

## **Appendix A1**

### **Full-Text ScienceDirect Document**























## **Appendix A2**

### **ScienceDirect Abstract**







## **Appendix B1**

### **Source File of ScienceDirect Document before Pre-processing**



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Biochemical and Biophysical Research Communications :

Prevention of Quinone-Mediated DNA Arylation by Antioxidants</title>
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Volume 262, Issue 3</a>

7 September 1999,

Pages 769-774

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<h4>Regular Article </h4>

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<p>Prevention of Quinone-Mediated DNA Arylation by Antioxidants<a name="bm4.1"></a><a href="#m4.1"><sup>\*1</sup></a> </h2>

<strong>

<p>Minoti Sharma<a href="#a1"><sup>a</sup></a><sup>, </sup><a name="bfnfn1"></a><a href="#fn1"><sup>1</sup></a> and Harry K. Slocum<a href="#a2"><sup>b</sup></a> </strong><br>

<br><a name="a1"></a><sup>a</sup> Department of Molecular and Cellular Biophysics, Roswell Park Cancer Institute, Buffalo, New York, 14263<br><a name="a2"></a><sup>b</sup> Department of Pharmacology and Therapeutics, Roswell Park Cancer Institute, Buffalo, New York, 14263 <br>


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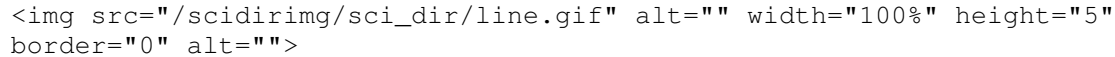
Received 6 August 1999.&nbsp;   Available online 12 April 2002.

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<h2>Abstract</h2><p>High performance liquid chromatographic (HPLC) analysis showed that the prototype antioxidant ascorbate (vitamin C) inhibits the DNA adducts induced by synthetic estrogen diethylstilbestrol (DES) and the antiestrogen metabolite 4-hydroxytamoxifen (4-OHTam). Treatment of salmon testes DNA with 4-OHTam quinone or 4-OHTam in the presence of horseradish peroxidase and hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) generated the same DNA adduct profile. Vitamin C and N-acetylcysteine (NAC) inhibited the formation of 4-OHTam-dG adducts in a dose-dependent manner. To determine whether the same antioxidants also protect cellular DNA, HL-60 cells were used as cell culture model. Cells treated with 10M 4-OHTam in the presence of 1M H<sub>2</sub>O<sub>2</sub> for 24 h gave 4-OHTam-dG adducts ~4 &times; 10<sup>-7</sup>, N = 3. Treatment

of the cells with 100  M 4-OHTam, without H<sub>2</sub>O<sub>2</sub>, produced the same level of adducts. Supplementation of the incubation media with vitamin C (2.5 mM) or NAC (5 mM) inhibited the formation of DNA adducts. Thus, antioxidants may protect susceptible cells from genotoxicity associated with 4-OHTam activation.




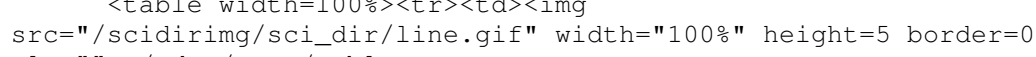
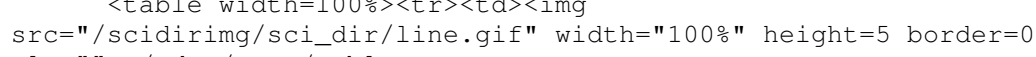
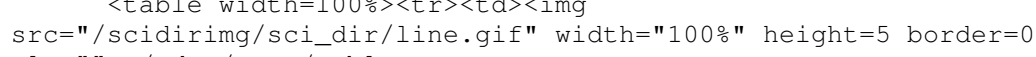
[m4.1](#)

[\\*1](#) Abbreviations used: HPLC, high performance liquid chromatography; DES, diethylstilbestrol; 4-OHTam, 4-hydroxytamoxifen; 4-OHTam-dG, 4-hydroxy-(deoxyguanosin-N<sup>2</sup>-yl)-tamoxifen; ascorbate, vitamin C; NAC, N-acetylcysteine; H<sub>2</sub>O<sub>2</sub>, hydrogen peroxide; HL-60 cells, promyelocytic leukemia cells; UV, ultraviolet; IR, infrared


[fn1](#)

[1](#) To whom correspondence should be addressed at Department of Molecular & Cellular Biophysics, RPCI, Elm & Carlton Streets, Buffalo, New York 14263. Fax: 716-845-8899.

