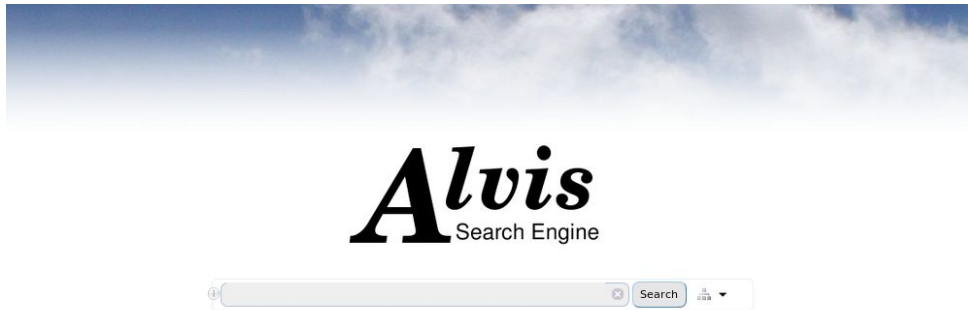


# Tutorial : Using Alvis Search Engine

Website:

<http://bibliome.jouy.inra.fr/demo/pubmed-ontobiotope/alvisir/webapi/search>



1. The Alvis Search Engine searches terms in PubMed abstracts about bacterial biotopes. At the moment bacteria and habitats are labeled by the Alvis software. Bacterial phenotypes will also be included in the near future.
2. It is different from Google search engine because it is a semantic search engine (the query interpretation can be consulted in the frame on the right)
  - a. If the query matches a term identified as a **Bacteria**, then it will be interpreted as such and the query will be extended to the children of the recognized concept

*e.g.* : *Listeria* => it is a taxon, the engine will retrieve documents about **Listeria** but also about its associated subspecies (*i.e.* *Listeria monocytogenes* , *Listeria aquatica*...)

The screenshot shows the Alvis Search Engine interface with the search term "Listeria". The search results are displayed in a grid format. The first result is titled "Regulation of virulence gene expression in pathogenic *Listeria*." and is from a 1996 *Microbiologia (Madrid, Spain)* journal. The abstract discusses dynamic interactions between host and pathogen, focusing on the evolution of control systems and the role of PrfA. The second result is titled "The molecular mechanisms of actin-based intracellular motility by *Listeria monocytogenes*." and is also from a 1996 *Microbiologia (Madrid, Spain)* journal. On the left side, there are two tables: "Bacteria" and "Habitats". The "Bacteria" table lists various bacterial species and their frequencies. The "Habitats" table lists various environments and their frequencies. On the right side, there is a sidebar with a list of synonyms and sub-concepts for *Listeria*.

locat value	freq	doc
<i>Listeria monocytogenes</i>	3810	1779
<i>Listeria</i>	1001	497
<i>Listeria innocua</i>	192	126
<i>Escherichia coli</i>	124	62
<i>Listeria ivanovii</i>	85	52
<i>Salmonella</i>	85	43
<i>Listeria seeligeri</i>	48	42
<i>Listeria welshimeri</i>	44	39
<i>Escherichia coli</i> O157:H7	36	35
<i>Staphylococcus aureus</i>	61	32

locat value	freq	doc
cell	1540	553
mouse	744	295
food	559	292
human	282	181
experimental medium	155	101
eukaryote host	137	97
cheese	245	96
spleen	159	92
animal	134	88
meat and meat product	171	87

b. If the query matches a term identified as a *Habitat* then the engine will also query the children of the identified concept in the ontology e.g.: the *food* query will look for the main concept “*food*”, as well as for the sub-concepts “*animal feed*” and “*food for human*” and all their sub-concepts.

