search, of seeking knowledge for knowledge's sake (and with no forseeable applied value) be supported by public funds? (ii) Is it fair, ethically speaking, to use animals in studies—to create and destroy life and sometimes cause suffering (if unavoidably "essential" for the research) for purely intellectual reasons? (iii) If relevance of such animal studies to an understanding of human diseases or other "humanocentric" problems is claimed, does not the basic researcher create his own trap? Relevance, after years of reductionism and nonapplied research on esoteric subjects, may be very difficult to demonstrate.

The complex area of basic biomedical research—including many studies in animal behavior and physiological psychology—needs to be looked at from a new perspective. Beginning with animal rights is only a start. We will get nowhere if the basic researcher remains locked in his own conceptual world of consensus values, approved standards of animal care, and so forth. We must all be free to look "objectively" at ourselves and avoid being defensive under the fire of outside criticism by others who do not share the same world view. Basic research, and biomedical research in general, may well benefit once open and constructive dialog on animal research is achieved—with ultimate benefit, one would hope, to the animals themselves.

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I regret that Aronson finds hostile an article in which his assailants' two most serious charges are dismissed as groundless or absurd and the third is discussed but not endorsed. It is only in general terms, not in their specific attack on the Museum, that I think the animal rights groups' arguments are at least worth considering. Their campaign has undoubtedly been hard on Aronson and on the Museum. Aronson, as the article concludes in discussing the campaign, "is an established and productive scientist whose work, in the aspects for which it is being assailed, differs in no way from the research carried on by a great many other investigators."—N.W.

Erratum: In the letter from William R. Havender (1 Oct., page 9, column 2, paragraph 1, the next-to-last-sentence), the word "not" was inadvertently omitted from the parenthetical phrase, ". . . (or else, the within-group heritabilities would *not* be high, as posited)."

Erratum: In the reply to the letter from Vladimir J. Konečni by Harry W. Power (5 Nov., page 563, column 2, paragraph 1), the last sentence should have read "To treat a functional dichotomy as a continuum is to do as great a violence to truth as to treat a continuum as a dichotomy."

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force as deuterium is to the nuclear force. The interaction appears to be quite complicated. There is a need for large spin-orbit and tensor forces which are as as yet incompletely understood. The central force is not an inverse-square or harmonic-oscillator one, but something intermediate; roughly a force independent of the quark-antiquark separation. But in any case great optimism remains that in the long run the charmonium system can teach much about whether, why, and how quarks of fractional charge are confined within hadrons.

Thus, rather rapidly, the evidence for ψ being a member of the hadron family as well as a bound state of a spin 1/2 constituent with its antiparticle became quite decisive. Just this much explains its production by gamma-rays, the charmonium levels and helps to interpret the large yield of hadrons at high energy observed by CEA and SPEAR. The crucial test came in the expectation that charmed quarks will bind to uncharmed antiquarks, forming overtly charmed hadrons. Their rest energy could be estimated at about 2 Gev, and in analogy to the behavior of strange particles they would be unstable with respect to the weak interactions. This leads to an estimated lifetime of order 10^{-13} second for a 2-Gev charmed particle. No time was wasted in embarking on the search. Ting was in an especially good position to attempt the search himself, using his spectrometers to detect charmed particles which decayed into two oppositely charged hadrons. Ultimately 10 million events were accumulated, but no positive evidence was found. A similar experiment at Fermilab extended his result to higher energies, and as yet charmed hadrons have not been detected as products of hadron-hadron collisions.

Actually, it was expected that electron-positron annihilation and neutrino reactions would be the best sources of charmed particles, but for a long time the search was inconclusive. Neutrino-induced reactions did provide positive evidence for charm, but not until the discovery of charmed mesons at SPEAR this year did the case for charm become highly persuasive. There is perhaps still room for the skeptic to doubt the existence of charm (not to mention the quark) but it is a severe uphill battle to do so.

The charm concept is more than just a label for a fourth quark; it has specific implications for problems of the weak interactions. The word charm was intro-