	
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,

7 September 1999

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Pages 769-774

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helpWin=window.open('h_browfd.tpl','sdhelp','scrollbars=yes,resizabl
e=yes,directories=no,toolbar=no,menubar=no,status=no,width=610,height
=480'); helpWin.focus()"

```

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we protect information that you supply.
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## **Appendix B2**

### **ScienceDirect Document after Pre-processing**



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Regular Article

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Prevention of Quinone-Mediated DNA Arylation by Antioxidants\*1

SEN

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Minoti Sharmaa, 1 and Harry K.

SEN

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Slocumb a Department of Molecular and Cellular Biophysics, Roswell Park Cancer Institute, Buffalo, New York, 14263b Department of Pharmacology and Therapeutics, Roswell Park Cancer Institute, Buffalo, New York, 14263 Received 6 August 1999. Available online 12 April 2002.

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Abstract

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High performance liquid chromatographic (HPLC) analysis showed that the prototype antioxidant ascorbate (vitamin C) inhibits the DNA adducts induced by synthetic estrogen diethylstilbestrol (DES) and the antiestrogen metabolite 4-hydroxytamoxifen (4-OHTam).

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Treatment of salmon testes DNA with 4-OHTam quinone or 4-OHTam in the presence of horseradish peroxidase and hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) generated the same DNA adduct profile.

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Vitamin C and N-acetylcysteine (NAC) inhibited the formation of 4-OHTam-dG adducts in a dose-dependent manner.

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To determine whether the same antioxidants also protect cellular DNA, HL-60 cells were used as cell culture model.

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Cells treated with 10 M 4-OHTam in the presence of 1 M H<sub>2</sub>O<sub>2</sub> for 24 h gave 4-OHTam-dG adducts  $\sim 4 \times 10^{-7}$ , N = 3.

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Treatment of the cells with 100 M 4-OHTam, without H<sub>2</sub>O<sub>2</sub>, produced the same level of adducts.

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Supplementation of the incubation media with vitamin C (2.5 mM) or NAC (5 mM) inhibited the formation of DNA adducts.

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Thus, antioxidants may protect susceptible cells from genotoxicity associated with 4-OHTam activation.

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\*1 Abbreviations used: HPLC, high performance liquid chromatography; DES, diethylstilbestrol; 4-OHTam, 4-hydroxytamoxifen; 4-OHTam-dG, 4-hydroxy-(deoxyguanosin-N2-yl)-tamoxifen; ascorbate, vitamin C; NAC, N-acetylcysteine; H2O2, hydrogen peroxide; HL-60 cells, promyelocytic leukemia cells; UV, ultraviolet; IR, infrared

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1 To whom correspondence should be addressed at Department of Molecular Cellular Biophysics, RPCI, Elm Carlton Streets, Buffalo, New York 14263.

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Fax: 716-845-8899.

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Biochemical and Biophysical Research Communications      Volume 262, Issue 3 ,7  
September 1999 ,Pages 769-774      

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## **Appendix C**

# **DCG Rules for Matching Definition Patterns of Abbreviations**

```

nea_x_abbrev_definition( entity( definition, Defn,
                                Defn_list, Pattern, [], [] ) ) -->

    nea_pre_def( Defn_list ),
    [ '(', target( T ), ')' ],
    { nea_insert_spaces_in_list( Defn_list, Defn),
      Pattern = [ '60abbrev', '(', target( T ), ')' ] }, !.

/* Following convention, Defn has spaces between the words while
Defn_list (for matching not writing out) does not. */
/* DEF ( TERM ) */

nea_x_abbrev_definition( entity( definition, Defn,
                                _Defn_list, _Pattern, [], [] ) ) -->

    [ target( _ ), '(' ],
    nea_pre_parent( Defn_list2 ),
    { nea_parent_stopwords( Word ),
      nea_check_parent_content( Word, Defn_list2),
      Defn = [ 'NIL' ] }, !.

/* Following convention, Defn has spaces between the words while
Defn_list (for matching not writing out) does not. */
/* TERM ( DEF ), DEF includes stopwords such as 'et al' and figure */

nea_x_abbrev_definition( entity( definition, Defn,
                                _Defn_list, _Pattern, [], [] ) ) -->

    [ target( _ ), ',', '(' ],
    nea_pre_parent( Defn_list2 ),
    { nea_parent_stopwords( Word ),
      nea_check_parent_content( Word, Defn_list2),
      Defn = [ 'NIL' ] }, !.

/* Following convention, Defn has spaces between the words while
Defn_list (for matching not writing out) does not. */
/* TERM, ( DEF ), DEF includes stopwords such as 'et al' and figure */

nea_x_abbrev_definition( entity( definition, Defn,
                                _Defn_list, _Pattern, [], [] ) ) -->

    [ target( _ ), '(' ],

```

```

nea_pre_parent( Defn_list2 ),
{ nea_check_parent_year_content( Defn_list2),
  Defn = [ 'NIL' ] }, !.

/* Following convention, Defn has spaces between the words while
Defn_list (for matching not writing out) does not. */
/* TERM ( DEF ), DEF includes year numbers such as 1999 */

nea_x_abbrev_definition( entity( definition, Defn,
                               _Defn_list, _Pattern, [], [] ) ) -->

[ target( _ ), ',', '(' ],
nea_pre_parent( Defn_list2 ),
{ nea_check_parent_year_content( Defn_list2),
  Defn = [ 'NIL' ] }, !.

/* Following convention, Defn has spaces between the words while
Defn_list (for matching not writing out) does not. */
/* TERM, ( DEF ), DEF includes year numbers such as 1999 */

nea_x_abbrev_definition( entity( definition, Defn,
                               _Defn_list, _Pattern, [], [] ) ) -->

[ target( _ ), '(' ],
nea_pre_parent( Defn_list2 ),
{ nea_check_authors( Defn_list2),
  Defn = [ 'NIL' ] }, !.