**Bacteria**

facet value	freq	doc.
Escherichia coli	513	249
Listeria monocytogenes	254	113
Salmonella	259	111
Staphylococcus aureus	179	83
Escherichia coli O157:H7	61	57
Helicobacter pylori	156	43
Salmonella enterica subsp	63	41
Lactobacillus	58	37
Lactobacillus acidophilus	59	29
Bacillus cereus	64	29

**Habitats**

facet value	freq	doc.
food	708	369
cell	488	258
milk	509	211
human	297	188
sea salt	234	128
sugar	231	112
water	208	110
animal probiotic	182	106
meat and meat product	196	106
milk and milk product	201	95

**Journals**

facet value	freq	doc.
Antimicrobial Agents & Dev	105	105

**Search Results:**

**1 food (habitat) (148628)**

- Synonyms (1)
- Sub-concepts (2)
  - animal feed
  - food for human

**2 A biological method for the quantitative measurement of tetrodotoxin (TTX): tissue culture bioassay in combination with a water-soluble tetrazolium salt.**

1996 *Toxicol. : official journal of the International Society on Toxicology*

**Abstract** A tissue culture bioassay, using the mouse neuroblastoma cell line (Neuro2A), was improved to provide a simple and sensitive bioassay for TTX or sodium channel-blocking toxins (SCB). The water-soluble tetrazolium salt, 2-(4-iodophenyl)-3-(4-nitrophenyl)-5-(2,4-disulphophenyl)-2H-tetrazolium, monosodium salt (WST-1), was applied to replace the time-consuming and subjective cell-counting procedure of the cells with automatic measurement, using a microplate reader. It was also confirmed that this method is directly applicable to bacterial culture supernatants, with the precaution of possible interference.

**3 Enzymatic and biochemical probes of residues external to the translocation pathway of UhpT, the sugar phosphate carrier of Escherichia coli.**

1996 *The Journal of biological chemistry*

**Abstract** Part of the substrate translocation pathway through UhpT, the Escherichia coli sugar phosphate carrier, has been assigned to a transmembrane helix extending between residues 260 and 282. To set limits on the external portion of the pathway, we identified nearby residues fully exposed to the periplasm. In one case, we used Western blots to evaluate cleavage by extracellular trypsin. The protease cleaved UhpT variants retaining lysine 294, but not those lacking lysine 294, indicating that trypsin acts at a single extracellular site, lysine 294. In other work we labeled single-cysteine variants with 3-(N-maleimidylpropionyl)biocytin and scored

c. If the term does not match with a **Bacteria** or **Habitat** concept, the search engine performs a “standard” search

e.g. : *resistance*

Note that the “standard” search uses text-mining tools by looking for word variations: it is not a search by "exact match" or keywords, but a search based on the stem of the query words, i.e. for resistance, resistant, resisting...

**Bacteria**

facet value	freq	doc.
Staphylococcus aureus	865	352
Escherichia coli	235	144
Streptococcus pneumoniae	200	108
Mycobacterium tuberculosis	167	104
Pseudomonas aeruginosa	125	71
Enterococcus faecium	119	53
Helicobacter pylori	118	46
Enterococcus	114	46
Neisseria gonorrhoeae	43	35
Acinetobacter baumannii	71	34

**Habitats**

facet value	freq	doc.
cell	247	130
human	179	127
patient	176	99
patient	163	90
hospital	125	85
laboratory	93	81
medical environment	87	69
hospital	90	67
animal	102	65
spring high in sulfide	77	51

**Journals**

facet value	freq	doc.
Antimicrobial Agents & Dev	105	105

**Search Results:**

**resistance (149157)**

**1 Antibiotic resistance.**

2003 *Dental clinics of North America*

**Abstract** Through billions of years of evolution, microbes have developed myriad defense mechanisms designed to ensure their survival. This protection is readily transferred to their fellow life forms via transposable elements. Despite very early warnings, humans have chosen to abuse the gift of antibiotics and have created a situation where all microorganisms are resistant to some antibiotics and some microorganisms are resistant to all antibiotics. When antibiotics are used, six events may occur with only one being beneficial: when the antibiotic aids the host defenses to gain control and eliminate the infection. Alternatively, the antibiotic may cause toxicity or allergy, initiate a superinfection with resistant bacteria, promote microbial chromosomal mutations to resistance, encourage resistance gene transfer to susceptible species, or promote the expression of dormant resistance genes.

