

# The real cause of influenza?

*The recent flu epidemic excited much media attention, some of which focused on the theories of Professor Chandra Wickramasinghe and Sir Fred Hoyle, who believe that flu epidemics are mediated by comets from space. Monitor invited them to expound their theory.*

OUR planet is unquestionably an open system. It receives cosmic material at a steady rate mainly from comets (Figure 1) originating in the outermost regions of the solar system. The earth picks up cometary material when it crosses the orbits of comets and also when very small comets plunge unobtrusively into the upper atmosphere unleashing substantial quantities of minute particles. Recent studies have shown that such cometary particles are mostly organic in character with spectroscopic properties indistinguishable from bacteria and viruses. The total quantity of extraterrestrial organic matter coming in amounts to about 1,000 metric tonnes per year. Even if only a minute fraction, say 0.001 per cent, were in the form of viruses, the total viral input would number upwards of  $10^{23}$  per year, exceeding the number exuded by humans by several orders of magnitude.

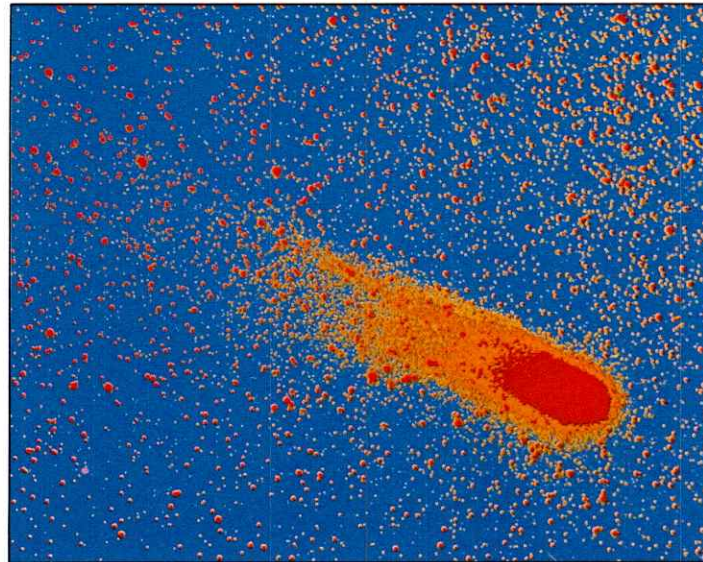
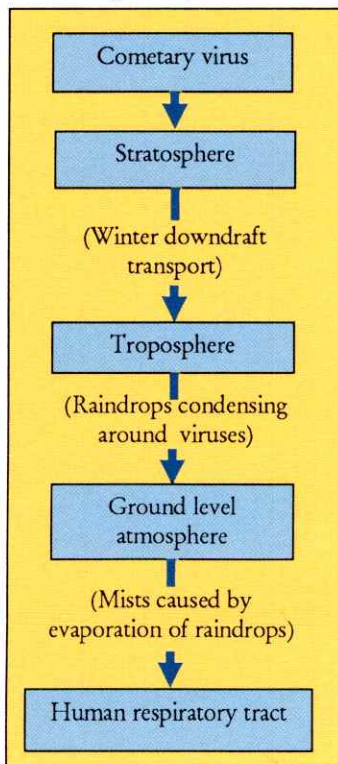


Figure 1. Cometary particles are mostly organic

Figure 2. Flow chart of cometary virus in its path to the human respiratory tract.



Particles of viral size added to the Earth are transported fairly easily by a variety of processes down to an altitude of about 50 km. Further descent of particles through the stratosphere and into the troposphere takes place mainly as a result of

winter downdrafts that occur six months apart in the two hemispheres. This well recognized meteorological phenomenon offers a ready explanation of the seasonal behaviour of influenza.

The route into humans of a comet-borne influenza virus in our view is shown schematically in Figure 2. It is commonly found that a spell of lingering mists in the winter season ushers in a wave of acute upper respiratory tract disease. Since bacteria and viruses are known to serve as condensation nuclei around which water droplets form, this coincidence is not unexpected. In situations where rain comes down as large drops there is not much chance of direct inhalation of nucleating viruses, whereas misty weather provides the incoming virus with the best opportunity to become dispersed in aerosol form that can easily be inhaled near ground level. This accords with a popular lore that persists in diverse cultures of the world. Ancient traditions throughout the Indian subcontinent link ex-

posure to mist with the danger of catching flu. Shakespeare expressed this same tradition in a Western context when he wrote: '...the winds... have suck'd up from the sea, contagious fogs'.

