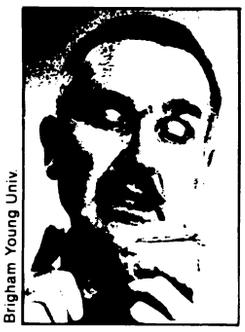
Bone bonanza: Early bird and mastodon

Some of history's most significant old bones have cropped up in the western United States during the past several weeks. In western Colorado's Dry Mesa quarry, Brigham Young University archaeologists have come upon the 140 million-year-old remains of what they are calling "the oldest bird ever found." And in Sequim, Wash., Washington State University researchers have uncovered the first direct evidence that mastodons were hunted by humans 11,000 to 14,000 years ago.

The discovered rear-leg bird femur (and subsequently, two connected shoulder bones) is some 60 million years older than the previously found "oldest bird" fossils, says BYU's James A. Jensen. The newly discovered bone is of the same period (Upper Jurassic) as the Archaeopteryx—a small, winged dinosaur thought by some to be an ancestor to the true bird. However, "it is obvious that we must now look for the ancestors of flying birds in a period of time much older than that in which the Archaeopteryx lived," says Yale University's John H. Ostrom, who positively identified the specimen from Jensen's excavation site.

One of the key clues that this was a true bird and not another winged dinosaur was found in the portion of the femur that attaches to the hip socket, Jensen says. "A bird has a relatively weak hip socket connection," he notes, while the Archaeopteryx has a stronger, less flexible ball and socket joint and a "ground dweller's femur." Lacking the deep keel on its breast bone to which flying muscles must attach, the Archaeopteryx was incapable of powered flight, but probably could glide, Jensen suggests. Its feathers served mainly to keep it warm. Jensen's find was made at the same site where, in 1972, he discovered the fossils of the largest known dinosaur—more than 50 feet tall, with 8-foot shoulder blades. The quarry has been mapped and dated by geologists. Although the bird fossils were found near the surface, Jensen believes they were once buried 16,000 feet underground before erosion gradually uncovered them.

At Washington State University's anthropology department, Richard Daugherty received a phone call in early August from Claire Manis, the wife of Sequim landowner Emanuel Manis. Her husband, she told Daugherty, was excavating to build a duck and goose pond on his 5-acre plot. After removing three feet of top soil, Manis came upon a tusk and other assorted mastodon bones. Daugherty rushed to the scene and found an unexpected prize—a broken rib fragment with an apparent projectile extending three-quarters of an inch out from it. X-rays showed the projectile also extended into the bone for three-quarters of an inch and was indeed a spearhead.



Brigham Young Univ.

Jensen examines femur. The unnamed bird's genus and species are uncertain.

Ruth and Louis Kirk

Mastodon rib with a protruding spear tip.

While there have been similar finds with mammoths, this was the first such direct evidence of human hunting of mastodons, Daugherty says adding, "This is great evidence. It could not have been done by accident."

Meanwhile, in eastern Siberia, Soviet scientists dug out a chunk of ice containing a perfectly preserved baby mammoth, about six months old with reddish fur, big feet and small ears. □

Mental illness Rx: Research, insurance

When President Carter established the President's Commission on Mental Health in February, he urged its members not to "reinvent the wheel" by repeating the work or findings of other governmental and citizens groups. In its preliminary report to the president, made public last week, the commission appeared to comply with Carter's request. But just how smoothly some of these recommendations will roll their way into Carter's upcoming budget proposals is still questionable.

After four months of research, which included testimony from 200 persons and written presentations from another 200, Commission Chairman Thomas E. Bryant unveiled a list of 14 recommendations, some aimed at inclusion in the budget. The commission's final report is to be completed by April 1, 1978.

While many of the proposals were predictable and expected, several were somewhat surprising. First, the commission recommended specific and sizeable increases in mental health research budgets but basically adopted a "hold the line" posture in treatment areas. This was the case despite the results of a new National Institute of Mental Health study indicating that the percentage of Americans in need of mental health care at any one time is increasing above the previously accepted estimate of 10 percent of the U.S. population. The report estimates that 20 million to 32 million people currently need some type of treatment.