**2 Resisting bacterial drug resistance.**

2003 *Chemistry & biology*

**Abstract** In this issue of Chemistry & Biology, Wright and colleagues report an elegant method for inhibiting enzymes critical for rendering bacteria drug resistant. By using cationic peptides as inhibitors, the authors have exploited two antibacterial mechanisms, making it doubly difficult for microbial retaliation.

3. The Alvis search engine uses a language to specify multicriteria searches

(information about the language is displayed when clicking on the i next to the search bar )

- a. If you query two terms like *penicillin* and *resistant* in the search bar, the search engine will look for the first term AND the second one

**Bacteria**

facet value	freq.	doc.
Streptococcus pneumoniae	1695	800
Staphylococcus aureus	337	181
Neisseria gonorrhoeae	218	109
Neisseria meningitidis	98	61
Enterococcus faecium	105	60
Escherichia coli	52	36
Enterococcus faecalis	58	32
Streptococcus mitis	41	26
Streptococcus	37	24
Mycoplasma gallisepticum	75	23

**Habitats**

facet value	freq.	doc.
human	203	137
cell	243	133
patient	182	99
patient	184	99
hospital	125	85
laboratory	86	78
hospital	91	69
animal	110	66
medical environment	80	61
spring high in sulfide	64	42

**Search Results:**

- Penicillin-resistant pneumococci.** 2.8017293  
1984 *Archives of pathology & laboratory medicine*  
**Abstract** Because of reports documenting the occurrence of pneumococci resistant to penicillin, the Microbiology Resource Committee of the College of American Pathologists studied the accuracy of various Kirby-Bauer disks in identifying a pneumococcal organism known to be clinically resistant to penicillin. The only disk that showed acceptable performance was the 1-microgram oxacillin disk, using the inhibition diameter of 19 mm or less as the criterion for predicting clinical penicillin resistance. It is particularly important to understand that, at present, penicillin disks do not provide acceptable predictive accuracy.
- Penicillin-resistant pneumococci.** 2.7422114  
1991 *The Journal of hospital infection*

- b. The Alvis search engine also accepts queries composed with AND, OR and NOT
  - i. *penicillin and resistant* returns the same results as *penicillin resistant*, and the same as *resistant and penicillin*
  - ii. *resistant or penicillin* returns : *penicillin and resistant + resistant + penicillin*
  - iii. *resistant not penicillin* returns documents that do not contain *penicillin*

**Bacteria**

facet value	freq.	doc.
Staphylococcus aureus	764	328
Escherichia coli	267	164
Mycobacterium tuberculo	200	121
Pseudomonas aeruginosa	134	75
Streptococcus pneumoniae	105	60
Enterococcus faecium	120	54
Helicobacter pylori	119	50
Enterococcus	96	38
Salmonella	60	36
Acinetobacter baumannii	82	34

**Habitats**

facet value	freq.	doc.
human	203	137
cell	243	133
patient	182	99
patient	184	99
hospital	125	85
laboratory	86	78
hospital	91	69
animal	110	66
medical environment	80	61
spring high in sulfide	64	42