The prevalent modern belief that influenza is a highly infectious disease probably came to be established after the viral nature of its causative agent was discovered. Yet all this latter discovery implies is that influenza is caused by a virus that multiplies within host cells.

There is evidence to suggest that the virus actually exuded from an infected person has a reduced infectivity and does not spread even within the intimate confines of a family unit.

Attempts to spread the common cold virus by deliberate means under controlled experimental conditions has always proved difficult. Edgar Hope-Simpson examined the infectivity of influenza A in over a thousand families in a general practice in Cirencester. He defined a set of about a hundred households by the condition that one member succumbs initially to influenza A. Observing the fates of other members of the same families he showed that they had almost the same chance of catching flu as the population at large. Being a member of an infected household did not significantly enhance one's chances of contracting the disease.

Other surveys have shown that GPs and dentists have no increased risk of catching flu during epidemics. (These investigations were carried out in 1957 before routine flu vaccinations were being administered.)

## Virus-laden 'aerosol'

A substantial body of evidence relating to the incidence of influenza, including both spatial and temporal characteristics, fits well to a model involving the settling of a virus-laden aerosol.



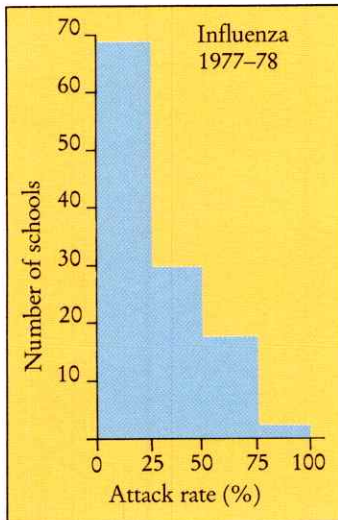


Figure 3. Distribution of attack rate among independent schools in England and Wales during the 1977-78 pandemic.

The particles begin their descent in the stratosphere and eventually reach ground level becoming incorporated in the nuclei of raindrops. The supportive evidence falls broadly into three categories:

1. The distinct seasonality of incidence on a worldwide scale conforming to a stratospheric descent model.
2. The incidence at ground level being exceedingly patchy on distance scales ranging from hundreds of metres to hundreds of kilometres. Epidemics starting suddenly and also stopping abruptly with only 10-20 per cent of the susceptible population encountering the disease.
3. The rapidity of spread within a community being inconsistent with person-to-person transmission.

We shall elaborate on aspects under the second heading.

Our analysis of data from Japan indicating patchiness on the scale of 30-100km associated with two groups of adjacent prefectures (or counties) into which the country is divided is listed in Table 1. (N stands for the population density in the prefecture.) The distribution of attack rates in schools in England and Wales during the 'Red Flu' epidemic of 1978 is shown in Figure 3.

