

Total numbers and species composition of birds retrieved from affected areas after the Exxon Valdez oil spill

	Area		Total
	Prince William Sound	Gulf of Alaska	
No. retrieved	3,360	31,919	35,279
No. identified	2,884	29,468	32,352
Percentages:			
Loons and grebes	20.5	0.9	2.6
Procellariids*	0.5	14.4	13.2
Cormorants	16.0	1.3	2.6
Seaducks	24.8	2.3	4.3
Gulls	1.7	6.3	5.9
Guillemots	15.1	64.9	61.7
Other alcids†	17.2	9.7	9.1
Other birds	4.2	0.2	0.4

\* Includes fulmars, shearwaters and storm-petrels.

† Includes pigeon guillemots, murrelets, auklets and puffins.

been much higher<sup>4</sup>. A few other locations in North America have the potential for similar bird losses, and many are the object of oil and gas exploration or development (for example, eastern Canadian Arctic, Grand Banks of Newfoundland).

Whether bird losses from the Exxon Valdez spill represent biologically significant losses in Alaska or will even be detectable in most populations remains to be seen. It will take years and even decades for some populations to return to pre-spill numbers<sup>14,15</sup>, but other natural and artificial perturbations may obscure the effects of, or recovery from, oil mortality<sup>7,9,16,17</sup>.

## Bacterial zipper

SIR—An in-phase repetition of a leucine every seven residues in an  $\alpha$ -helical structure is a motif associated with the dimerization of proteins and, together with an adjacent basic region, is responsible for the interaction of eukaryotic regulators and specific DNA sequences. This structural and functional motif has been termed the 'leucine zipper'<sup>1,2</sup>. It is also present in membrane proteins that do not bind to DNA<sup>3-5</sup>.

In the course of our work on a new plasmid of *Pseudomonas savastanoi* (Nieto *et al.* in preparation) we have found that its replication protein (RepA) has a putative leucine-zipper motif in a sequence located at the N terminus. The computer

Furthermore, even though we suspect that certain colonies were hard hit by oil, we were unable to identify where dead birds originated, and losses may therefore be spread over a larger geographical range than we surmise<sup>6</sup>. In any case, local populations may recover in 20–70 years, and the process will be accelerated if birds emigrate from unaffected colonies<sup>14-17</sup>.

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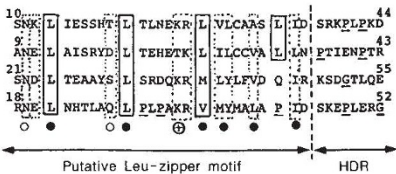
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predictions of secondary structure give this region a potential  $\alpha$ -helical character. There are no residues incompatible with  $\alpha$ -helix among the first four Leu residues but the two prolines that flank the fifth Leu residue should destabilize the  $\alpha$ -helical structure; we therefore predict that the  $\alpha$ -helix has about seven turns.

Comparison of this region of the RepA protein with known sequences of functionally equivalent proteins involved in initiation of replication in plasmids of Gram-negative bacteria, indicates that some of them<sup>6-8</sup> also have a potential leucine zipper motif at the N<sub>2</sub>-terminal region. The eventual absence of a leucine or a compatible residue at the fourth position and the presence of destabilizing residues could indicate, however, that all

Comparison of N-terminal regions of four plasmid replication initiator proteins. Coordinates of initial and terminal residues are indicated. □, Leu repeats and other compatible residues; ○, other conserved positions. Average chemical character of residues: ●, non-polar; ○, polar; ⊕, positively charged. Underlined: helix-destabilizing residues. HDR: helix-destabilizing region.

Protein	Plasmid	Ref
RepA	pPS10	10
RepA	pSC101	21
E	F	18
π	R6K	18



## Which Haldane?

SIR—Mark Williamson and Robert May (*Nature* **341**, 695; 1989) in considering the Haldane beetle story appear to err by attributing it to J. B. S. Haldane, the famous geneticist. Its origin is more likely to be his father, J. S. Haldane, the distinguished physiologist, who began his work in the physiology laboratory at Oxford in 1887, or possibly his uncle, R. B. Haldane, who was Minister of War before becoming Lord Chancellor in 1912. In 1915 R.B. Haldane was excluded by Asquith from his coalition government because public opinion considered him pro-German because of his well-known enthusiasm for Kant and other German philosophers. This enthusiasm he had imparted to his young brother. Either J. S. or R. B. Haldane, as young men, might well have approached Jowett for advice on philosophy and been invited to dinner at high table at Balliol where the conversation, now a legend, could have taken place.

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these sequences may represent a leucine zipper-like motif in prokaryotes in which shorter  $\alpha$ -helices could also be functional.

Note that the reported initiator proteins share the properties of binding to DNA and of being transcriptional regulators of their own synthesis; it has been proposed that they also interact within themselves and with other proteins of the replication machinery of the cell<sup>9,10</sup>.

A computer search for the DNA-binding helix-turn-helix motif<sup>11</sup> in RepA found a C-terminal region that could fit that structure. Similar observations have been reported for the other initiation proteins<sup>12,13</sup>. The N-terminal leucine zipper-like motif described here may, therefore, be involved in protein-protein interactions.

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