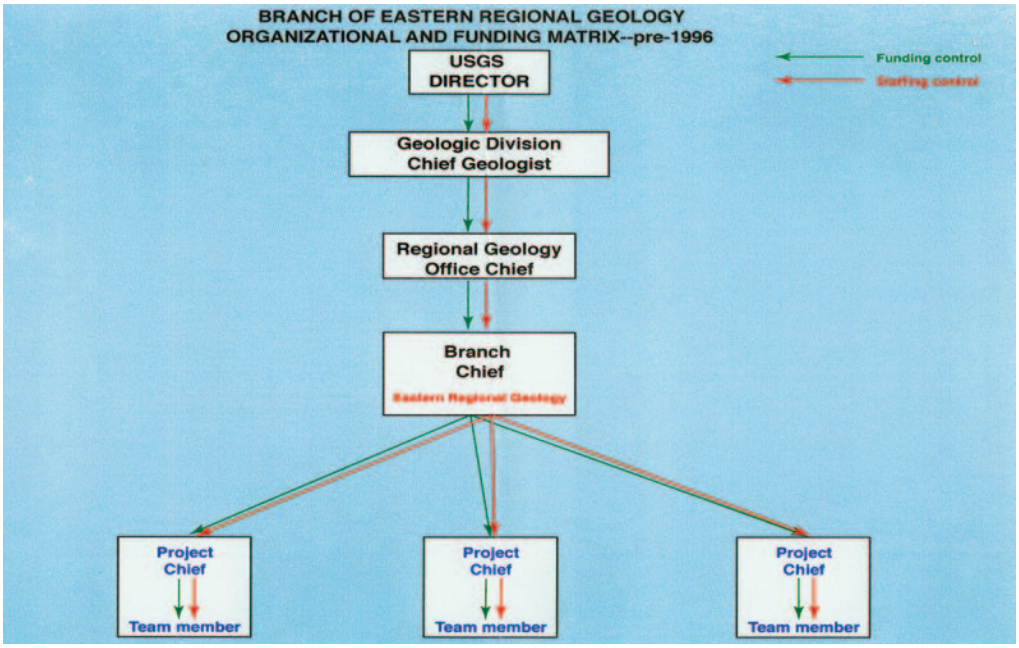
Finally, an ultimate reorganization of the USGS in the late 1990s led to the effectual elimination of the old organization, including the Branches themselves. These three charts (Figs. 17–19), depicting the organizational and funding matrices in: 1) pre-1996 (50 years of stability!) (Fig. 17), 2) 1996–1998 (separation of staffing and funding controls) (Fig. 18), and 3) 2003 (present chaos!) (Fig. 19), graphically illustrate the decline and fall of the Branch structure in the Geological Survey.

Summary and Results

The P & S Branch in the last half of the 20th Century, fulfilled the fondest dreams of its first post-World War II chief, Preston E. Cloud, Jr. During the middle decades of that time, 1960–1990, it was the most influential force in paleontology in the Western Hemisphere (perhaps in the world). Its scientists produced a steady series of: 1) taxonomic monographs in diverse biologic groups; 2) biostratigraphic correlation papers in every Phanerozoic System; 3) and thousands of administrative reports (the Examination and Report) to USGS geologists, and others, who referred fossils to the Branch for study, analysis, and age-dating. Many of the monographs and stratigraphic syntheses provided major breakthroughs that solved, or were parts of the solutions of, climactic geologic enigmas. Most of these works, some now over 50 years old, continue to guide the residual research paleontologic efforts in government, academia, and the few remaining industrial laboratories. Production of scientific results took every imaginable form during this 50-year period and a conservative estimate of published papers and abstracts is over 5000. The administrative reports (E and Rs) number in the hundreds of thousands! Averages mean very little, of course, but over sample decades of the 60s and 70s, each professional paleontologist published two or three research papers and another two abstracts each year and was involved with biostratigraphic service work for four or five separate projects during that year.

