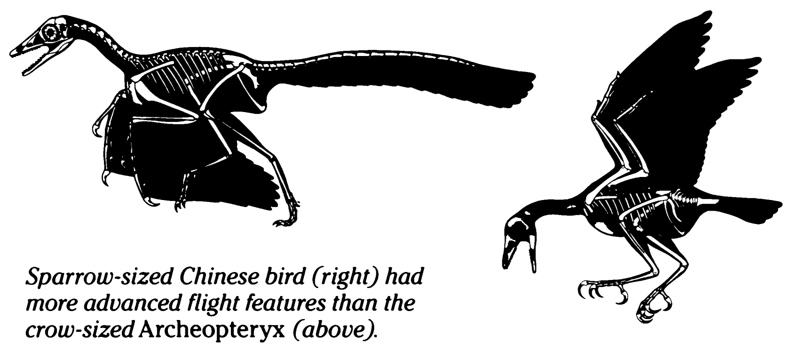

Sereno

Sparrow-sized Chinese bird (right) had more advanced flight features than the crow-sized Archeopteryx *(above).*

bones in the wings had a shrunken first digit and an enlarged second digit, an arrangement resembling that seen in modern birds.

The fossil also shows many characteristics lacking in modern birds, such as stomach ribs, unfused hand bones and a primitive pubic bone.

A 10-year-old boy discovered the specimen in the rocky remains of an ancient lake that existed during the early Cretaceous period. The Chinese bird joins several slightly younger fossils found in Spain (SN: 2/13/88, p.102) as the only known birds from this crucial phase in avian history. Some of its primitive features, including stomach ribs, do not appear in the Spanish fossils.

Larry D. Martin, a paleontologist at the University of Kansas in Lawrence, says the great geographic distance between the Chinese and Spanish fossils indicates that modernized flying ability must have developed and spread across the continents long before the time of these birds.

– R. Monastersky

Protein may predict diabetic complications

Insulin-dependent (Type I) diabetics who suffer from disease-related blood vessel damage often have elevated levels of a blood protein called prorenin. Now, a study suggests that a diabetic's prorenin levels may increase significantly 18 months *before* any vessel damage shows up in the eyes or kidneys.

If further research verifies that finding, the protein may someday serve as an early warning of microvascular complications, giving physicians "a better chance of helping people avoid [diabetic retinopathy and kidney damage]," says Darrell M. Wilson of the Stanford University School of Medicine.

Over periods averaging about two years, Wilson and John A. Luetscher of Stanford took blood samples from 135 children and adolescents with Type I diabetes, who also underwent periodic physical examinations.

During the study, nine of the diabetics developed kidney damage (indicated by increased amounts of albumin in urine) and/or diabetic retinopathy, a vision-robbing disorder caused by leaky blood vessels in the eye. Eight of the nine had at least one blood sample showing higher-than-normal prorenin concentrations an average of 18 months before the onset of symptoms, the scientists report in the Oct. 18 New England Journal of Medicine. Among the diabetics who had consistently normal prorenin concentrations, only one developed microvascular complications during the study, the investigators say.

Prorenin is a precursor of renin, a kidney enzyme that helps regulate blood pressure. Its role as a possible marker and perhaps even as a contributing cause of diabetic retinopathy and kidney damage remains unclear, Wilson says. But he suggests that prorenin overproduction may offer one of several indicators that vessel damage has begun or will soon start.

If the new findings are confirmed, he adds, physicians may want to intensify efforts to prevent or delay diabetic blood vessel damage when prorenin levels first rise.

Wilson notes that most insulin-dependent patients don't begin to develop such complications until five years after the onset of diabetes. The National Institute of Diabetes and Digestive and Kidney Diseases estimates that 30 percent of all diabetics develop complications after 10 years with the disease, and 40 percent after 25 years.

Tight control of blood sugar may offer one strategy for staving off microvascular complications, but such control has proved difficult to achieve. In another approach, several researchers have begun testing a variety of drugs that might delay or prevent diabetic complications, notes Ronald D. Brown of the University of Oklahoma Medical School in Oklahoma City. Among these agents are aminoguanidine – which may prevent damaging reactions between glucose and certain proteins – and several antihypertensive drugs, including some that block an enzyme that acts on a byproduct of renin.

– R. Cowen

Spectral astronomy with household tools

Using a car jack and a soldering iron, scientists have identified a prime suspect in a 17-year-old mystery of astrophysics. Their data point to the likely molecular source of certain narrow bands of infrared radiation abundant in space.

Astronomers first noticed in 1973 that many nebulas in the Milky Way and other galaxies emit infrared radiation centered at five specific wavelengths. A decade later, scientists hypothesized that this ubiquitous radiation emanates from polycyclic aromatic hydrocarbons (PAHs), a class of molecules consisting of multiple carbon rings. But when they attempted to confirm the hypothesis, they found that the PAH spectra seen in the lab did not quite match the emissions from space.

Now, two astrophysicists at the University of Alabama at Birmingham say they have resolved one of the biggest discrepancies. By heating PAHs to temperatures surpassing those of earlier experiments, simulating the fleeting conditions under which molecules in a nebula might emit radiation, Thomas J. Wdowiak and Gregory C. Flickinger obtained spectra that appear identical to the interstellar radiation. They report their findings in the Oct. 20 Astrophysical Journal Letters.

"Wdowiak showed that under certain conditions, one of the absorption bands [3.3 microns] of the PAHs matches the profile and position of the infrared radiation," says Louis J. Allamandola, who studies interstellar radiation at the NASA Ames Research Center in Mountain View, Calif. The experiment "very strongly supports" the theory that PAHs produce the emissions, he says.

To save money and time, the Birmingham team used two surprisingly low-tech tools. With an ordinary car jack, they pressed several different PAHs into tablets. Then they used a modified soldering iron to heat the tablets to temperatures as high as 515°C. An infrared spectrometer recorded the spectra of radiation absorbed by the still-hot PAHs. Scientists believe such absorption spectra correspond to the wavelengths at which molecules emit radiation.

The new results don't entirely settle the issue, however. Researchers don't understand the mechanism behind the emissions, and they aren't sure which PAH molecules might be the source.

Proof that PAHs underlie the puzzling emissions would suggest that these hydrocarbons are among the most common organic molecules in space and thus may have played a role in the emergence of life, Wdowiak says. Earlier studies indicated that PAHs may catalyze the production of formaldehyde, a chemical thought necessary for the origin of life.

– R.N. Langreth