/* Following convention, Defn has spaces between the words while
Defn_list (for matching not writing out) does not. */
/* TERM ( DEF ), DEF includes authors such as Beck and Beck */

nea_x_abbrev_definition( entity( definition, Defn,
                               _Defn_list, _Pattern, [], [] ) ) -->

[ target( _ ), ',', '(' ],
nea_pre_parent( Defn_list2 ),
{ nea_check_authors( Defn_list2),

```

```

Defn = [ 'NIL' ] }, !.

/* Following convention, Defn has spaces between the words while
Defn_list (for matching not writing out) does not. */
/* TERM, ( DEF ), DEF includes authors such as Beck and Beck */

nea_x_abbrev_definition( entity( definition, Defn,
                               Defn_list, Pattern, [], [] ) ) -->

[ target( T ), '(' ],
nea_pre_parent( Defn_list ),
{ nea_insert_spaces_in_list( Defn_list, Defn),
  Pattern = [ '38abbrev', target( T ),
    [ '(' ], Defn_list, [ ')' ] ] }, !.

/* Following convention, Defn has spaces between the words while
Defn_list (for matching not writing out) does not. */
/* TERM ( DEF ) */

nea_x_abbrev_definition( entity( definition, Defn,
                               Defn_list, Pattern, [], [] ) ) -->

[ target( T ), ',', '(' ],
nea_pre_parent( Defn_list ),
{ nea_insert_spaces_in_list( Defn_list, Defn),
  Pattern = [ '38babbrev', target( T ),
    [ '(' ], Defn_list, [ ')' ] ] }, !.

```

## **Appendix D**

### **Final Output of the System**



Explanation for the first answer (first two lines): '4123' is the query number, the first '1' is the doc\_so\_far\_term\_count, the second '1' is the doc\_total\_term\_count, 'N. pemaquidensis' is the answer, 62a is the pattern number, followed by the lexical pattern ('is considered a') and the query term (target) 'facultative'.