For more than 30 years, this large active group of researchers accepted any challenge and more often than not came up with significant results. For example, Josiah Bridge's work on the fossils of the Mascot-Jefferson City zinc district in Tennessee helped mining companies work out the geologic structure and thus locate more than a million tons of ore. Helen Duncan identified tubular holes in a dolomite core as a Mississippian syringoporoid coral, in Utah, which encouraged the company to continue drilling, and a large sulfide ore deposit was subsequently discovered. Anita Harris's pioneering research on color changes in conodonts, related to temperature, has provided vital data to companies that are exploring for oil and gas in the Appalachians, the Basin and Range, and in northern Alaska.

In the 1960s, Serge Mamay and Charlie Read published a Professional Paper detailing paleobotanical biozonation of the Carboniferous of the eastern United States. More than 50 years later, this monograph remains the standard for correlation of the nonmarine Carboniferous and has not been supplanted. Roland Brown delineated the Cretaceous-Tertiary boundary with his work in the 50s on the plant-bearing beds in the Denver Basin. Spore-pollen description was done by Bob Tschudy. Recent isotopic dating of the boundary has put an age in years on this event so critical to



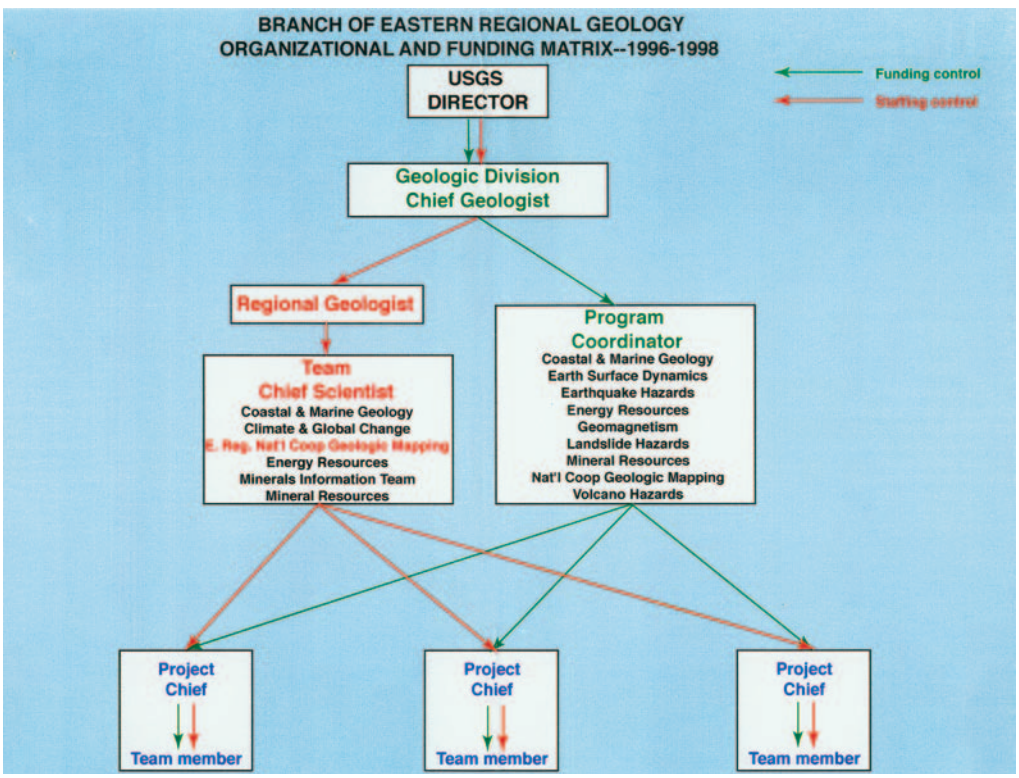


FIGURE 17 (above). pre-1996 (50 years of stability!).
FIGURE 18 (below). 1996–1998 (separation of staffing [red] and funding [green] controls).

