LETTERS

Universe Beyond the Galaxies

The statement that four giant elliptical galaxies are "the most distant celestial bodies ever studied" (Research News, 20 Mar., p. 1334) needs qualification. They are the most distant *galaxies* but not the most distant celestial bodies. Many quasars (or QSO's) are much more distant. The most distant known object, quasar OQ172, has a redshift of more than 3.5 as compared to 1.2 for the most distant of the four ellipticals. The redshift for OQ172 was established by Margaret Burbidge, President-Elect of the AAAS, and a team of Lick Observatory astronomers in 1973. In a Hubble universe with a radius of 18 billion light-years, OQ172 is at a distance of more than 16 billion light-years from Earth as compared to about 11 billion light-years for the four ellipticals.

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Cattle Breeding

George E. Seidel, Jr.,'s review article "Superovulation and embyro transfer in cattle" (23 Jan., p. 351) raises two important issues. First is the welfare of donor cows. Codes or regulations need to be established to limit the number of surgical interventions performed annually on these animals if the surgical method of ova collection is used. Second, while this technique can certainly help improve herd utility, the possibility of narrowing the genetic base of domestic livestock should be considered, especially since there is further reduction through widespread practice of artificial insemination. There are hazards associated with rebuilding the nation's herds on the genetic material from only a few bulls and cows. It would be wise, therefore, to maintain some livestock of different lineages and phenotypic characteristics not deemed useful in order to preserve genetic diversity. A program along the lines of the Rare Breeds Trust in the United Kingdom, for example, should be seriously considered.

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Codes or regulations to limit the number of surgical interventions performed on a donor cow annually would serve no useful purpose. As indicated in my article (*1*) and in the references I cited, embryos are recovered by entirely nonsurgical methods in the commercial embryo transfer industry, except in occasional cases of infertility affecting fewer than 1 percent of donors; surgery is rarely repeated on the same donor in these cases.

Embryo transfer is unlikely to contribute significantly to narrowing the genetic base of cattle unless coupled with some form of cloning. For example, limiting donors of female gametes to 100 per generation would only decrease heterozygosity by about 2 percent per century (*1, 2*). To date, in fact, it appears that embryo transfer has functioned more to broaden than to narrow the genetic base of cattle in North America, primarily through the rapid proliferation of purebred animals of the so-called "exotic" breeds, such as Simmental and Limousin (*1*). Before the availability of embryo transfer technology, these populations were precariously small as a result of import restrictions.

Superovulation followed by cryopreservation of embryos for transfer some years hence is an ideal solution to the problem of maintaining genetic stocks of animals that are currently of marginal economic value. This is already being practiced in mice (*3*). The cost of frozen storage of embryos is much less than that of maintaining equivalent live animals. The freezing of semen is also an excellent method of preserving genetic material indefinitely.

Like embryo transfer, artificial insemination does not automatically lead to narrowing of genetic bases. It is clearly a more efficacious method of spreading genetic material over the population than natural mating and has contributed significantly to the recent broadening of the genetic base of beef cattle in North America.

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References

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2. C. C. Li, *Population Genetics* (Univ. of Chicago Press, Chicago, 1955), p. 212.
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Auto Safety

The article "Auto crash tests unsettle Japan and Detroit" (News and Comment, 9 Jan., p. 150) calls attention to the

results of recent government studies comparing the crash test performances of selected new car models. The article begins and ends with reference to a Chevrolet dealer-sponsored advertisement, as an example of how the results of these tests can be used competitively by automobile manufacturers to advertise the safety performance of their products.

Although the advertisement was neither approved nor endorsed by General Motors or the Chevrolet Division, our reluctance to embrace the results of these specific government tests does not stem from any competitive shyness. Rather it evolves from our own recognition of the many technological complexities of assessing vehicle crashworthiness, which, at present, preclude a scientific correlation of the test results to real-world accident data.

For about a year, the National Highway Traffic Safety Administration (NHTSA), as part of its New Car Assessment Program, has been conducting vehicle crash tests in an effort to demonstrate that substantial differences exist in the occupant protection capabilities of today's new cars. In this test program, one each of selected new car models are crashed into a concrete barrier at 35 miles per hour. On the basis of these single, frontal tests, each vehicle is then rated as having "passed" or "failed," depending on whether the resulting impact and acceleration forces on the test dummies meet specified occupant injury criteria. Such representations are based, however, on the flawed assumption that the test results can be easily translated into injuries that would be expected to occur in actual highway crashes. This is simply not the case.

It is well recognized within the safety community that a test dummy Head Injury Criteria (HIC) value in excess of 1000 is not necessarily indicative of a serious or fatal injury. Yet, in representing their test results, the NHTSA has consistently classified HIC values in excess of 1000 as "failure"—meaning serious injury or fatality and values under 1000 as "passed"—meaning no serious injury. How high the HIC value must be and what shape or type of object must be contacted to indicate reliably a specific level of injury are not within today's science or technology.

Particularly inappropriate and misleading are "pass/fail" distinctions at or near the 1000 HIC threshold, where the test result differences are relatively small. In one of the NHTSA tests, for example, vehicle "A" with an HIC value of 997 was classified as having "passed," while another vehicle "B" with an HIC value of 1024 was classified as having "failed." The extent to which such small differences in HIC values can be considered as evidence of real performance differences and not the result of test variation cannot be demonstrated.

Moreover, the variety of real-world accident configurations essentially defies classification. Our analysis, for instance, of the NHTSA's own accident data file indicates that only about 5 percent of total real-world accidents are representative of the full-front barrier-type test as used by the NHTSA to justify its "pass/fail" results. This fact alone is enough to bring into question the usefulness of the NHTSA tests. Yet, regrettably, by relying on the NHTSA's simplistic "pass/fail" designations, consumers are likely to perceive car "B" as being less safe than car "A" simply because it is labeled "failed."

With increasing regularity, the tendency among industry critics is to attribute improvements in vehicle safety solely to the implementation of government safety standards. While in many instances these standards have had a beneficial effect, history documents clearly that many significant voluntary safety design improvements have evolved as a result of industry's traditional concerns for motor vehicle safety. Indeed, many of these voluntary initiatives, such as the collapsible steering column, side door beam, and so forth, were later simply translated into federal safety standards. Unfortunately, this is a fact that is generally overlooked.

As with vehicle improvements, commitment to our customers' safety also extends to consumer information. In this regard, General Motors supports the concept of providing consumers with information which can be helpful in making informed purchase decisions. However, to lead car buyers to believe that one car is more or less safe than another, when the observed differences in individual tests are so small as to be within the band of test repeatability and when "real world" cases exhibit no such "safe/unsafe" response, is categorically wrong and injects into the marketplace spurious factors which unfairly affect the competitive position of responsible manufacturers.

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