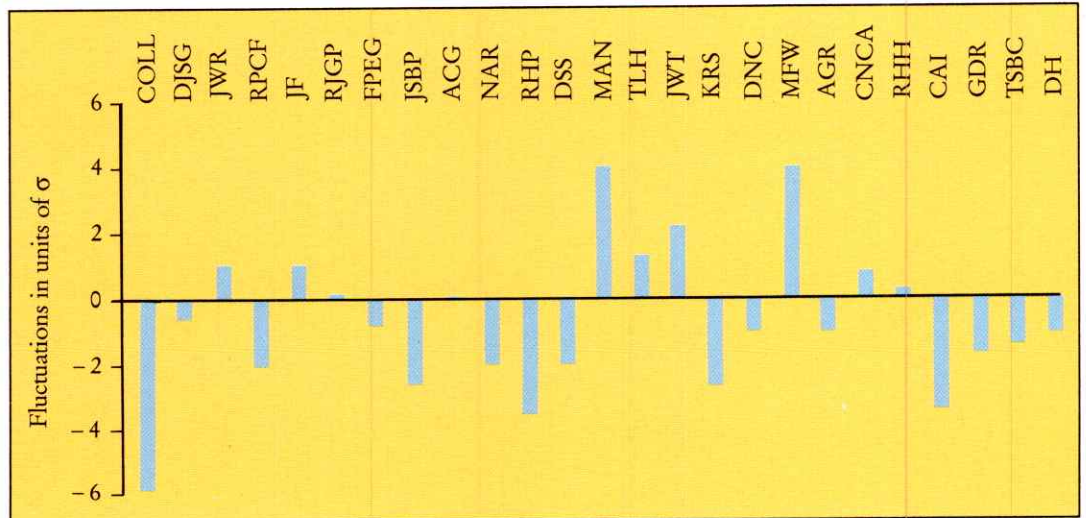


Figure 4. Deviations of case numbers of influenza above and below the mean expected value for the school houses at Eton College during the 1978 epidemic. The deviations are relative to the sample standard deviation computed house by house.

Both Figure 3 and Table 1 are inconsistent with an infective model and show that attack rates are determined by the location of a school or a county in relation to an infall pattern which is patchy over distance scales ranging from 10-100 km.

An even finer scale of patchiness shows up in data for individual boarding schools indicating that the final ground-

level deposition of the aerosol is modulated by highly localized effects such as heat-generated convection currents associated with individual buildings. This is clearly seen in the 1978 data for Eton College shown in Figure 4. Here a mean attack rate of 35 per cent was distributed in such a way that some houses had case numbers representing three or four standard

deviations above the mean expected value, while others were three to six standard deviations below.

### 1989 epidemic

A sharp upturn in the reports of flu-like illness and school absences began on about 27 November 1989. Among the earliest to succumb were the inhabitants of Gowerton near

Prefecture no.	N(km <sup>-2</sup> )	1970	1977	1979	1980	1981
8	423	6.6	61.4	1.0	16.8	2.5
11	1,580	114.4	1.4	-	0.8	0.1
12	869	37.4	5.5	-	6.4	4.2
13	3,600	63.4	2.8	0.4	1.1	0.6
14	2,197	51.7	20.5	6.7	5.7	1.4
15	205	113.3	2.0	5.4	25.2	6.3
16	225	67.5	312.1	2.5	101.6	4.9
17	217	399.7	95.9	139.1	10.8	0.4
18	117	375.5	2,850.4	-	57.1	264.4
19	189	126.0	19.1	1.0	16.5	0.4
20	165	5.6	49.7	5.9	3.5	-



15► Swansea. Attendance registers at the local school showed a rise of absences on 27 November, the same day as when a local publican, his wife and their child all came down with flu-like illness. Furthermore, the entire village became shrouded in persistent low-lying mist starting about two days before the outbreak.

Although the H3N2 virus was found to be involved in the recent epidemic, a whole host of other airborne viruses appears to have been in circulation at the same time. The incidence patterns of these viruses are consistent with an atmospheric fall-out model, and inconsistent with direct person-to-person spread.

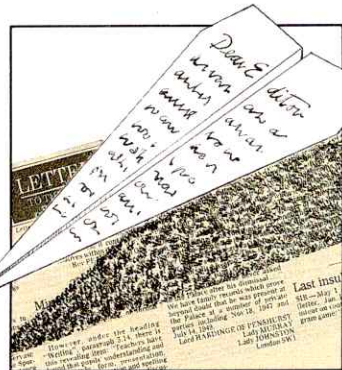
Among earlier evidence that pointed in the same direction, the observations of Professor F Magrassi relating to the 1948 pandemic in Sardinia are worthy of note. He wrote in *Minerva med. Torino* (Vol.40, p565): 'We were able to verify...the appearance of influenza in shepherds who were living for a long time alone, in solitary open country far from any inhabited centre; this occurred absolutely contemporaneously with the appearance of influenza in the nearest inhabited centres...'

Finally, we note that our conclusion which re-asserts itself with every new epidemic, accords fully with a highly respectable medical view that prevailed in the 19th Century. It also provides an interesting vindication of the etymology of the word 'influenza' from its 13th Century roots which means 'influence of the stars'.

Professor N.C. Wickramasinghe and Sir Fred Hoyle, School of Mathematics, University of Wales College of Cardiff, Cardiff.