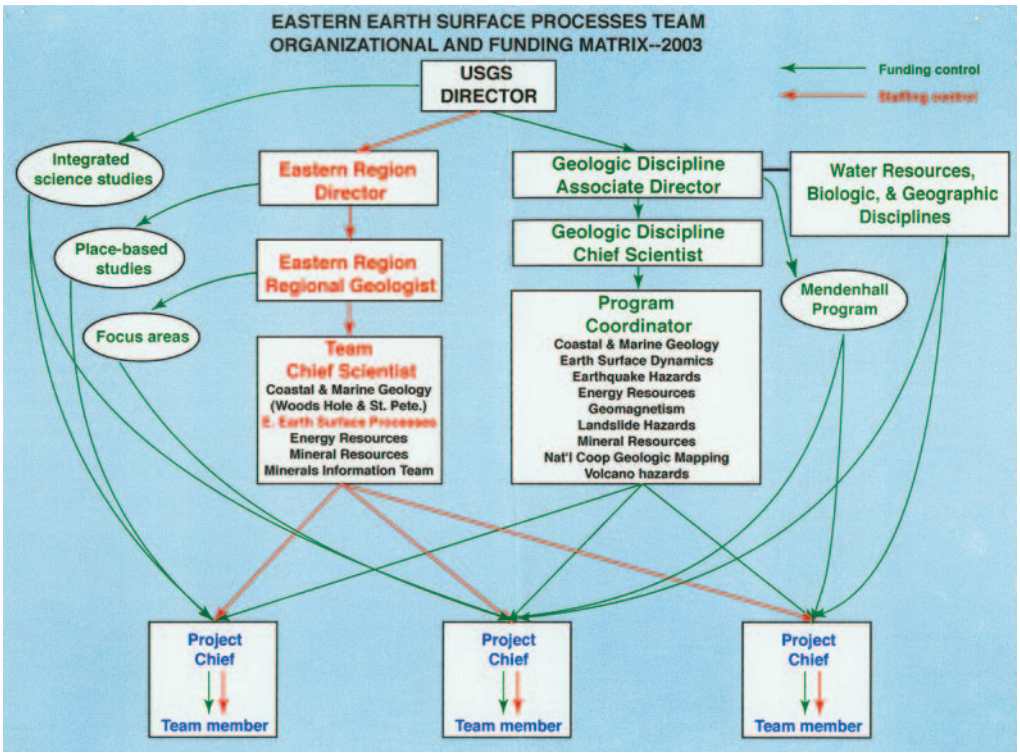


FIGURE 19. 2003 (present chaos!).

extinction theory, but the accuracy of the stratigraphic position of the boundary is unchanged since Brown and Tschudy's work. Mac Gordon's systematic studies of Carboniferous goniatites and regional biostratigraphy produced a detailed synthesis for the Arkansas bauxite field, and his cephelopod zonation has become a standard for North American Carboniferous studies from Arkansas and Oklahoma to the Great Basin and California to northern Alaska. Bill Cobban's intimate knowledge of Cretaceous stratigraphy and detailed ammonite distribution allowed him to establish a biozonation consisting of 30 zones in Montana. These zones, along with Peterson's isotope-based dates on interlayered ash beds, produced a fine-scale age template for late Cretaceous events. This multipurpose Cretaceous calendar is still used extensively for studies of dinosaur extinction and end-Cretaceous geologic events everywhere in North America.

In retrospect, a national laboratory concept could not have survived in the late 20th century U.S. Geological Survey. The vision of Cloud and Bradley, nurtured by the general climate of science in the 1950s, was a grand one. The P & S Branch was a focus of paleontologic research in the United States for more than a quarter-century. Many of its scientists developed international reputations and became leaders in their fields. The stronger researchers, supported and supplemented by a variety of talents in less viable specialties, developed teams to attack everything from the origin of life to the evolution of coral reefs. Evolutionary patterns were clarified for many groups of fossils. And all these data were added to the common pool of paleobiologic knowledge in the latter half of the 20th Century, and became the backbone for dozens of large-scale syntheses including great chunks of the *Treatise on Invertebrate Paleontology*, the development of the detailed Geologic Time Scale, regional geotectonic basinal studies and plate-tectonic controlled paleobiologic historical studies. Certainly, the demise of the P & S Branch, along with other basic geolog-

ic research in the U.S. Geological Survey, has been a scientific disaster of epic proportions.

Photo Credits

Figure 1, National Academy of Sciences; Figures 2, 4–6, 8–9, 11–12, U.S. Geological Survey; Figure 3, Smithsonian Institution Archives; Figures 7, 17–19, John Pojeta, Jr.; Figures 10 and 13, Department of Paleobiology, National Museum of Natural History; Figures 14–16, Alan E. Leviton.

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