The commission's research recommendations call for increases of 20 percent in the $117 million NIMH budget, 30 percent in the $16 million National Institute on Alcohol Abuse and Alcoholism allocation and 35 percent in the $34 million National Institute on Drug Abuse budget. "The [research] data out there now are poor," said Bryant, who has been director of the Drug Abuse Council since 1971. Substantial increases are needed "not just in basic research, but in the areas of epidemiology and service delivery as well," he said. Bryant added that in a conversation with Carter, the president "favored" the idea of more research and "said he would try to accomodate us in that."

At the same time, the commission called for essentially no increases in budgets for mental health manpower training and the community mental health centers program. Moreover, it is apparent that the commissioners do not consider the community center concept—the major thrust of the U.S. mental health movement since the early 1960s—nearly the cure-all it was first envisioned to be. "Individual centers have made substantial contributions to the communities they serve," Bryant said, "but important questions have been raised about the concept and implementation of the program. Our initial findings indicate that the centers, though a good method of providing community based services, are not the only method of providing these services." Bryant did not rule out the possibility of cutting off federal funding of the centers after fiscal year 1979.

Bryant said the recommendations do not mean a de-emphasis of treatment, but rather point to a shift in strategy toward improving mental health benefits in Medicare and Medicaid and ultimately including such provisions in Carter's national health insurance package. "Those [restructured Medicare and Medicaid regulations] will be here in April and probably be the building blocks of national health insurance," he said. However, American Psychiatric Association President Jack Weinberg suggested that the commission may have leaned too heavily on research objectives. "We expect . . . that additional funding will be needed for treatment programs as well," he said.

Among the other commission recom-

mendations are: That HEW Secretary Joseph A. Califano Jr. move toward boosting manpower at shortstaffed mental hospitals; give priority to training minority and bilingual workers; analyze the impact of privately insured state programs; and assess the current costs of providing specific mental health services, and that an interagency group be established with the federal government to coordinate the administration of community-based programs. □

Energy reorganization is set to begin

Effective Oct. 1, there will no longer be a Federal Energy Administration, Federal Power Commission or Energy Research and Development Administration. Nor will there be energy projects within the Department of the Interior, the Department of the Navy, the Interstate Commerce Commission, the Commerce Department or the Department of Housing and Urban Development. In their place will be a single cabinet-level department, created by President Carter on Sept. 13, to consolidate federal duties, money and manpower relating to energy.

"Simply creating the department will not solve our energy problems," said the President in announcing the Department of Energy. But he added that together with the National Energy Plan, which he introduced to Congress in April (SN: 4/30/77, p. 277), the new agency will provide "the direction and focus of our energy future."

Chief among changes specifically affecting research and development will be a new system of reporting. Energy programs within ERDA, the primary research agency, had been divided by technology—fossil, nuclear, "advanced systems" (including solar, geothermal and wind), environment and safety, weapons and conservation. DOE will instead divide responsibilities by function—that is, as basic research, precommercial-stage technologies, commercial-stage technologies, conservation technologies (including solar heating and cooling) and weapons.

Another change, the effects of which no one is yet ready to comment upon, is that national laboratories such as Argonne, Brookhaven and Oak Ridge will no longer report to regional operations offices but instead will report directly to an assistant secretary of DOE in Washington. Phil Kief of ERDA says the immediate intention behind this change is to streamline reporting; later, however, there will be an attempt to make individual laboratories more "missions-oriented" and programs within a laboratory more "unified." Although changes will occur slowly, he said it was possible that in time one laboratory will, for example, take responsibility for weapons work, another for nuclear research, another for solar. □

