pathic factor dilutions, and the standard testing procedure carried out. Four tubes were used for each dilution, as well as the normal control series. It was possible to dilute the cytopathic factor 1 : 16 and still protect 75 per cent of the cells. A dilution of 1 : 8 afforded 100 per cent cell protection.

At this point it was considered vital to know whether the cytopathic factor acted on the cell *per se* or the virus particle. To resolve this problem, the fluid from 24-hr. old cultures of *UIRHM*1 cells was decanted and the cell sheet was overlayed with undiluted cytopathic factor fluid and incubated for 1, 3, 6, and 20 hr. at 37° C. At the end of this time, the fluids were removed and replaced by complete growth media and 0·1 ml. of *B*54 virus. No protection occurred at any of the periods tested, showing that the cytopathic factor was not adsorbed to the cell sheet.

To test the action of cytopathic factor on influenza virus, *B*54 virus was diluted 1 : 10 in the undiluted factor fluid and incubated at 37° C. for 1, 3, 6, and 20 hr. At the end of this time, the virus was sedimented by centrifugation at 81,000*g* for 30 min. The fluid was decanted and the virus re-suspended, to its original stock concentration, in complete growth media and used in the standard test system. The virus was fully as toxic to *UIRHM*1 cells as untreated virus, indicating that the action of cytopathic factor is not directed against the virus *per se*. The lack of action on the virus was further demonstrated by its negative reaction in hæmagglutination inhibition tests.

In order to determine the period of formation of cytopathic factor, the following experiment was designed. Six 10-ml. flasks of *MPD*1 cells were inoculated with 4×10^5 cells per ml. and incubated at 37° C. At the end of 24 hr., and every 24 hr. for a total of 6 days, the entire 10 ml. of supernatant fluid was harvested and stored frozen. When all fluids had been collected, they were tested for the presence of cytopathic factor by the dilution method mentioned. The fluid was negative for protective capacity at 24 hr., became positive at 48 hr., and increased to a maximum at 5 days. The period between 24 and 72 hr. is undergoing further investigation.

Present results indicate that the cytopathic factor differs mainly from interferon and viral inhibitory factor in that it is produced in uninfected cultures and not as a result of contact with viruses, either active or inactive. It is similar to viral inhibitory factor in that it neither acts on the virus *per se* nor is adsorbed to the cell sheet. Interferon, on the other hand, is readily bound by test cells. The cytopathic factor appears to be a natural cell product protecting against the cytopathic effect of influenza virus in the cells from which it originates as well as cells from human and rabbit sources. Further, it has not been found in the parent cultures containing serum of the *MPD*1 line. Since both virus infection and adaptation to serum-free media must represent a traumatic experience to the cell, there is the possibility that other manipulations of this type will produce similar materials. That the protection crosses species barriers at a cellular level is not startling, since it has been shown by Alfred and Pumper[8] that the supernatant fluid from *MPD*1 cells or purified portions of it can act as a serum replacement for human liver cells *in vitro*.

Cytopathic factor had been used in attempts to protect the *UIKM*1 line of cells against coxsackie, mumps, vaccinia, poliomyelitis, and adenoviruses to which this cell line is susceptible, without success. Thus it appears to be specific for influenza viruses. Experiments to determine its physical and chemical properties and site of action, as well as work on its purification, are in progress.

Robert W. Pumper
Herbert M. Yamashiroya
Lawrence J. Alfred

Department of Microbiology,
College of Medicine,
University of Illinois,
Chicago.

[1] Isaacs, A., and Lindemann, J., *Proc. Roy. Soc.*, B, **147**, 258 (1957).
[2] Ho, M., and Enders, J. F., *Proc. U.S. Nat. Acad. Sci.*, **45**, 385 (1959).
[3] Ho, M., and Enders, J. F., *Virology*, **9**, 446 (1959).
[4] Tamm, I., and Horsfall, F. L., *Proc. Soc. Exp. Biol. Med.*, **74**, 108 (1950). McCrea, J. F., *Biochem. J.*, **55**, 132 (1953). Cohen, A., *Lancet*, 791 (1960). Low, R. J., and Baron, S., *Science*, **132**, 622 (1960).
[5] Pumper, R. W., *Science*, **128**, 363 (1958).
[6] Pumper, R. W., Alfred, L. J., and Sackett, D. L., *Nature*, **185**, 123 (1960).
[7] Pumper, R. W., and Yamashiroya, H. M., *Amer. J. Hyg.*, **72**, 284 (1960).
[8] Alfred, L. J., and Pumper, R. W., *Proc. Soc. Exp. Biol. Med.*, **103**, 688 (1960).

MISCELLANY

The Grayling Fish and River-Names

The grayling fish belongs to the family Thymalidae and is closely related to the family Salmonidae. It offers, I believe, a new and tenable explanation for the much-disputed origin of the river-names 'Thames' and 'Humber'.

When, in British prehistory, these Rivers were so named, fishing was a vital industry, certainly more so than agriculture, and possibly more than hunting. Our rivers were, in those remote days, teeming with fish, and especially fish of the salmon family, so that nothing could be more natural than that some of these rivers should be named 'grayling-river'.

'Grayling' is a name of germanic origin (cf. German: *grau*). But in medieval English the grayling fish retained two names of non-germanic origin: *thyme* and *umbre*. The 'thyme' word for a grayling is due to the fact that the fish has a smell closely resembling that of the herb of the same name. The word is related to Latin *thymallus* (a fish smelling of thyme) and to Greek θύμος, the herb 'thyme' (θύω, 'to smell'). The 'umbre' word for a grayling is due to its grey and shadowy appearance, and may be cognate with, if not directly descended from, Latin *umbra*, 'shade' (*umbra* was a Roman word for a grayling fish).

In his book, *Der Flüssname Thämse unde seine Sippe* (1941), Prof. Max Forster reaches the conclusion that the meaning of 'Thames' is 'dark river'. For 'Humber', Prof. Eilert Ekwall (*Oxford Dictionary of English Place Names*) suggests that the meaning is 'good-river'.

However, I submit that there is a *prima facie* case for expert investigation of the hypothesis that both the Thames and the Humber, and the groups of river-names associated with them, are so called because of the grayling fish that frequented them—the Thames on account of the smell, and the Humber on account of the colour.

If this is acceptable, it has some bearing on the origins of the language spoken by the natives of Britain before the Romans arrived.

John Tutin

11A Tregunter Road,
London, S.W.10.