```

4123 1 1 N . pemaquidensis
[62a,[is],considered,[a],target([facultative])]
4137 2 7 Site X displayed consistently higher TPM , PIM , POM and
nonalgal POM concentrations than the mussel sites ,
[56a,including,[the],target([following])]
4137 1 1 The best way to avoid the development of resistance is to
use as little chemicals as possible by applying nonchemical control
methods [52,such,as,target([following])]
4137 3 3 IHN virus , [47,target([following]),[,],[IHN,virus,,]]
4137 1 2 single year classes ,
[47,target([following]),[,],[single,year,classes,,]]
4146 3 27 involved 628 individuals .
[47,target([family]),[,],[involved,628,individuals,.]]
4146 1 8 in a clade containing fish AhR2 genes .
[47,target([family]),[,],[in,a,clade,containing,fish,AhR2,genes,.]]
4146 2 4 C / EBP , [47,target([family]),[,],[C,/EBP,,]]
4146 1 1 have not been examined in teleosts .
[47,target([family]),[,],[have,not,been,examined,in,teleosts,.]]
4146 3 4 mammalian and chicken mannose - binding lectins ,
conglutinin and surfactant proteins A and D [ 11 ] .
[25,target([family]),[includes],[mammalian,and,chicken,mannose,-
,binding,lectins,,,conglutinin,and,surfactant,proteins,A,and,D,[11],
,.]]
4146 2 4 including GH , [47,target([family]),[,],[including,GH,,]]
4146 3 4 the pituitary form of GH ( hGH - N ) , as well as chorionic
somatotropin ( hCS ) , a hCS variant ( hCS - L ) , and a GH variant (
hGH - V ) which are expressed in placenta ( Miller and Chen ) .
[25,target([family]),[includes],[the,pituitary,form,of,GH,(,hGH,-
,N),,,,as,well,as,chorionic,somatotropin,(,hCS),,,,a,hCS,variant,(,hC
S,-,L),,,,and,a,GH,variant,(,hGH,-
,V),,which,are,expressed,in,placenta,(,Miller,and,Chen),.]]
4146 1 1 regulation of GST and the contribution of the isoenzymes to
cancer chemoprotection and drug resistance .
[45,target([family]),[:],[regulation,of,GST,and,the,contribution,of,t
he,isoenzymes,to,cancer,chemoprotection,and,drug,resistance,.]]
4146 1 3 FSH - , LH - or TSH - receptor
[38,target([family]),[(],[FSH,-,,,LH,-,or,TSH,-,receptor],[])]
4146 1 1 responsible for sensitivity of Listeria monocytogenes to
mesentericin Y105 .
[9aa,target([family]),is,[responsible,for,sensitivity,of,Listeria,mon
ocytogenes,to,mesentericin,Y105,.]]
4146 1 3 have a life cycle consisting of the following stages : two
nauplius ,
[47,target([family]),[,],[have,a,life,cycle,consisting,of,the,followi
ng,stages,:,two,nauplius,.]]
4146 1 1 visual predators ( Gaston and Jones , 1998 ) .
[9ab,target([family]),are,[visual,predators,(,Gaston,and,Jones,,,1998
),.]]
4146 2 5 conserved between various vertebrate species , and proteins
similar to LTBP's and fibrillins have been identified even in as
distant a species as jelly fish ( Saharinen et al . , 1999 ) .
[9aa,target([family]),is,[conserved,between,various,vertebrate,specie
s,,,and,proteins,similar,to,LTBP's,and,fibrillins,have,been,identified

```

, even, in, as, distant, a, species, as, jelly, fish, (, Saharinen, et, al, . . . , 1999, . . . ]]

4146 2 2 ploidy , [47, target ([family]), [, ], [ploidy, . . . ]]

4146 2 5 present in vertebrates , as well as in some invertebrate species .  
[9ab, target ([family]), are, [present, in, vertebrates, . . . , as, well, as, in, some, invertebrate, species, . . . ]]

4146 1 2 related to each other by structure and believed to have evolved from a common ancestral gene by duplication and subsequent divergence ( reviewed by Rand - Weaver and Kawauchi ,  
[10b, target ([family]), . . . , which, are, [related, to, each, other, by, structure, and, believed, to, have, evolved, from, a, common, ancestral, gene, by, duplication, and, subsequent, divergence, (, reviewed, by, Rand, - Weaver, and, Kawauchi, . . . ]]

4146 2 3 Cyprinidae [38, target ([family]), [, ], [Cyprinidae], [ . . . ]]

4146 1 1 denoted by a common symbol .  
[9ab, target ([family]), are, [denoted, by, a, common, symbol, . . . ]]

4146 2 4 90 - kDa protein ( HSP90 ) is highly conserved and abundant in unstressed cells , [34, target ([family]), [, ], [the], [ . . . ], [90, - kDa, protein, (, HSP90, ) , is, highly, conserved, and, abundant, in, unstressed, cells, . . . ]]

4146 2 2 W272 and NCA , [47, target ([family]), [, ], [W272, and, NCA, . . . ]]

4146 2 2 testicular alternative splicing variant hPL - A2 : recombinant expression revealed a membrane associated growth factor molecule .  
[34, target ([family]), [, ], [the], [ . . . ], [testicular, alternative, splicing, variant, hPL, - A2, : , recombinant, expression, revealed, a, membrane, associated, growth, factor, molecule, . . . ]]

4146 1 1 an icosahedric capsid without envelope ,  
[10c, target ([family]), . . . , which, has, [an, icosahedric, capsid, without, envelope, . . . ]]

4146 1 3 three subfamilies : Salmoninae ( trout , salmon , char ) , Coregoninae ( whitefish ) and Thymallinae ( greyling ) .  
[23, target ([family]), [comprises], [three, subfamilies, : , Salmoninae, (, trout, , , salmon, , , char, ) , , , Coregoninae, (, whitefish, ) , and, Thymallinae, (, greyling, ) , . . . ]]

