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.
3. D. G. Whittingham, M. F. Lyon, P. H. Glenister, *Genet. Res.* **30**, 287 (1977).

Auto Safety

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