for the type 5 adenylyl cyclase most highly concentrated in the brain, but with readily detectable levels in the heart, kidney and lung, raising the question as to why our northern blot analysis did not show the cyclase in these peripheral tissues. They used whole rat brain, of which the corpus striatum is only about 5%. In their analysis levels in whole brain are roughly 5–10 times those in the peripheral tissues. Thus, striatal levels of the enzyme are about two orders of magnitude higher than these peripheral tissues. At the exposure times we used we would not have detected a signal in tissues that was only one-hundredth that of the corpus striatum.

Charles E. Glatt
Solomon H. Snyder
Department of Neuroscience,
Johns Hopkins University School of Medicine,
Baltimore, Maryland 21205, USA

1. Glatt, C. E. & Snyder, S. H. *Nature* **361**, 536–538 (1993).
2. Ishikawa, Y. *et al. J. biol. Chem.* **267**, 13553–13557 (1992).
3. Premont, R. T., Chen, J., Ma, H.-W., Ponnapalli, M. & Iyengar, R. *Proc. natn. Acad. Sci. U.S.A.*, **89**, 9809–9813 (1992).
4. Zarbin, M. A. *et al. Brain Res.* **374**, 75–92 (1986).
5. Amenta, F. *J. Autonomic Pharmac.* **10**, s11–s18 (1990).
6. Mansour, A. *et al. J. Neurosci.* **10**, 2587–2600 (1990).
7. Kokhandwala, M. F. & Amenta, F. *FASEB. J.* **5**, 3023–3030 (1991).

Health risks and natural gas

SIR — We have found that oxide coatings on gas burners in Polish houses 5 to 100 km away from gas deposits in the Rotliegendes basin contain high concentrations of Pb, Cu, Ag and As. This long-distance transport of metals takes place presumably in the form of stable gaseous organometallic compounds. The Hg, Pb and As content of natural gas from the Rotliegendes basin poses a health hazard with respect to its domestic use.

Natural gas in Permian and Carboniferous rocks in the central part of the Proterozoic basin in Poland contains Hg in concentrations equal to the saturation limit[1]. Underground sections of pipes used for gas extraction are often heavily corroded and coated with native lead, lead amalgams, native copper and its amalgams with Ag and Fe–As alloys.

Oxide coatings on gas burners were collected from kitchens in Poznan, Buk and Siekierki (Poland), and one reference coating in Vienna (see table). The Vienna location was probably supplied by a field in Siberia, 3,000 km away. Oxide coatings in Poland were abraded from the surface with a file, and the oxide coating on the gas burner from Vienna was dissolved by submerging the gas burner head in aqua regia. The second technique gives higher metal contents than the first, probably because filing of gas burner coatings significantly contaminates the sample with underlying iron, which lowers the measured concentrations of the other metals owing to dilution.

CONCENTRATION OF METALS IN OXIDE COATINGS OF GAS BURNERS IN KITCHENS

Locality (town)	Pb(p.p.m.)	Ag(p.p.b.)	Cu(p.p.m.)	As(p.p.m.)	Distance to deposit (km)
Siekierki	112	98	34	15	20
Buk	491	1,082	57	32	5
Buk	511	1,321	61	45	5
Poznan	134	82	21	≤5	~ 100
Vienna	1,283	1,136	61	?	3,000?

Determined by atomic absorption spectroscopy.

We found that the concentrations of Pb, Cu, As and Ag in all the oxide coatings from Poland are very high (see table). The metal contents are roughly a function of the distance to the gas source, being highest in Buk. The metal contents in oxide coatings in Vienna are also very high (see table). This might be due to the different technique used to collect the Vienna specimen, although it is also pertinent that the gas burner in Vienna has been in use for about 25 years while those in Poland have been in use for only about 10 years.

The transport of heavy metals over long distances could possibly be due to the formation of volatile organometallic complexes. The most suitable compound to transport lead in methane is tetramethyl lead ($(CH_3)_4Pb$). Gas chromatograms of metal precipitates found in underground sections of gas pipes indicate the presence of higher hydrocarbons, but also some traces of hydrocarbons with a very high molecular weight were released at temperatures of 100–140 °C. More precise identification of the nature of these hydrocarbons trapped in the metal precipitates requires further study.

Methyl compounds of Ag and Cu may be stable in the presence of tetramethyl lead. This may explain the relationship between Pb and Ag, and Cu concentrations in gas burner coatings. The methyl compound of arsenic ($(CH_3)_3As$) melts at −130.5 °C and boils at 50 °C, but is unstable[2]. This instability may be reflected in the low As content of oxide coatings on gas burners. Some mercury has also been detected in the oxide coatings, but the elemental matrix caused difficulties in obtaining low limits of detection and analytical repeatability. Methyl mercury ($(CH_3)_2Hg$), a very stable compound, boils at 92 °C and is also very poisonous[2]. Therefore mercury could be transported long distances not only as mercury vapour, but also as gaseous $(CH_3)_2Hg$. Further studies are clearly needed to validate these hypotheses.

Methyl complexes of Pb and Hg are much more poisonous than the metals. Without demercurization of the Rotliegendes basin gas, the mercury content in the air in kitchens during cooking may exceed 23–26 times the safety limit[1]. No measurements have yet been done of lead content of gas or of air in kitchens. The data presented in the table are preliminary, but we believe that the high toxicity of the methyl derivates of Pb and Hg calls for an urgent further study.

H. Kucha
Institute of Geology and Mineral Deposits,
Ave Mickiewicza 30,
30-059 Krakow,
Poland
K. Slupczynski
Institute of Fossil Fuels,
Ave Mickiewicza 30,
30-059 Krakow,
Poland
W. Prochaska
Institute of Geological Sciences,
Mining University Leoben,
A-8700 Leoben,
Austria

1. Lubas, J. *Trans. I. G. N. G.* No. 56 (1986).
2. Coates, G. E. *Organo-Metallic Compounds* 2nd edn (Methuen, London, 1960).

Pointing the way

SIR — Recent reports of the presence of interesting words in protein-sequence databases[1–3] have encouraged me to mention a further example concerning the formation of disulphide bridges in the S-rich prolamin storage proteins. Using a similar algorithm to that reported by Harvey[3], using a human neural network, we have discovered the suggestive sequence SSLINKASE, which forms the carboxy-terminal amino acid sequence of an oat prolamin[4]. To emphasize the message, the seven letters immediately preceding this sequence — PEGEDE — form the past tense of the Danish verb 'to point'.

David J. Simpson
Department of Physiology,
Carlsberg Laboratory,
Gamle Carlsbergvej 10,
DK-2500 Copenhagen, Denmark

1. Gonnet, G. H. & Benner, S. A. *Nature* **361**, 121 (1993).
2. Jones, D. *Nature* **361**, 694 (1993).
3. Harvey, S. C. *Nature* **362**, 300 (1993).
4. Fabijanski, S. *et al. Biochem. Physiol. Pflanz.* **183**, 143 152 (1988).