Further reading

1. Hope-Simpson R E, Sutherland I. Does influenza spread through the household? *Lancet* 1954; i: 721.
2. Hoyle F, Wickramasinghe C. *Diseases from space*. (J M Dent 1979).
3. Hoyle F, Wickramasinghe C, Watkins J. *Viruses from space* (University College Cardiff Press 1986).
4. Wickramasinghe C. In: Patrick Moore (ed.) *1987 Yearbook of Astronomy* (Sidgwick & Jackson 1986).



Stuffed turkey

Dear Editor

The letter by Dr Ruth MacGillivray (*Monitor* 1990; 3(2): 8) is frankly quite sexist. I do not think it is strange that a male would write about how to cook and stuff a turkey. I learned my culinary skills from my mother who always used to stuff the carcass of the turkey and never received any complaints.

Now that I am divorced and bringing up a five-year-old son, who does Mr MacGillivray suggest cooks our food as we have no female in the house?

I would be only too happy to take some cookery lessons from the good lady doctor if she would like to contact me.

Dr Jonathan Levy  
GP, London

New management

Dear Editor

I cannot let your article 'New management' (*Monitor* 1990; 3(2): 13) go without strong protest.

I have seen endless articles on the subject of general practice being a business and exhorting us all to treat it as such. However, I hope that there are still many of us left who see general practice as a vocation, and deplore the constant brain-washing going on enjoining us all to get the maximum profit out of it.

I entered general practice as a commitment to care for my patients, many of whom have become well known to me. My true reward for this care is to see them living healthy fulfilling

lives. To this end I have naturally embarked on screening programmes, immunization programmes, and ongoing health education. If this should now lead to an increased paypacket, that is good news for me. Can I really believe that a doctor in a well known medical magazine is advising us to 'maximize remuneration by means such as removing or not registering smear or immunization refusers.' Is that really what we have come to?

At a practice meeting the other day I found myself questioning the validity of trying to run clinics for people who would probably be better counselled on a one-to-one basis. Again, am I really going to reorganize my postgraduate education to fit the approval of our FPC managers, or to continue to equip myself, as best I understand it, to serve my patients?

Surely now is the time for us to show that we too have the patients well being at heart. I believe we will gain far more in the long run by retaining our difficult patients' than we will by being ruthless in order to satisfy a well meaning but ill conceived whim of Government.

Dr Joy Howe  
GP, Colchester

Sinister revelations

Dear Editor

I was very interested to read 'Sinister revelations' (*Monitor* 1990; 3(2): 20) that left handers have a reduced life expectancy, especially since the research by Corey of Vancouver suggests that it is the result of accidents.

I say this because left handers are, because they have a more developed right hemisphere, better able to make sense of three-dimensional space. To exemplify this we have four great tennis champions — Bjorn Bjorg, Martina Navratilova, Jimmy Connors and John McEnroe. Left handers think differently, and behave differently, it is true. They have evolved be-

cause they are successful, for example Charlie Chaplin, Marilyn Monroe, Kenneth Williams, Telly Savalas, Paul McCartney, Shirley McLaine, Judy Garland, and in ancient times, of course, Leonardo da Vinci. Of the team of five that designed the Apple Mackintosh Personal Computer in California, four are left handed, whereas in an average group there would be one. Among brilliant mathematicians left handers are frequent.

To return to the question of health and longevity, apart from Chaplin, who lived to 88, the rest died younger, and some accidentally. Left handedness was thought by Geschwind and Behan to be associated with allergies, autoimmune diseases, migraine, stammering and dyslexia. Geschwind believed they would have a different disease pattern, dying from different cancers but more resistant to infections. He based his theory on the effects of intrauterine testosterone levels, which would be higher in males, and still higher in twin males, who are more likely to be left handed because the sibling's testosterone would be added. Of course, there is testosterone present *in utero* in females from the mother, but it remains low. High levels are thought to slow the development of the left hemisphere after the 20th week.

Of course, handedness is of varying degrees, but in extreme left handedness the left testicle may be bigger and higher than the right, the reverse of normal, and this is shown in the statue *The age of bronze* by Rodin, who was a slow developer at school. There is a 250 per cent higher rate of autoimmune disease in extreme left handers, and this may be due to an intrauterine effect on the development of the immune system, which is passive *in utero* as it learns to identify the self. This is fascinating for general practice research, I would have thought.

Dr Keith Thompson  
GP, London