4146 3 3 than of growth hormone in teleost fish .  
[47, target ([family]), [, ], [than, of, growth, hormone, in, teleost, fish, . . . ]]

4146 2 3 main signaling pathway is via adenylyl cyclase ( Poyner and Aiyar ) .  
[34, target ([family]), [, ], [the], [ . . . ], [main, signaling, pathway, is, via, adenylyl, cyclase, (, Poyner, and, Aiyar, ) , . . . ]]

4146 3 8 having in common a six amino acid ring structure at the NH2 terminus of the molecule ( created by a disulfide bond between two cysteines at positions 2 and 7 ) and an amide group at the COOH terminus .  
[47, target ([family]), [, ], [having, in, common, a, six, amino, acid, ring, structure, at, the, NH2, terminus, of, the, molecule, (, created, by, a, disulfide, bond, between, two, cysteines, at, positions, 2, and, 7, ) , and, an, amide, group, at, the, COOH, terminus, . . . ]]

4146 2 2 more common than n - 3 fatty acids .  
[9ab, target ([family]), are, [more, common, than, n, - , 3, fatty, acids, . . . ]]

4146 1 1 activates G proteins ( Gq and G11 ) that stimulate phospholipase C activity to generate inositol triphosphate and diacylglycerol .  
[47, target ([family]), [, ], [activates, G, proteins, (, Gq, and, G11, ) , that, stimulate, phospholipase, C, activity, to, generate, inositol, triphosphate, and, diacylglycerol, . . . ]]

4146 1 15 CCAAT / enhancer binding proteins ( C / EBPs )  
[30a, [CCAAT, /, enhancer, binding, proteins, (, C, /, EBPs, )], [comprise], [a], target([family])]

4146 1 18 widely studied in mammalian systems .  
[9ab, target([family]), are, [widely, studied, in, mammalian, systems, .]]

4146 3 27 pair of parents  
[38, target([family]), [(], [pair, of, parents], [ ])]

4146 1 9 MyoD , myogenin , myf5 and MRF4 .  
[25, target([family]), [includes], [MyoD, , , myogenin, , , myf5, and, MRF4, .]]

4146 1 2 F = 5 . 14 , P = 0 . 003  
[38, target([family]), [(], [F, =, 5, ., 14, , , P, =, 0, ., 003], [ ])]

4149 2 2 likely to result in an even more pronounced reduction in genetic variability as evidenced in the Norwegian farmed II population .  
[9aa, target([family, selection]), is, [likely, to, result, in, an, even, more, pronounced, reduction, in, genetic, variability, as, evidenced, in, the, Norwegian, farmed, II, population, .]]

4151 1 1 Guo Xiang - Qun , [47, target([Fang]), [, ], [Guo, Xiang, - , Qun, , ]]

4154 1 1 Rome , [47, target([FAO]), [, ], [Rome, , ]]

4154 1 1 The United Nations Food and Agriculture Organization [60, (, target([FAO]), , )]

4154 1 11 In 1995 the United Nations Food and Agriculture Organization [60, (, target([FAO]), , )]

4154 1 1 Oxford , [47, target([FAO]), [, ], [Oxford, , ]]

4154 1 7 00100 , [47, target([FAO]), [, ], [00100, , ]]

4167 1 1 processed into fish meal at high temperatures , a histamine derivative , gizzerosine ( GE = 2 - amino - 9 - ( 4 - imidazolyl ) - 7 - azanonanoic acid ) is formed by a reaction between the - amino group of lysine with the imidazolethyl group of histidine or histamine ( Okazaki et al . , 1983 ) .  
[9ab, target([fatty, fish]), are, [processed, into, fish, meal, at, high, temperatures, , , a, histamine, derivative, , , gizzerosine, (, GE, =, 2, -, amino, -, 9, -, (, 4, -, imidazolyl, ) , -, 7, -, , azanonanoic, acid, ) , is, formed, by, a, reaction, between, the, -, amino, group, of, lysine, with, the, imidazolethyl, group, of, histidine, or, histamine, (, Okazaki, et, al, . , , 1983, ) , .]]

4167 1 2 salmon , tuna , mackerel  
[38, target([fatty, fish]), [(], [salmon, , , tuna, , , mackerel], [ ])]

4169 1 1 mainly terrestrial insects  
[38, target([fauna]), [(], [mainly, terrestrial, insects], [ ])]

4169 1 1 seawater temperature at Paleo Kushiro Bay was about 5 degrees C warmer than at present .  
[47, target([fauna]), [, ], [seawater, temperature, at, Paleo, Kushiro, Bay, was, about, 5, degrees, C, warmer, than, at, present, .]]

4169 2 3 evidence for atmospheric delivery .  
[45, target([fauna]), [:], [evidence, for, atmospheric, delivery, .]]

4169 3 3 the environment in general , can the society accept ? The quality of this controversy is not one that can be resolved by increased research or improved technology [ 25 ] .  
[37, target([fauna]), [, , or], [the, environment, in, general, , , can, the, society, accept, ?, The, quality, of, this, controversy, is, not, one, that, can, be, resolved, by, increased, research, or, improved, technology, [, 25, ], .]]

4187 2 4 Biomass losses due to spawning [60, (, target([fecundity]), , )]

4187 1 1 longevity , [47, target([fecundity]), [, ], [longevity, , ]]

4187 2 2 reflecting the expected strong selection on egg size relative to egg number .

**Appendix E**  
**Vital and Okay Answers**  
**(First Experiment)**

Term	Judgement	Pattern	Text extract (relevant definition in bold)
artificial photoperiod	Okay	TERM is DEF	<b>Capable of altering the timing of maturation</b>
Chinook salmon	Okay	TERM (DEF	<b>Oncorhynchus tshawytscha</b> in the Pacific Northwest
Chinook salmon	Okay	TERM constitutes DEF	<b>Roughly 30% of the total British Columbia production</b>
