

## TRANSPORTATION OF BIOLOGICAL SUBSTANCES BY GROUND BIO-101 COURSE NOTES



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Compliant with the Transportation of Dangerous Goods Regulations and IATA at the time of publication.

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**ACTS AND REGULATIONS**

The Transportation of Dangerous Goods Regulation (TDGR) require that the various people involved in the all aspects of transport comply with the prescriptions of the law. These people are:

- Handlers, including receivers or consignees,
- Carriers and transport companies
- Shippers (distributors, brokers, importers);
- And any other person involved in the logistics of transporting dangerous goods.

**Repercussion to non-compliance**

Federal inspectors and provincial peace officers and highway controllers are mandated to enforce these regulations. Possible repercussions include but not limited to:

- To the shipper and transport company: Penalties and sanctions: Up to \$50,000 and or 2 years
- To the driver: 3-9 demerit points on the driver’s license and \$250 to\$ 900 in fines

These sanctions apply unless a person can prove **due diligence** under the Act.

**REGISTRATION:** The TDGR now requires that dangerous goods shipping, transportation and handling sites register in the Transport Canada database. This registration is renewable every 12 months.

A site means a permanent place where the importation, presentation for transport, handling or transport of dangerous goods takes place which are in the direct possession of a person carrying out these activities.

This applies to any person who imports, presents for transport, handles or transports dangerous goods at a site located in Canada of which they are the owner or operator.

<https://canadagazette.gc.ca/rp-pr/p2/2023/2023-10-25/html/sor-dors206-eng.html>

**IN THE CASE OF INFECTIOUS SUBSTANCES, ONLY CAT A SHIPMENTS REQUIRE REGISTRATION.**

**EMERGENCY RESPONSE ASSISTANCE PLAN (ERAP)**

Some shipments of dangerous goods present a higher level of danger. These shipments are required to have an **Emergency Assistance Response Plan**. This plan must be approved by Transport Canada.

<b>These substances must always be classified as Category A</b>	
Crimean-Congo Hemorrhagic fever virus;	Ebola virus;
Flexal virus;	Guanarito virus;
Hantaviruses causing hemorrhagic fever with renal syndrome;	Hantaviruses causing pulmonary syndrome;
Hendra virus;	Herpes B virus (Cercopithecine Herpesvirus-1);
Junin virus;	Kyasanur Forest virus;
Lassa virus;	Machupo virus;
Marburg virus;	Monkeypox virus;
Nipah virus;	Omsk hemorrhagic fever virus;
Russian Spring - Summer encephalitis virus;	Sabia virus; and
Variola (smallpox virus).	

**STEP 1 - TRAINING**

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Under TDGR requires all persons (Shippers, carriers, handlers and importers) must:

- Be adequately trained and hold a training certificate, OR work in the presence and under the direct supervision of a trained person; AND
- Present his training certificate to any inspector or peace officer requesting it.
- Keep training certificates for two years after the expiry date.

Training certificate:

- is valid for 2 years (air) and 3 years (ground) or when changing employers.
- must be signed by the employee and employer.

**STEP 2 - CLASSIFICATION**

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The classification (or shipping description) includes four elements which are:

**Category:**

- Category A = high risk
- Category B = minor risk
- *Exempt specimens<sup>1</sup>: no foreseeable risks*

**Shipping name:**

- BIOLOGICAL SUBSTANCES, CATEGORY B
- INFECTIOUS SUBSTANCE, AFFECTING HUMANS
- INFECTIOUS SUBSTANCE, AFFECTING ANIMALS, only
- DRY ICE
- *Exempt human specimen, OR exempt animal specimen<sup>2</sup>*

**Hazard class:** TDGR has assigned all the dangerous goods to one of 9 hazard classes. For the purposes of this book we will only discuss the classes involved in shipping biological samples.

