a bird with a humerus length of 52 cm would have a wingspan of 523 cm, whereas *P. antiquus*, had it ever attained this humerus size, would have had a 1019-cm wingspan, and *Pteranodon* would have had a 1241-cm wingspan.

The Texas pterosaur, hereafter to be referred to as *Quetzalcoatlus northropi*, is represented by the type Texas Memorial Museum No. 41450-3, which consists of a left humerus and partial radius, ulna, proximal and distal carpals, metacarpal, and first and second phalanges of the fourth digit. An approximate regression equation for the relation of its wingspan to its humerus length

$$W = 29.70H^{1.0116}$$

can be based on a more nearly complete, smaller specimen of the same species and on the regression coefficient of *Pteranodon*. The solution of this equation for a humerus of 52 cm gives a wingspan of approximately 1600 cm.

As for the relation between mass and wingspan, Bramwell and Whitfield (*3*) list five estimates for the mass of *Pteranodon* with a wingspan of 6.95 meters that range from 12.9 to 29.8 kilograms. These estimates are based on attempts to flesh out the animal, not on a calculated relation between mass and wingspan. However, using Greenewalt's (*4*) equation for the relation between mass and wingspan in birds and insects

$$W = cl^3$$

where W is weight, l is the length of the arm, and c is a constant of proportionality, the mass of a bird with a wingspan of 695 cm would be 100 kg, and for a bird with a wingspan of 1550 cm, it would be 440 kg. Once again, the relation between some anatomical feature and wingspan does not seem to have been the same in pterosaurs as it is in birds. Both of these departures from the relation seen in birds ultimately reflect the differences in mode of locomotion. It seems that, although study of present-day flying creatures provides insight into possible structural solutions to a common problem, it does not dictate that a particular solution must be practiced by all flying creatures.

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Sea-Floor Exploration

In the otherwise excellent article by Allen Hammond, "Submersibles: A research technology whose time has come?" (Research News, 7 Mar., p. 824), one error should be corrected. Hammond remarks that "even ordinary echo-sounding gear is almost nonexistent on most university-operated research ships." As best as I can determine, every U.S. university-operated research ship (barring rowboats) can boast an "ordinary" echo sounder adequate to determine depth on the continental shelf. All of the "blue-water" oceanographic ships in the University-National Oceanographic Laboratory System have at least one precision deep-water sounding system capable of determining the water depth to an accuracy of 1 fathom. Most have more than one system. What they don't have are "extraordinary" systems with multiple, high-power, directionally stabilized, narrow-beam transducers designed to map a strip of the bottom rather than a line at one pass. The Navy has a few of these.

U.S. academic research ships are currently suffering from a whole set of problems caused by rapidly escalating costs, limited funding, expanded claims of jurisdiction by coastal states, and a maze of red tape, but they are not in as bad shape as Hammond implies.

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DOD Sponsored Research

In the article "Department of Defense R & D in the university" (22 Nov. 1974, p. 706) by Stanton A. Glantz and Norm V. Albers, my response to a DDC (Defense Documentation Center) statement was presented as evidence of "Two different perceptions" of DOD (Department of Defense) sponsored research. It is a pity that the authors used this as an example, since my strong response was due to a misreading of the DDC statement. While the authors were very open in preparing the material included in volume 1 of their Stanford report (*1*), they used extreme secrecy in preparing volume 2 (*2*), upon which much of their *Science* article is based. As a result, I was not able to correct my error until after the report was published and issued to the public late in 1971. Early in 1972, the Stanford Workshop on Political and Social Issues (SWOPSI) policy board approved an addendum to the report giving this correction and the reasons for it. Part of this addendum is included as refer-