parr	Okay	TERM are DEF	<b>Commonly reared in freshwater on diets containing northern hemisphere fish oils</b>
parr	Okay	DEF (TERM)	Studies conducted in laboratory streams have shown that <b>juvenile salmonid fish</b>
redd	Vital	TERM (DEF	Jacks spawn in the <b>female's nest</b>
redd	Okay	DEF called a TERM	The researcher cannot be certain that a particular location in a stream is suitable until spawning has taken place there, leaving <b>feature in the stream bed</b>
alevin	Okay	DEF (TERM)	The <b>hatched Atlantic salmon</b>
alevin	Okay	TERM (DEF	<b>under 2 cm in length</b> ) were collected every other day for 20 days
smolt	Okay	Term (DEF	<b>4810 degrees days</b>
smolt	Vital	DEF is termed TERM	<b>Anadromous salmonids migrate from rivers to marine habitats as a developmental stage</b>
smolt	Vital	TERM is DEF	<b>usually defined as a juvenile salmon that is able to survive and grow normally in sea water</b> (Sigholt, 1997)
grilse	Okay	DEF (TERM)	Positional and temporal variations in swimming speed and some morphological attributes were assessed in various mixed populations of <b>early maturing</b>
grilse	Vital	TERM (DEF	<b>i.e., as 2-year-olds after one winter of seawater residence</b> ), whereas their Nova Scotian relatives are recognised...
osmoregulation	Okay	DEF including TERM	The stress-induced elevation of cortisol is thought to be important in the <b>physiological adjustments to stress</b>
fry	Okay	TERM which is DEF	<b>a phase in the life cycle characterised by a very high growth rate</b> (Austreng, 1987)
astaxanthin	Vital	TERM is DEF	An approved color additive in the feed of salmonids
astaxanthin	Okay	DEF such as TERM	In addition to the (n-3) HUFAs, marine fish larvae also require ascorbic acid, tocopherol and <b>carotenoids</b>

## **Appendix F**

### **Query Terms for which Answers were Found (Second Experiment)**

adipose fin	amino acids	declaration
abbreviate heterocercal	amocoetes	decomposition
abdomen	amphibians	deep sea
abdominal	amphipods	deep water
abdominal cavity	anadromous	definition
abdominal fins	analogous	degenerate
aberrant	angel	deletions
aberration	angling	demersal
abiotic	annular	demographic
absorption	annuli	density
accession	anonymous	deoxyribonucleic acid
acclimation	anoxia	depensation
acidity	anterior	depensatory
acoustic tag	anthropogenic	depressed
active metabolism	antibiotics	depression
acute toxicity	anus	depth
ad libitum	application	derived
adipose	approximation	dermal
adsorption	aquaculture	dermal bone
adult	aquaculture Center	dermis
advance	aquifer	dermocranium
aeration	arrow	description
affinis	article	designation
agar	articulated	detritus
age at first maturity	artificial selection	diarrhea
age structure	ascidians	diatoms
aggregate	asia	diencephalon
aggregation	assimilation efficiency	differentiation
alcohol	association	diffusion
alevin	asteriscus	disc
algae	atlas	discharge
algorithm	atresia	dispersal
alimentary canal	attribute	displacement
alkalinity	australian salmon	dissolved oxygen
allele	axial	distinctiveness
allèle	axial skeleton	disturbance
allometry	dam	diurnal
allozyme	data	divergence
alta	database	diversity
altitude	dataset	division
ambient temperature	debris	dolphins

domestication	intestine	metabolic rate
dominant	inventory	metabolism
doris	invertebrates	metamorphosis
dorsal	ionic regulation	metric ton
dorsal fin	iris	microorganisms
drawn	irradiation	microsatellite
dredge	isóbata	midbrain
dressed	isopropyl	migrating
dried fish	isotherm	migration
duct	isozyme	Milkfish
uplications	iteroparous	milt
ichthyology	Mackerels	mimetic
identification	macro-	mimic
imprinting	macrobenthos	minnow
inbreeding	macrofauna	Mississippi State University, Mississippi
increment	macrophytes	mitochondria
incubation	Mannitol	mitochondrial DNA
incubation period	map	mitosis
incubator	margin	mixed fishery
indeterminate	mariculture	moist pellet
indication	marin	molluscs
indicator	Marine Protected Area	mono-
indicator species	marked	monoculture
indice	marsh	monophyletic
industrial fishery	mass selection	Mooneyes
inferior	mat	Moray eels
infestation	matrix	morphology
information	maturation	morphometric
information system	maturity	mortality
inlet	maximum economic yield	mouth
innate	maximum sustainable yield	mucus
inner ear	medial	myotome
insecticide	median	mysids
insertion	Median effective concentration	race
inshore waters	median fins	raceway
institute of Zoology, Academia Sinica, Taipei	medicated feed	rada
institutions	medulla oblongata	radiation
integument	membrane	radiograph
intensive culture	meristic	radius
interbreeding	meristic characters	ranching
interface	mesh size	rancidity
internet	mesohaline	rare



rarity	rings	sea water
ration	risk	Secchi disc
ray	river basin	secondary production
rearing	riverine	section
rearing habitat	robust	seed
rearing pond	robustness	seine
recent	rod	selection
recombinant DNA technology	roe	selective breeding
record	root	selectivity
recreational fishery	root effect	semelparous
recruitment	rostral	Semi-dry
recruitment curve	rostrum	seminal vesicle