- Class 6.2 - Infectious substances
- Class 9 - Miscellaneous dangerous goods

**IDENTIFICATION NUMBER (UN NUMBER)**

- UN3373 - BIOLOGICAL SUBSTANCES, CATEGORY B
- UN1845 - DRY ICE
- UN2814 - INFECTIOUS SUBSTANCE, AFFECTING HUMANS
- UN2900 - INFECTIOUS SUBSTANCE, AFFECTING ANIMALS, only

**CLASS 6.2 - INFECTIOUS SUBSTANCES**

An infectious substance is defined as “a substance known or reasonably believed to contain viable micro-organisms that are known or reasonably believed to cause disease in humans or animals.

- Viruses (HIV, H1N1), bacteria, rickettsias, parasites etc.

Inclusion in class 6.2 is based « on a reason to believe » (or professional judgement) that the substance contains an infectious substance. Classification **must not be based** on universal precautions or statistical inferences. While there are various contradictory interpretations from Transport Canada, a substance for which there is no reason to believe that it is infected

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<sup>1</sup> Exempt specimen is not an official category under TDGR but included here for clarity and training purposes.

<sup>2</sup> Exempt human (animal) specimen are not proper shipping name per se but are terms used to describe certain samples and included here for clarity and training purposes.

should not be classified as an “infectious substance”.

**CATEGORIES (class 6.2)**

**CATEGORY A (high risk):** Infectious substances transported in a form that, in case of exposure, can provoke a permanent invalidity, constitutes a menace or cause death.

- UN2814 - INFECTIOUS SUBSTANCE, AFFECTING HUMANS
- UN2900 - INFECTIOUS SUBSTANCE, AFFECTING ANIMALS, only



**Substances considered Cat. A (UN2814) at all times**

Crimean-Congo Hemorrhagic fever virus;  
 Ebola virus;  
 Flexal virus;  
 Guanarito virus;  
 Hantaviruses causing hemorrhagic fever with renal syndrome;  
 Hantaviruses causing pulmonary syndrome;  
 Hendra virus;  
 Herpes B virus (Cercopithecine Herpesvirus-1); \*

Junin virus;  
 Kyasanur Forest virus;  
 Lassa virus;  
 Machupo virus;  
 Marburg virus;  
 Monkeypox virus;  
 Nipah virus;  
 Omsk hemorrhagic fever virus;  
 Russian Spring - Summer encephalitis virus;\*  
 Sabia virus; and  
 Variola (smallpox virus).

**Substances considered Cat. A (UN2814) in CULTURES ONLY**

Bacillus anthracis  
 Brucella abortus  
 Brucella melitensis  
 Brucella suis  
 Burkholderia mallei - Pseudomonas mallei - Morve  
 Burkholderia pseudomallei - Pseudomonas pseudomallei  
 Chlamydia psittaci - (avian strains)  
 Clostridium botulinum  
 Coccidioides immitis  
 Coxiella burnetii  
 Escherichia coli, verotoxigenic – ETEC  
 Francisella tularensis  
 Mycobacterium tuberculosis  
 Polioviruses  
 Rickettsia prowazekii  
 Rickettsia rickettsii  
 Shigella dysenteriae type 1

Tick-borne encephalitis virus  
 Eastern equine encephalitis virus  
 Venezuelan equine encephalitis virus  
 Japanese encephalitis virus  
 Hepatitis B virus  
 Human Immunodeficiency virus (HIV)  
 Highly pathogenic avian influenza virus  
 Dengue virus  
 Rift Valley Fever virus  
 Yellow fever virus (wild type)  
 West Nile fever virus  
 Rabies virus  
 Yersinia pestis  
 Herpesvirus simiae (Canada only)  
 Monkeypox virus (Canada only)  
 Severe Acute Respiratory Syndrome -SARS (Canada only)

**Substances considered Cat. A (UN2900) in culture only** (FOR ANIMALS ONLY)

*Mycoplasma mycoides - contagious bovine Pleuropneumonia*

Avian paramyxovirus Type 1 Velogenic Newcastle virus

Lumpy skin disease virus

Foot and mouth disease virus

Hog Cholera virus (Classical Swine Fever)

African Swine fever virus

Swine vesicular disease virus

*Peste des petits ruminants* virus

Vesicular stomatitis virus

Goat pox virus

Sheep pox virus

Rinderpest virus

**CATEGORY B** (lower risk) : Infectious substances that do not meet the requirements for inclusion in Category A, but still represents a risk for public safety.