**Search Results:**

- Antimicrobial resistance.** 1.5388991  
2006 *The Veterinary clinics of North America. Small animal practice*  
**Abstract** Development of antimicrobial resistance is an inevitable consequence of exposure of microorganisms to antimicrobial agents. Although emergence of resistance cannot be prevented, it can be retarded by minimizing use of antimicrobial agents and avoiding selection of relatively resistant pathogenic and nonpathogenic strains caused by exposure to tissue concentrations that confer a competitive advantage. Most attention in veterinary medicine has focused on the emergence of resistance in food-borne pathogens, with relatively little attention being devoted to small companion animals, despite the frequent use of antimicrobial agents in these animals, evidence that resistance is emerging, and potential for transfer of resistance between companion animals and people. To retard further emergence of resistance in small companion animals, it is imperative that surveillance programs be instituted to monitor development of resistance.
- Mupirocin resistance.** 1.8930763  
2009  
*Clinical infectious diseases : an official publication of the Infectious Diseases Society of America*  
**Abstract** With increasing pressure to prevent methicillin-resistant Staphylococcus aureus (MRSA) infection, it is possible that there will be increased use of mupirocin for nasal decolonization of MRSA. Understanding the mechanisms, clinical significance, and epidemiology of mupirocin resistance is important for predicting how changes in mupirocin use may affect bacterial

1. c. If you want to look for a term occurring closely after another term in

the text, you can use the *term1 ~ NUMBER term2* expression, e.g. **resistant ~ 3 penicillin** where the Alvis search engine returns all the texts which have matched with the term *resistance* AND with the term *penicillin* located at 1, 2 or 3 positions after the word *resistance*.

The screenshot shows the Alvis Search Engine interface with the search query "resistant ~3 penicillin". The results are displayed in three columns: Bacteria, Habitats, and Journals. The main content area shows a search result snippet for "Moderate resistance to penicillin in Neisseria meningitidis" from 1997 Microbiologia (Madrid, Spain). The snippet includes an abstract discussing the frequency of isolation of resistant strains and the role of penicillin binding protein 2 (PBP2).

**Bacteria**

facet value	freq.	doc.
Streptococcus pneumoniae	738	422
Staphylococcus aureus	497	265
Neisseria gonorrhoeae	348	184
Escherichia coli	67	50
Haemophilus influenzae	69	40
Staphylococcus	61	37
Neisseria meningitidis	56	36
Staphylococcus epidermi	49	32
Bacteroides fragilis	43	25
Enterococcus faecium	49	24

**Habitats**

facet value	freq.	doc.
patient	240	142
patient	234	130
blood	110	93
child	142	88
hospital	107	84
agar	99	75
laboratory	100	70
hospital	86	68
child	100	68
experimental medium	74	54

**Journals**

facet value	freq.	doc.
Journal of clinical microbiology	10	20

**Search Results:**

resistant (149157)  
penicillin (20314)

susceptible organisms were inhibited. At 37 °C, the **resistance** was detectable with some strains but not with others. When cloxacillin disks were used, the temperature effect was not seen. The incubation temperature did not affect results with nonheteroresistant strains. Therefore, it is recommended that all Kirby-Bauer tests be incubated at a temperature of 35 °C to insure detection of methicillin-**resistant** *S. aureus* strains. Detection of these strains is of increasing importance because the incidence of infections with these organisms is increasing, particularly in hospitalized patients.

9 **Moderate **resistance** to **penicillin** in *Neisseria meningitidis*.**  
1997 *Microbiologia (Madrid, Spain)*

**Abstract** Meningococcal moderate **resistance** to **penicillin** (MICs 0.12 to 1 mg/l) was rarely reported before the 1980's in Spain. The frequency of isolation of **resistant** strains increased from 0.4% in 1985 to 42.6% in 1990. In the last few years, these strains have been reported in several countries, which suggests a change in the meningococcal response to **penicillin**. The **resistance** is due, at least in part, to a decreased affinity of **penicillin** binding protein 2 (PBP2) for **penicillin**. This decreased affinity has also been found in commensal *Neisseriae*. Population genetic studies demonstrate that recombinational events, replacing parts of the PBP2 gene by the corresponding regions of commensal species, followed by a rapid spread of the clones could be the origin of such **resistant** strains.

10 **Reliability of high-content disks and modified broth dilution tests for detecting staphylococcal **resistance** to the penicillinase-**resistant** **penicillins**.**  
1987 *Journal of clinical microbiology*