that two distinct lines of vertical descent have occurred. Perhaps a subtle difference in ligand specificity may eventually distinguish these two groups of putative porphyrin-binding proteins. The possibility of defining the precise biochemical nature of the ligands binding proteins. The possibility of defining these two groups of putative porphyrin-occurred. Perhaps a subtle difference in that two distinct lines of vertical descent have increased now that bacterial lipocalin homologues are available.

**R. E. Bishop* and J. H. Weiner**

Medical Research Council Group in the Molecular Biology of Membranes and Department of Biochemistry, University of Alberta, Edmonton, Alberta, Canada T6G 2H7.

*For correspondence. Fax: +1 403 492 0886. e-mail: russell.bishop@ualberta.ca


**Authors’ reply**

**Origin of *Vibrio cholerae* lipocalin: which gene came first?**

We wish to acknowledge an oversight in not referring to the work of Bishop and colleagues. We were aware of the homologies of VlpA to the family of lipocalins at the time of our database submission (9th January 1992 compared with 24th February 1995 for the *ble* sequence of Dr Weiner) and this had been reported (4, 5), although the first detailed discussion of vlpA from this laboratory (1) post-dated the publications of Dr Bishop and Weiner.

Interestingly, the lipocalin gene (*vlpA*) in *Vibrio cholerae*, as reported previously, varies significantly in copy number and chromosomal location (1). It is now clear that vlpA is associated with a mega-integron (3), which is essentially a gene-capture system involving site-specific recombination of gene cassettes containing the VCR repeat element and constitutes about 5% of the *V. cholerae* chromosome (2). The multiple copies observed in different *V. cholerae* strains are a consequence of insertion at different sites (P. Kaewrakon & P.A. Manning, unpublished).

Thus, although the *V. cholerae* lipocalin was the first reported in the database, the gene itself has probably been pilfered from another organism, possibly a member of the *Enterobacteriaceae*.

**Andrew Barker and Paul A. Manning**

Microbial Pathogenesis Unit, Department of Microbiology and Immunology, The University of Adelaide, Adelaide SA 5005, Australia.

*Present address: Institut für Genetik der Universität zu Köln, Weyertal 121, D-50931 Köln, Germany.

*For correspondence. Tel: +61 8 8303 5974. Fax: +61 8 8303 4362. e-mail: pmanning@microb.adelaide.edu.au