Serial passage of the virus in chicken embryos failed to result in attenuation. Accordingly, monolayer cultures of a cell line derived from the kidney of a suckling rabbit were used.

The Sanarelli strain of virus produced cytopathic effects starting with the initial passage in cell culture. However, cytopathic effects did not appear in rabbit kidney cultures of the California strain until the eighteenth passage necessitating during this interval, the use of rabbits to determine whether virus was present. With the development of cytopathic effects this procedure became unnecessary and quantitation and serological study of the isolate were possible.

The titre of the isolate increased from $10^{-3.71}$ at the twenty-first passage to $10^{-6.5}$ at the fortieth, but it became decreasingly virulent for rabbits. Rabbits inoculated with virus at the latter passage-level developed a mild fever, and reaction at the site of inoculation was minimal. The rabbits possessed antibody to the virus in high titre and afterwards were shown to be solidly immune to challenge with virulent virus.

The Sanarelli strain of virus failed to attenuate until much later. However, since cross-immunity and reciprocal cross serum-neutralization tests demonstrated that it was immunologically and serologically identical with the California isolate, efforts were concentrated on the development of a vaccine from the latter.

Virus at the forty-fourth passage level in rabbit kidney cell culture was tested for suitability as a vaccine. Since it was planned to market as a desiccated product any effective vaccine developed, it was considered advisable to test the virus in the form in which it ultimately might be made available commercially. Accordingly, the virus was furnished to a biological firm for preparation of a desiccated experimental vaccine.

Tests of the vaccine demonstrated that the virus was stable on storage at 4°C and maintained for at least one year a titre adequate for immunizing purposes. It was found that the virus could not be passed in rabbits for more than two consecutive transfers, and that it did not revert to virulence after this number of passages.

To test the immunizing efficacy of the vaccine, approximately 100 rabbits were injected subcutaneously with 500 immunizing doses each. Mild fevers developed in the majority of the rabbits following vaccination, but no loss of weight or clinical evidence of infection occurred. A group of rabbits was allowed to mingle with the vaccinated to determine whether the virus could transmit by contact from vaccinated to non-vaccinated animals. Members of the contact control group remained clinically normal, and their temperatures stayed within usual limits.

One month after vaccination, representative rabbits from each group were bled, and all rabbits on experiment were given 55 minimal lethal doses of virulent virus by subcutaneous inoculation. Unvaccinated rabbits also were inoculated to serve as virus controls.

After challenge the vaccinated rabbits remained clinically normal and made weight gains, although their temperatures were elevated slightly for a brief period. Essentially no localized reactions occurred at the site of inoculation. In contrast, the contact and virus control rabbits became febrile and developed typical signs of myxomatosis, accompanied by severe localized reactions and rapid loss of weight. All either died from the disease or were killed *in extremis*. Other rabbits inoculated with as little as five immunizing doses of the experimental vaccine were immune to challenge 7-9 months later.

On the basis of these experimental results and on results of limited field testing, it is concluded that the vaccine is safe to use inasmuch as it does not produce disease. The vaccine virus is not transmitted by contact and appears to have limited potential for transmission by insect vectors. Thus, it is unlikely to revert to virulence under field conditions. Finally, it stimulates a durable immunity to a

challenge greatly in excess of that occurring in the natural state.

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¹ Sanarelli, G., *Zbl. Bakt.*, I. Abt. Orig., **23**, 865 (1898).

² McKercher, D. G., *Amer. J. Vet. Res.*, **13**, 425 (1952).

MISCELLANEOUS

"Education for Industrial Design"

IN Prof. Misha Black's excellent article on "Education for Industrial Design"¹ there seems to me to be an unnecessary pessimism about the menace of the 'market-place' where the whole phantasmagoria of "wishful thinking, day-dreaming, subliminal desires, snobbery, ritual symbolism and taboos affect the purchase decision". He is obviously worried about a "large proportion of students trained as industrial designers who have thus been destined to live their professional lives doing work in which they have little faith or in compromise or complete prostitution of their talents and convictions".

The barristers, the journalists, the copywriters and the commercial artists are faced with similar challenges. Their talents are at the mercy of those who can afford to hire them—in that sense all these professions are in key with the oldest.

But one of the criteria for spotting a good barrister, journalist, copywriter or commercial artist is that he has the talent to reconcile the demands of his clients with the standards he has set himself.

Prof. Black implies that the client will always wish to play down to the lowest common factor of taste. This is simply not true—there are many enlightened clients: and it is the pleasure of many good 'professional' men to have found such enlightened patrons, and it is their duty to demonstrate to the less enlightened that mass-appeal can be profitably well-done as well as profitably crudely-done.

If the designers of the future are to be trained under the impression that all public taste is bad and that industrial leaders are all boneheads it will be a very biased, misleading, and disappointing education. The excitement of success in any of the professional spheres I have mentioned (except perhaps the oldest) is in refusing to play down to one's public and in assuming that it has more taste than may at first be apparent. If the designers of the future are to be taught to turn their backs on the perpetual striving which such an assessment involves, then the future of design is dark indeed.

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¹ Black, M., *Nature*, **201**, 1258 (1964).

MR. HUTCHISON sees only my pessimism and neglects my modest optimism. I did write that "the student designers are now finding that their absolute standards are within hailing distance of those of reasonably large sections of the public".

London Transport has been, and still is, one of the national bodies which form a bridge between high standards of design and the community as a whole. When more directly competitive traders achieve the same understanding and follow the lead of London Transport, the need for my despondency will diminish.

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