

The hidden dangers of AIDS vaccination

SIR—Vaccines against AIDS (acquired immune deficiency syndrome) will probably be directly tested in human immunodeficiency virus (HIV) seronegative humans before a thorough evaluation of their potential hazards is completed in animals¹ because of the shortage of chimpanzees^{1,2}, and the first vaccination-like programme in HIV-seropositive subjects is already being conducted in Africa³. But both types of experimentation may prove harmful to the volunteers even though the injected material is not infective.

Indeed, vaccination⁴ and post-infection immunization⁵ against other lentiviruses closely related to HIV⁶⁻⁹ have induced deleterious effects. Goats injected with inactivated caprine arthritis-encephalitis virus develop more severe lesions than controls when later challenged with the live virus⁴. And the induction of a greater severity of lesions in visna virus disease by post-infection immunization⁵ of sheep suggests the involvement of specific antigenic stimulation.

Autoimmune mechanisms may be involved in the production of the specific CD4 lymphopaenia of AIDS^{10,11}. Therefore, we cannot exclude the possibility that AIDS vaccination in HIV-seronegative subjects may increase the severity of disease if HIV is encountered later, especially if the vaccine is not fully protective. In the same way, immune stimulation of seropositive volunteers with HIV-derived products may accelerate the disease; however, antigenic stimulation of their CD4 cells may increase the propagation of viruses to uninfected cells^{10,11}.

Such untoward effects are less likely to be produced by viral antigens that induce a strong neutralizing antibody response, but the ability to induce neutralizing antibodies in humans cannot be fully predicted from experiments in animals.

The expansion and prognosis of AIDS will increase the pressure to test AIDS vaccination in humans. The volunteers in such programmes should of course be fully informed about the risks they take and be able to understand this information. But the data obtained so far in animal immunization against lentiviruses closely related to HIV are a strong indication that the routine testing of the safety of vaccines in animals before use in humans should not be abandoned.

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A different perspective on coral population genetics

SIR—I wish to raise two objections to Diamond's News and Views article "Clones within a coral reef"¹. First, Diamond misrepresents the reproductive and juvenile ecology of *Porites compressa* by equating the rarity of small (less than 60 cm²) colonies with infrequent successful larval settlement. Low larval abundance and post-settlement mortality could also explain why small colonies are rare. There is no apparent shortage of larvae. Following one of several spawnings during a summer, the water can become cloudy with *P. compressa* eggs, and densities of 10 larvae m⁻³ sea water occur in Kaneohe Bay², the site of the study³ reported by Diamond¹.

Before settlement, *P. compressa* larvae are less than 0.3 mm long². A juvenile coral, under field conditions, is not visible until 2mm in diameter⁴, for *P. compressa*, perhaps three months after settlement, extrapolating from growth of other species⁵. Larval settlement is also often cryptic^{4,7}. Thus, only careful examination under the microscope of substrata shortly after spawning can determine if unsuccessful larval settlement or post-settlement mortality explain the scarcity of small colonies. The latter is strongly supported by studies from the Great Barrier Reef. Examinations of substrata give much higher estimates of the number of corals successfully settling than do macroscopic observations^{4,6}, and larval mortality is highest during the first three months after settlement⁷. Regardless of why juveniles are rare, they are important, representing new genotypes in the population.

Second, Diamond fails to discuss potential problems with using morphological traits and ultraviolet-absorbing pigments



Fig. 1 *Porites compressa*, a recently settled juvenile, with the polyp retracted in the skeleton. Photographed on an experimental substratum collected from windward Coconut Island, Kaneohe Bay, Oahu, Hawaii. Maximum diameter is 0.45 mm. Juveniles of this size are not visible without magnification.

to identify genotypes. Both types of characters successfully separated genotypes in the small area of uniform depth³ investigated in the study Diamond reports. However, *P. compressa* and other species can exhibit both changed morphology⁸⁻¹⁰ and concentration of ultraviolet-absorbing pigments⁸ when transplanted to different habitats and depths. Before morphological characters and ultraviolet-absorbing pigments are used to distinguish genotypes in more heterogeneous environments, their phenotypic plasticity must be investigated further.

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Is there such a thing as fractal music?

SIR—Philip Campbell¹ raises the possibility of music being derived purely from mathematical formulae — an acoustic analogy to the pictorial representations of arithmetical relations, such as the iterated mappings leading to 'fractal' images (Mandelbrot sets and the like). In brief, does fractal music exist and is it interesting?

The answer to both questions is yes². In fact, the fractal pieces that have been synthesized to date exhibit astounding paradoxes of perceived pitch^{3,5}. One such 'composition' is a tone complex comprising many pure tones, spanning the auditory frequency range, whose adjacent frequencies are in the constant ratio 1:2^{1/12} (10Hz, 21Hz, ..., 428Hz, 907Hz, ..., 18,284Hz). The figure shows a plot of a waveform comprising seven such frequency components. Functions such as those (imperfectly) illustrated were introduced by Karl Weierstrass into the debates on the foundations of mathematics during the last century. (Specifically, Weierstrass wanted to show his sceptical colleagues that there are functions that are everywhere continuous but nowhere differentiable. In other words, what mathematicians call a function is a lot less innocent than they were wont to believe.)

If a (computer generated) tone complex with the above frequencies is recorded on magnetic tape and played back at twice