Quasar 3C273 ultraviolet spectrum

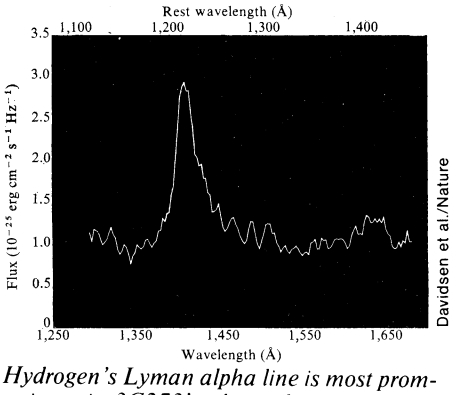
Like Banquo's ghost, quasars will not go away. After a decade and a half of observation the major questions about what sort of astrophysical object they are and what role they have to play in cosmology remain unanswered. It may be some time yet before quasars are put away in a neatly labeled pigeonhole, but a recent significant development, what the observers call the first recording of a quasar's spectrum in the ultraviolet, may put a few constraints on the uncertainties. It even prompts the observers to make a suggestion about that most debated of cosmological questions, the openness or closure of the universe.

The quasar in question is 3C273, one of the oldest beacons, so to speak, of quasar observation. The observers are Arthur F. Davidsen, George F. Hartig and William G. Fastie of The Johns Hopkins University in Baltimore. The observation was made with the Faint Object Telescope, which with a 40-centimeter diameter is the largest optical telescope over flown on a sounding rocket (SN: 7/9/77, p. 24). The total observing time was 235 seconds during which some 13,000 photons from 3C273 were received. The report is in the Sept. 15 NATURE.

The spectrum obtained runs between wavelengths of 1,200 and 1,700 angstroms. In this range the most prominent line, not unexpectedly, is the one called Lyman alpha of hydrogen at wavelength 1,216 angstroms. This line appears with a redshift of 0.16, which is the same as that previously determined from the Balmer series in the visible portion.

If 3C273's redshift is confirmed by comparison of visible and ultraviolet spectral lines—the first time such a comparison has been available for the same quasar—a popular astrophysical model of what a quasar should be is left more than a little shaky. By piecing together partial observations of the strengths of spectral lines in different quasars, a line from here and a line from there, theorists had come up with a model in which a source of ionizing (that is, highly penetrating) radiation is surrounded by filaments or clouds of gas. This model contains the assumption that the ratio of brightness between the Lyman alpha and the H beta line in the visible spectrum should be 40. In 3C273's spectrum it comes out to 4. This discrepancy by a factor of 10 "is likely to have a major impact on [quasar] models," the observers remark.

Cosmologically, 3C273, because of its relatively low redshift, is not very interesting itself. It is the quasars with redshifts above 2 that are mostly concerned in the dispute over the origin of the redshifts: Are they cosmological (due to distance) or gravitational? If one knew the intrinsic luminosities of quasars, one might be able to compare the observed luminosities and have an independent test of the distances and their relation to redshift. The over-all luminosities of quasars vary too much, but there is an hypothesis that comparing ultraviolet luminosities at about 1,450 angstroms might work. The comparison between 3C273 and five high-redshift quasars appears to work if the universe is closed and has about twice the density needed for closure, but these observers caution that it is premature to draw a firm conclusion from that sample. □



Hydrogen's Lyman alpha line is most prominent in 3C273's ultraviolet spectrum.

Pinning down the Viking landers

Locating the Viking landers on Mars with exactitude has been a problem, since they're too small to photograph from orbit. Radio tracking has been the best bet, and it has also been used to refine the "control net," or latitude-longitude grid, by which the positions of the landers and natural surface features are described. Using the newly determined Martian prime meridian on which such a refinement is based, Merton E. Davies of the Rand Corp. reports in the Sept. 23 SCIENCE that the longitudes of landers 1 and 2 are, respectively, 47.82° and 225.59°, each with an uncertainty of ±0.1°.

The best method would have been a photogrammetric one, he says, but the landers have not been locatable on the orbiter photos. "This inability to find the lander locations relative to the local topography is a shortcoming of the Viking mission, and care should be taken in the future to be sure that landers and [proposed surface-roving vehicles] can be located with reference to the local terrain."

In fact, however, it has been done, using the photo that is on the cover of this issue of SCIENCE NEWS. Produced by Ken Jones of JPL (see cover blurb) and applied by Jones and Elliot Morris of the U.S. Geological Survey, it has reduced the longitude uncertainty of lander 1 to ±0.005°. (The technique, says Jones, won't work for lander 2, which has less-conspicuous features on its horizon.) □