- HIV tainted blood sample (not a culture)
- Biological specimen infected with Hepatitis B

Category B substances are automatically assigned to **UN 3373 - BIOLOGICAL SAMPLE, CATEGORY B.**



**ACCORDING TO A RECENT TRANSPORT CANADA INTERPRETATION, WHEN THE PATIENT'S MEDICAL HISTORY IS UNKNOWN OR NOT AVAILABLE, THE PATIENT SPECIMEN MUST BE CLASSIFIED AS UN3373, CATEGORY B**

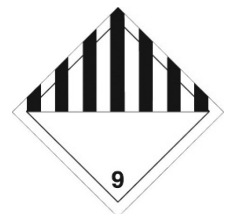
**EXEMPTED SPECIMENS** (minimal risk): A substance reasonably believe that it **does not contain** an infectious

- E.g. Blood sample on non-contaminated blood (routine testing), Urine sample (drug testing)

**CLASS 9 - MISCELLANEOUS DANGEROUS GOODS**

Dry ice UN1845 has three basic dangers associated to it:

Risk of suffocation by oxygen displacement, cold burns (dry ice is approximately -70 deg. C; or explosion form over-pressurisation of the packaging cause by the sublimation process.



### STEP 3 - PACKAGING SURFACE (GROUND) TRANSPORT

**Exempted specimens** must use packaging that under normal conditions of transport will have no release of the specimen including:

- A primary leak proof receptacle
- A secondary receptacle (absorbent recommended - mandatory for Shared Health Manitoba)
- A sturdy, rigid outer package



**Category B** substances must be packed in accordance with **Packing Instruction 650** which requires:

- A primary leak proof receptacle
- A secondary leak proof receptacle (with absorbent for liquids)
- A sturdy, rigid outer package minimum size of 100 mm x 100 mm with a description of the contents.
- Testing is required



**Category A** substances must be packed in accordance with **Packing Instruction 620** which requires standardized packaging with:

- A primary leak proof receptacle
- A secondary leak proof receptacle (absorbent required for all liquid content)
- Rigid outer package with a minimum size of 100 mm x 100 mm bearing a certification (standardization) mark.



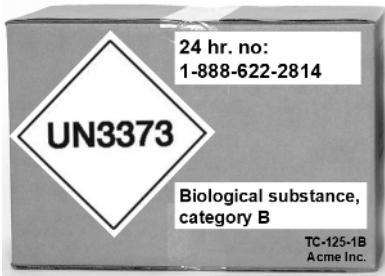
**Dry ice** does not require standardized packaging but must be packaged in such a manner as to **avoid over-pressurisation**.

**STEP 4 - MARKING AND LABELLING**

All packages must show appropriate safety marks as per TDGR. These safety marks must be visible, legible and resistant; be in French or in English (English only for the USA);

For exempt specimens:

- « Exempt Human Specimen » or « Exempt Animal Specimen », as required, or the equivalent in French



For Category B, the following are required:

- Shipping name: « Biological substances, category B»
- UN3373 label
- An emergency telephone number (24 hrs, 7 without any break in the communication with the mention: 24-hrs, or the equivalent in French).<sup>3</sup>

For Category A, the following are required:

- Shipping name
- Hazard class 6.2 label
- Identification number (UN)
- Package certification (TC125-1A)

Dry ice does not require any form of identification for surface transport.

**STEP 5 - DOCUMENTATION**

The term “ transport document ” , “ dangerous goods declaration ” , “ shipper’s declaration ”, are all synonymous and refer to the sheet of paper that must be used to indicate the presence of dangerous goods in a shipment.

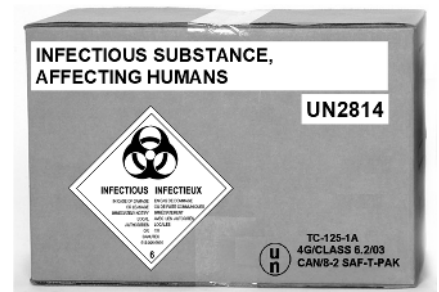
Only dangerous goods shipment of Cat. A require a transport document. No shipper’s declaration of dangerous goods is required for Category B or Dry Ice.