recruits	Round fish	sensorial
redd	round weight	sensory
reef	rounded	separate
reference	routine metabolism	server
refugium	run	setting
regime shift	runoff	settlement
reintroduction	sac fry	sewage
relationship	sacculus	sex ratio
relative abundance	sagitta	sexual dimorphism
release	salinity	sharks
relict	Salmonids	shelf life
relief	salting	shelf waters
reproduction	saltwater	shell
reproductive isolation	sample	shellfish
reservoir	sand	shipwreck
resident	Sardines	shoals
resolution	satellite	shoulder
respiration	Sauerlappen	sib selection
response to selection	sauvage	sic
restocking	scale	silage
restoration	scaling	sill
retention	scavenger	Silversides
retina	school	simple
reverberation	School of Oceanography	simulation
reversal	schooling	sine
rib	sclera	size distribution
richness	scoliosis	size-at-age
ridge	scraper	skeletal system
riffle	Sculpins	skeleton
Righteye flounders	sea ranching	skin

skull	species epithet	Stocker
SL	species flock	stocking
slope	species richness	stocking density
slough	specific growth rate	stomach
smoke flavour	specimen	strain
Smoked fish	spectroscopy	strait
smolt	sperm	stratification
smoltification	spermatogonia	straying
Snappers	spermatozoa	stream
snout	spine	stream bed
soft water	splitting	streamflow
somites	sport fish	strip
sonar	sport fishing	stripe
sound	spot	stripping
Southern Africa	spring runoff	sub
sp.	squalene	subcutaneous
spawn	standard length	subsistence fisheries
spawning	standard metabolism	subspecies
spawning escapement	stationary	substrate
spawning fish	status quo	succession
spawning ground	stay	sucker
spawning migration	steak	super
spawning stock	steaks	superior
spawning substrate	stock	supplementation
speciation	stock assessment	supra
species	stock enhancement	
species diversity	stock structure	

**Appendix G**  
**Vital and Okay Answers**  
**(Second Experiment)**

Term	Judgement	Pattern	Text extract (relevant definition in bold)
adult	Okay	DEF such as a/an/the TERM	The term recruits can apply to any <b>stage in the life cycle</b>
alcohol	Okay	TERM, DEF	Isopropanol
alcohol	Okay	TERM (DEF)	<b>EtOH</b>
amino acids	Okay	TERM were DEF	predicted to <b>constitute the signal peptide</b>
amphipods	Okay	DEF, TERM,	Tadokoro, Ishida, Davis, Ueyanagi, and Sugimoto (1996) reported that chum salmon shifted their diets from predominantly gelatinous zooplankton (pteropods, appendicularians, jellyfish, chaetognaths, polychaetes and unidentified material) in 1991, when pink salmon were abundant, to a diet composed more of <b>crustaceans</b> (euphausiids, copepods)
amphipods	Okay	DEF such as TERM	Each of these top predators is directly or indirectly dependent on food web based on <b>crustaceans</b>
anadromous	Vital	TERM--DEF	That is they <b>spawn in freshwater and, a few weeks to a few years after hatching, the young migrate to the ocean, where they spend from one to several years</b> (Groot and Meehan and Bjornn, 1991).
antibiotics	Okay	TERM, DEF	Such as <b>oxytetracycline (OTC)</b>
antibiotics	Okay	TERM are DEF	<b>Registered and sold for use in the United States as feed additives for disease control in farmed fish.</b>
aquaculture	Okay	TERM, DEF	<b>Growing fish in captivity</b>
Australian salmon	Vital	TERM (DEF)	<b>Arripidae: Arripis truttacea, Cuvier</b>
sib selection	Vital	DEF (TERM)	An alternate strategy would be to rear a portion of each family under production condition and <b>select broodstock families on the basis of the production performance of their sibs</b>
smoltification	Vital	TERM--DEF	The transformation from freshwater dwelling parr to saltwater tolerant smolt
snappers	Vital	TERM (DEF)	<b>Subfamily Lutjaninae</b>
soft water	Okay	TERM (DEF)	100 mg CaCO <sub>3</sub> /l
intestine	Vital	TERM, DEF	Defined as the section from the ileorectal valve to the anus
intestine	Okay	TERM is DEF	<b>the main target organ of dietary metals</b> (Handy 1992)

<b>Term</b>	<b>Judgement</b>	<b>Pattern</b>	<b>Text extract (relevant definition in bold)</b>
intestine	Okay	TERM is DEF	<b>One of the major osmoregulatory organs in fish</b>
iteparous	Vital	TERM, DEF	<b>potentially spawning multiple times</b>
maturation	Okay	TERM (DEF)	<b>grilsing</b>
maturity	Okay	TERM, i.e. DEF	<b>the presence of running milt</b>
salmonids	Okay	TERM: DEF	<b>Rainbow trout, Atlantic salmon and coho salmon</b>
salting	Vital	TERM is DEF	<b>An ancient preservation method, usually used separately or in combination with other process such as air drying and pH lowering</b>
salting	Okay	DEF, TERM,	The traditional cold-smoked salmon process involves the use of a number of <b>preserving technologies</b> , including cooling,
seine	Okay	DEF consists of a//an/the TERM	<b>A net-pen</b>
semelparous	Vital	TERM (DEF)	i.e., they <b>reproduce once and die soon after spawning</b>
Specific growth rate	Okay	TERM (DEF)	<b>SGR</b>
Specific growth rate	Okay	TERM was DEF	<b>Calculated as <math>(\ln W2 - \ln W1) / T1 - 2</math>, where <math>T1 - 2</math> is the number of days between times <math>T1</math> and <math>T2</math></b>
