Turning off the gas . . .

SIR—In the leading article "Next steps on global warming" (*Nature* **348**, 181; 1990) you emphasize the need now — after the Second World Climate Conference (SWCC) in Geneva — for a more persuasive framework of arguments than the Intergovernmental Panel on Climate Change (IPCC) has provided. Clearly, governments must reach agreement on a comprehensive framework for a World Climate Convention in 1992 that equitably balances the protection of the global environment against the needs of developing countries and the world's capacity to generate wealth and thus well-being.

A beginning has been made by the final statement of the scientific/technical sessions of the SWCC. Action is needed to manage the risk of climate change and to identify rational strategies to mitigate or prevent adverse effects of expected climate changes. Such strategies might involve ways of slowing climate change that will give countries more time to enhance their prospects for a sustainable development.

The SWCC scientific/technical statement, however, does not indicate how the results of the IPCC should be amended by a critical and unbiased study of options for managing the risk of greenhouse warming. It states only that continued dialogue is necessary between scientists and policy-makers.

To help this process of development of greenhouse warming policy, the "First Nordic Inter-Disciplinary Research Conference on the Greenhouse Effect: Meteorology, Climatology, Effects, Risk Management, and Interim Climate Modification" is being organized in Copenhagen on 18–20 February 1991 with the chairman of the IPCC, Professor Bert Bolin, as programme chairman (see announcement in *Nature* 25 October 1990, Classified 28).

The conference will focus on novel approaches to managing the risks involved in the decision-makers' dilemma associated with the anthropogenic greenhouse effect. Among the options to be critically discussed will be engineered, interim climate modification, considered as a 'technological insurance', in order to gain the time required for implementing at an economically feasible pace and without disastrous environmental effects the Brundtland Commission's programme of drastically reducing the rates of release of greenhouse gases to the atmosphere.

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Uphill struggle

SIR—The analysis of bicycling by Franke *et al. (Eur. J. Phys.* **11**, 116; 1990), as outlined by John Maddox (*Nature* **346**, 407; 1990), assumes that the cyclist does not regulate the steering angle and lean angle in combination during motion. Unfortunately, as most cyclists are aware, these two variables are under constant adjustment in order to maintain balance, even during hands-off riding. If the steering angle is fixed, it is almost impossible to maintain one's balance. This could be taken as confirmation of the finding that there are only one or two combinations of steering angle, rider displacement and lean angle consonant with maintenance of balance and direction; the poor cyclist's control is unlikely to be so sensitive. Furthermore, it should be remembered that for the cyclist to maintain constant velocity on the flat, he must be pedalling, and this action results in a constant oscillation in the centre of gravity and displacement.

Maddox also suggested that riders stand on the pedals when going slowly in order to achieve a lengthening of the trailing distance. The only reason why I stand on the pedals is to increase the power output when climbing hills or accelerating rapidly.

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One route to religious ecstasy

SIR—The hallucinogenic mushroom fly-agaric *(Amanita muscaria)* may be the oldest pharmacological agent used in religious rituals by primitive societies to attain states of trance. By means of such ecstatic experiences, individuals such as shamans and medicine-men cured the diseased, accompanied the dead to the underworld and acted as mediators between their community and its gods[1]. The role of fly-agaric in the ecstatic rites of Siberian shamans is also well documented[2] and there is strong indirect evidence for the identification as *A. muscaria* of Soma, an inebriating plant used by the earliest Indo-European populations of India and celebrated in the hymns of the *Rigveda*[3].

In mediaeval Europe, hallucinogenic plants were used, especially among country-folk, in popular religious rites that were condemned by the Church as witchcraft and heresy (for a recent discussion, see ref. 4). The names of some of these psychoactive plants have survived in the works of Renaissance natural philosophers[5,6], but there is no mention of the fly-agaric in them or other sources[3,4]. A possible exception to this silence may be found, however, in the biography of a Genoese noblewoman, Caterina Fieschi-Adorno, Saint Catherine of Genoa (1447–1510) (reprinted in ref. 7). The following passage seems to have escaped thus far the attention of both ethnopharmacologists and historians:

> God, Who had taken control even of her body, wanted to regulate it, and take away from her all the wordly and human instincts. Because He wanted her to lose the taste for the food she ate, He made her keep hepatic aloe and ground agaric, so that, when she realized that some food was giving her pleasure, or suspected so, she secretly put some into it. After God had prepared this soul in such a way, He tempted her with spiritual temptations. He infused such suavity and divine sweetness in her heart that both soul and body were so full as to make her unable to stand up.

In the second half of her life, Saint Catherine of Genoa experienced a number of trances during which, she affirmed, she was able to achieve a state of mystical communion with the "Divino Amore" (Divine Love). Describing one such trance, her biographers write: ". . . one day she felt as if she were up in the air; her spiritual self *(parte spirituale)* desired to reach for the Heavens, and bring with her the soul; her human self *(parte umana)* desired to reach for the Earth. Finally, after a long struggle, her spiritual self succeeded. She saw visions of angels, and laughed with them".

Complex experiences such as religious ecstasy, which obviously involve multiple material and cultural factors, cannot be explained uniquely in pharmacological terms. The passage reported here does raise, however, the intriguing possibility that at least one of the means, either conscious or accidental, by which Caterina Fieschi-Adorno attained her states of religious ecstasy was by the use of fly-agaric (which can be found in the Italian Alps). In her Christian devotion, she could not suspect herself of following the steps of the Aryas ministers of Indra, the vedic God of the Sky.

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1. Eliade, M. *Le Chamanisme et les Techniques Archaiques de l'Extase* 2nd edn (Payot, Paris, 1968).
2. Furst, P.T. *Hallucinogens and Culture*, 89–108 (Chandler and Sharp, Novato, California, 1976).
3. Wasson, R.G. *Soma, Divine Mushroom of Immortality* (Harcourt, Brace and World, New York, 1969).
4. Ginzburg, C. *Storia Notturna. Una Decifrazione del Sabba* 283–288 (Einaudi, Torino, 1990).
5. Cardano, G. *De Subtilitate* Vol. 18, 354 (J. Petreium, Nuremberg) (1550).
6. Della Porta, G.B. (1558) *Magiae Naturalis, sive de Miraculis Rerum Naturalium* First ed Vol. 2, 186 (Naples, 1558).
7. Craveri, M. *Sante e Streghe* 144–161 (Feltrinelli, Milano, 1980).