- In English or French (English only for shipments to the USA);
- Legible and in indelible ink
- Kept for two years (shipper, carrier and importer)
- Within easy reach of the driver;
- Visible to anyone entering from the driver's door, driver is away

The shipping document must have the following:

- Name and address of shipper
- A date
- A emergency number with the words *24-Hour Number* or *24-hr No.* or the equivalent in French
- number of packages, and total quantity (net or gross) in **metric units** (L or Kg)

<sup>3</sup> The shipper may use CANUTEC if his/her firm is registered with that organization. Registration must be renewed every 3 years.



- the complete shipping description (S.H.I.P.). in the following order: UN number, Shipping name, Hazard class.
- For certain highly infectious substances (see ERAP section), the shipper must have an Emergency Response Assistance Plan number and a telephone number to activate it.

If the shipment consists of dangerous and non-dangerous goods on a single document, the dangerous goods information must be given in one of the following methods:

- The dangerous goods must be listed first under a heading "Dangerous Goods";
- The dangerous goods can be listed in any order but must be identified with an "X" in a column identified "DG" or "MD"; or
- The dangerous goods can be printed or highlighted in color.

## STEP 6 - PLACARDING TRANSPORT UNITS

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All large means of containment (trucks), in transport or storage in view of transporting, must have the appropriate safety marks (placards) as required by the TDGR. These safety marks must:

- Be visible, legible and resistant on all four sides;
- Removed when the container is cleaned and purged
- Showing the UN number when an ERAP is required
- For any quantity requiring an ERAP or 500 kg of Cat. A substances.

Any vehicle requiring placards becomes a "heavy truck" under Quebec Road Act and must therefore meet all requirements of this category.

## STEP7 - LOADING

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In Canada, it is forbidden to transport goods unless they are braced and secured using instruments of sufficient capacity. Please consult standard no. 10 of the Canadian Bracing and Securing Code.

## STEP 8 - REPORTING

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Any accidental release or imminent accidental release of class 6.2 materials must immediately be reported to 911, and CANUTEC (613-996-6666 or \*666 on any cell phone). A written follow up report must be filed within 30 days.

If dangerous good, are discovered to have been lost or stolen or otherwise unlawfully interfered with, you must immediately make a report to the local police; CANUTEC at 613-996-6666 (\*666 on any cell phone).

You must make all attempts to limit the damages following any spill of dangerous goods without putting your safety at risk. In general terms, you should:

- Advised persons concerned;
- Ensure adequate safety perimeter;
- Limit contamination to the environment;
- Collaborate with emergency personnel;
- Call Canutec \*666





**Tunnels:** It is prohibited to travel in marked tunnels with a dangerous goods load requiring placards.



**Level Crossings:** The driver of a road vehicle that contains dangerous goods requiring placards must:

Stop at 5 meters from the crossing and look;

Use the by-pass lane if there is one. If not stay on the main road and use hazard lights while crossing.

Some exemptions exist - look for this road sign.



**CHECKLIST**

GROUND TRANSPORT	
PACKAGING AND LABELLING	YES
<b>Exempt Specimens</b>	
Good quality packaging	
Label « Exempt ..... Specimen »	
<b>Category B</b>	
Packed according to PI 650	
UN 3373 label as a diamond on a point	
« Biological Substance, Category B » on the same surface as the label	
A telephone number with the words « 24 hr no. »	
<b>Category A</b>	
Packed according to PI 620	
UN2814 Infectious material affecting humans, OR	
UN2900 Infectious material affecting animals	
Classe 6.2 (diamond on a point), next to the UN no.	
Package certification mark (UN4G/class 6.2....)	
<b>SHIPPING DOCUMENT – CAT A ONLY</b>	
Name and address of shipper	
The date	
Emergency number with the words <b>24-hr no.</b>	
Description, in the following order	
• UN2814 Infectious material affecting humans, OR	
• UN2900 Infectious material affecting animals	
Include name of pathogens (in brackets)	
Number of packages	
Total qty. In kg or L	
ERAP information (if required – 16 pathogens)	
Shipper's certification and name	
<b>PLACARDS</b>	
Supply / affix placards if required	
<b>LOADING</b>	
Packages are secured	
<b>TRAINING</b>	
My training certificat is valid and in your possession	

**TDGR – APPENDIX 3 - GUIDE TO CATEGORY B ASSIGNMENT**

If the symbol “@” appears beside an infectious substance listed in this Appendix, that infectious substance affects animals only.