stationary	Okay	TERM, DEF	<b>Maintaining position with a steady tail beat</b>
stock enhancement	Okay	TERM is DEF	<b>required to sustain catches, for example for restoration and mitigation, or where angling expectation exceeds the capacity for the prevailing conditions to provide</b>
sturgeons	Vital	TERM ( DEF)	<b>Acipenseridae, 26 species</b>

## **Appendix H**

### **Query Terms for which Answers were Found**

#### **(Third Experiment)**

Facultative	Fishy	gastrula
Fallowing	Fissure	gear
Family	Fitness	gel
Family selection	Fixation	gelatinous
Fang	Flake	gen
FAO	Flasher	gene
Fatty fish	Flatfish	gene bank
Fauna	Floater	genera
Fecundity	Flood tide	generation
Feed conversion efficiency	Flow-through system	genetic distance
Feed utilisation	Food chain	genetic diversity
Feeder	Food consumption	genetic drift
Feral	Food conversion efficiency	genetic material
Fertilisation	Food fish	genetics
Fertility	Food web	genome
Fertilization	Forage fish	genotype
Field	Foramen	genus
Filament	Forebrain	Geographic Information System
Filet	Foregut	geology
Fillet	Fork length	Georges Bank
Fin rays	Formalin	gill
Finfish	Forum	gill arch
Fingerling	Fosse	gill filaments
Fins	Fossil	gill rakers
Fish ladder	Founding population	gillnet
Fish liver	Fracture	gland
Fish meal	Fresh fish	Global Positioning System
Fish oils	Freshet	global warming
Fish protein concentrate	Freshwater	gobies
Fish silage	Freshwater eels	gonad
Fish tank	Frozen fish	gorge
FishBase	Fry	GPS
Fisher	Fugu	gravel
Fisheries Research Centre	Full-sibs	grilse
Fisherman	Function	groove
Fishery	Funnel	groundfish
Fishery biology	Fusiform	groundwater
Fishing effort	gall bladder	group
Fishing gear	game fish	grow-out
Fishing mortality	gametes	growth
Fishmeal	gas supersaturation	growth rate

guanine	Pikes	pot
gubbins	pineal organ	pre
guild	piscator	precautionary principle
gut	Pisces	precision
guttled fish	piscine	precocious
gyre	piscivorous	predator
pancreas	plain	predatory
parallelism	planktivorous	prediction
parameter	plankton	primary production
parasite	plankton bloom	primary productivity
parasitic	planktonivorous	priority
parr	plants	Probability distribution
parsimony	plate	process
parts per thousand	plumbeus	processing
Passive Integrated Transponder tags	poikilotherm	produced
pathogen	polarisation	productivity
pectoral fins	polarity	profile
peduncle	pollution	projection
pelagic	poly-	pronephros
pellet	polychaetes	proposal
pelvic fins	polyculture	proposition
pen	polymorphic	prospecting
peripheral	polymorphic loci	protected area
persistence	polymorphism	protozoans
personal communication	polyunsaturated fatty acids	province
pH	Pomfrets	proximal
pharynx	pond	publication
phenotype	pond culture	published work
phenotypic plasticity	pool	pungent
pheromone	population	purse seine
phi	population dynamics	pyloric caeca
philopatry	pore	pyloric caecum
photoperiod	porpoises	pylorus
photosynthesis	port	year class
phylogeny	post-	year-class
phytoplankton	posterior	yearling
pigmentation	postlarvae	yield



**Appendix I**  
**Vital and Okay Answers**  
**(Third Experiment)**

<b>Term</b>	<b>Judgement</b>	<b>Pattern</b>	<b>Text extract (relevant definition in bold)</b>
FAO	Vital	DEF (TERM)	<b>The United Nations Food and Agriculture Organization</b>
feed conversion efficiency	Vital	TERM (DEF)	<b>wet weight gain by fish/ dry weight of feed consumed</b>
fish meal	Okay	TERM, the DEF	<b>major source of protein in commercial diets of salmonids</b>
FishBase	Okay	TERM, a DEF	<b>Large database on the biology of fish</b> (Froese and Pauly)
flasher	Vital	TERM (DEF)	<b>approximately 36 in. silver lure</b>
freshwater eels	Vital	TERM (DEF)	<b>Anguillidae</b>
fugu	Okay	TERM (DEF)	<b>Puffer fish</b>
genetics	Okay	DEF such as TERM	The genetically identical nature of cloned fish is also important for <b>basic biological sciences</b>

## **Appendix J**

### **Vital and Okay Answers (Fourth Experiment)**

Term	Judgement	Pattern	Text extract (relevant definition in bold)
algae	Okay	DEF including TERM	<b>Epibiotic microorganism</b> s
caciques	Okay	TERM (DEF)	<b>Icterinae: Cacicus cela</b>
Cartilaginous fishes	Okay	DEF (TERM)	Since the appearance of vertebrates with true jaws in the Silurian period (438-408 mya), the gnathosome vertebrates have undergone three major radiations: <b>the Chondrichthyes</b>
caviar	Okay	DEF ([Words], TERM, _ )	The prevalence of L. monocytogenes in <b>cured seafood</b>
newts	Okay	TERM (DEF)	<b>Amphibia</b>
amphipods	Okay	DEF such as TERM	Each of these top predators is directly or indirectly dependent on food web based on <b>crustaceans</b>
lapillus	Vital	DEF called a/an/the TERM	<b>The inner ear of teleost fish consists of three semicircular canals and three otolithic organs, the utriculus, sacculus and lagena, each containing a single otolith</b>
Length-weight relationship	Okay	DEF ( TERM)	Condition factor
lethargy	Okay	DEF including [Words], TERM	The pyriithiamine-injections induced several <b>M74-like symptoms</b>
luciferase	Okay	DEF ( TERM)	Recombinant stbTSHR expressed in COS1 cells activated <b>reorter genes</b>
adipose	Okay	DEF ( TERM)	<b>fat</b>