**UN3373, Category B — Virus, Bacteria and Fungi**

**Virus**

Item	Column 1 - Family	Column 2- Genus	Column 3 - Species
1 (1)	Adenoviridae	(1) Aviadenovirus	Animal, all isolates@
		(2) Mastadenovirus	(a) Adenovirus (human, all types) (b) Animal, all isolates@
2 (2)	Arenaviridae	Arenavirus	(a) Lymphocytic choriomeningitis virus (b) Mopeia virus (c) Tacaribe viruses (d) Whitewater Arroyo virus
3 (3)	Arteviridae	Arterivirus	(a) Equine arteritis virus@ (b) Porcine reproductive/ Respiratory syndrome virus@ (c) Simian hemorrhagic fever virus
4 (4)	Astroviridae	Astrovirus	All serotypes
5 (5)	Birnaviridae	Birnavirus	(a) Infectious bursal disease virus@ (b) Infectious pancreatic necrosis virus@
6 (6)	Bornaviridae	Bornavirus	Borna disease virus (CNS-encephalo-myelitis)
7 (7)	Bunyaviridae	(1) Bunyavirus	(a) Aino virus@ (b) Akabane virus@ (c) Bunyamwera virus (d) California encephalitis virus (e) Jamestown Canyon virus (f) La Crosse virus (g) Lumbo virus (h) Oropouche virus (i) Snowshoe hare virus (j) Tahyna virus
		(2) Hantavirus	(a) Hantaviruses not causing pulmonary syndrome (b) Hantaviruses not causing hemorrhagic fever with renal syndrome
		(3) Nairovirus	(a) Hazara virus Nairobi sheep disease virus@
8 (8)	Caliciviridae	Calicivirus	(a) European brown hare virus@ (b) Feline calicivirus@ (c) Hepatitis E virus (d) Norwalk virus (e) Rabbit hemorrhagic disease virus@ (f) San Miguel sea lion virus@ (g) Vesicular exanthema of swine virus
9 (9)	Circoviridae	Circovirus	(a) Avian circovirus@ (b) Porcine circovirus@

10 (10)	Coronaviridae	(1) Coronavirus	(a) Avian infectious bronchitis virus@ (b) Bovine coronavirus, all strains (c) Canine, Rat and Rabbit coronavirus@ (d) Feline enteric coronavirus@ (e) Feline infectious peritonitis virus@ (f) Hemagglutinating encephalo-myelitis virus of swine@
			(g) Human coronavirus, all strains excluding SARS (h) Mouse hepatitis virus@ (i) Porcine epidemic diarrhea virus@ (j) Porcine respiratory coronavirus@ (k) Transmissible gastroenteritis virus of swine@ (l) Turkeys enteritis coronavirus@
		(2) Torovirus	(a) Berne virus@ (b) Breda virus@
11 (11)	Flaviviridae	(1) Flavivirus	(a) Kunjin virus (b) Louping ill virus (c) Murray Valley encephalitis virus (Australia encephalitis) (d) Powassan virus (e) Rocio virus (f) St. Louis encephalitis virus (g) Turkey meningoencephalitis virus (h) Wesselsbron virus (i) Yellow fever virus (vaccine strain 17D)
		(2) Hepacivirus	Hepatitis C virus
		(3) Pestivirus	(a) Border disease virus@ (b) Bovine viral diarrhea virus@
12 (12)	Hepadnaviridae	(1) Delta virus	Hepatitis D (Delta) virus
		(2) Avihepadna-virus	Duck hepatitis B virus@
		(3) Orthohepadna-virus	(a) Ground squirrel hepatitis B virus (b) Woodchuck hepatitis virus@
13 (13)	Herpesviridae (Alphaherpesvirinae)	(1) Simplexvirus	(a) Human herpes virus 1 (b) Human herpes virus 2 (c) Mammillitis virus (bovine herpes-virus 2)@
		(2) Varicellovirus	(a) All isolates, excluding pseudorabies virus (b) Bovine infectious rhinotracheitis (herpesvirus 1) (c) Equine abortion virus (equine herpesvirus 1)@ (d) Equine coital exanthema virus (equine herpesvirus 3)@ (e) Equine rhinopneumonitis (equine herpesvirus 4)@ (f) Feline rhinotracheitis (feline herpesvirus 1)@ (g) Human herpes virus 3 (Varicella-zoster virus) (h) Pseudorabies virus (suis herpes virus 1) (i) Pseudorabies virus (suis herpes virus 1)
		(3) Unclassified	(a) Canine herpesvirus 1 @ (b) Caprine herpesvirus 1 @ (c) Cervid herpesvirus 1 and 2@

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14 (14)	Herpesviridae (Betaherpesvirinae)	(1) Cytomegalovirus	(a) Human cytomegalovirus (CMV) (b) Porcine cytomegalovirus (suid herpesvirus 2)@
		(2) Muromegalovirus	Caviid herpesvirus (guinea-pig cytomegalovirus)@
		(3) Roseolovirus	Equine cytomegalovirus (equine herpesvirus 2)@
15 (15)	Herpesviridae (Gammaherpesvirinae)	(1) Lymphocryptovirus	(a) Epstein-Barr-like virus (EBV) (Monkey virus) (b) Epstein-Barr virus (EBV) (Human herpes-virus 4) (c) Human B lymphotropic virus
		(2) Rhadinovirus	(a) Herpesvirus ateles (b) Herpesvirus saimiri (c) Malignant catarrhal fever virus (Alcelaphine herpesvirus)@
16 (16)	Orthomyxoviridae	Influenzavirus A, B and C	Influenza A, B, C and all isolates except influenza A — avian H5 and H7, Human H2 and 1918 H1N1 Spanish flu strain
17 (17)	Paramyxoviridae	Pneumovirus	Turkey rhinotracheitis virus@
18 (18)	Paramyxoviridae (subfamily Paramyxovirinae)	(1) Morbillivirus	(a) Canine distemper virus@ (b) Measles virus (c) Phocine distemper virus@
		(2) Paramyxovirus	Parainfluenza types 1-4
		(3) Respirivirus	(a) Bovine Parainfluenza virus Type 3@ (b) Sendai virus (mouse parainfluenza virus)@
		(4) Rubulavirus	(a) Avian paramyxovirus Types 2 to 9@ (b) Mumps virus
19 (19)	Paramyxoviridae (subfamily Pneumovirinae)	Pneumovirus	(a) Bovine respiratory syncytial virus@ (b) Human respiratory syncytial virus (c) Pneumonia virus of mice@
20 (20)	Parvoviridae	Parvovirus	All isolates
21 (21)	Picornaviridae	(1) Cardiovirus	(a) All isolates (human) (b) Swine encephalomyocarditis virus@ (c) Theiler's murine poliovirus
		(2) Enterovirus	(a) All isolates, excluding Swine vesicular disease virus and Polioviruses (b) Coxsackieviruses
		(3) Hepatovirus	All isolates (including Hepatitis A, human enterovirus type 72)
		(4) Rhinovirus	(a) All isolates (human) (b) Bovine rhinovirus Types 1 to 3@ (c) Equine rhinovirus@ (d) Feline Rhinovirus@ (e) Rhinovirus

22 (22)	Poxviridae	(1) Avipoxvirus	(a) All isolates@ (animal) (b) All isolates (human)
		(2) Leporipoxvirus	(a) Rabbit (Shope) fibroma virus@ (b) Squirrel fibroma virus@
		(3) Orthopoxvirus	(a) All isolates@, excluding Monkeypox and Variola (smallpox virus) (b) Buffalo pox (c) Cowpox virus (d) Rabbit pox (e) Skunkpox (f) Vaccinia
		(4) Parapoxvirus	(a) All isolates@, excluding Sealpox virus (b) Bovine papular stomatitis virus (c) Orf virus (d) Pseudocowpox virus (paravaccinia) (e) Sealpox virus
23 (23)	Reoviridae	(1) Coltivirus	Coltivirus
		(2) Orbivirus	(a) Epizootic hemorrhagic disease virus@ (b) Equine encephalosis virus@ (c) Ibaraki virus (d) Palyam virus@
		(3) Orthoreovirus	(a) Animal, all isolates except Ndelle and Ourem viruses (b) Types 1, 2 and 3
		(4) Reovirus, types 1 and 2	Animal, all isolates@
		(5) Rotavirus	(a) Animal, all isolates@ (b) Rotavirus
24 (24)	Retroviridae	(1) Betaretrovirus	Mason-Pfizer monkey virus@
		(2) Gammaretrovirus	(a) Animal, all isolates@ (b) Avian reticuloendotheliosis virus
		(3) Deltaretrovirus	Human T-cell lymphotropic viruses (HTLV)
25 (25)	Retroviridae (subfamily Spumavirinae)	(1) Spumavirus	All isolates
		(2) Deltaretrovirus	Bovine leukemia virus@

26 (26)	Rhabdoviridae	(1) Lyssavirus	(a) Australian bat lyssavirus (b) Duvenhage virus (c) European bat lyssavirus I (d) European bat lyssavirus II (e) Lagos bat virus (f) Mokola virus (g) Rabies virus-Fixed virus
		(2) Vesiculovirus	(a) Alagoas virus (b) Chandipura virus (c) Cocal virus (d) Isfahan virus (e) Pyri virus (f) Vesicular stomatitis virus — Indiana lab strain

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27 (27)	Togaviridae	(1) Alphavirus	(a) Bebaru virus (b) Chikungunya virus (c) Everglades virus (d) Getah virus (e) Highlands J virus (f) Mayaro virus (g) Mucambo virus (h) Ndumu virus (i) O'Nyong-Nyong virus (j) Ross River virus (k) Semliki forest virus (l) Sindbis (m) Tonate virus (n) Western equine encephalitis virus strain TC-83
		(2) Arterivirus	Equine arteritis virus@
		(3) Pestivirus	Border disease virus
		(4) Rubivirus	Rubella virus
28 (28)	Transmissible Spongiform Encephalopathies		(a) Bovine spongiform encephalopathy (b) Chronic wasting disease of captive mule deer/elk@ (c) Creutzfeldt-Jacob disease (d) Gertsmann-Straussier-Scheinker (e) Kuru (f) Scrapie@ (g) Transmissible mink encephalopathy@
29 (29)	Unclassified	Unclassified	Swine hepatitis E virus@

## Bacteria

Item	Column 1 - Genus	Column 2 Species
1 (1)	Acholeplasma	oculi@
2 (2)	Acinetobacter	(a) baumannii (b) calcoaceticus (c) lwoffii (d) spp
3 (3)	Actinobacillus	(a) actinomycetemcomitans (b) capsulatus@ (c) equuli@ (d) lignieresii@ (e) pleuropneumoniae@ (f) seminis@ (g) spp (h) suis@ (i) ureae@
4 (4)	Actinomadura	(a) madurae (b) pelletieri
5 (5)	Actinomyces	(a) bovis@ (b) gerencseriae (c) hordeovulneris@ (d) israelii (e) naeslundii (f) pyogenes (g) spp (h) suis@ (i) viscosus@
6 (6)	Aeromonas	(a) hydrophila (b) punctata (c) spp
7 (7)	Afipia	spp
8 (8)	Agrobacterium	Radiobacter
9 (9)	Alcaligenes	spp
10 (10)	Amycolata	Autotrophica
11 (11)	Anaplasma	(a) caudatum@ (b) centrale@ (c) marginale@ (d) ovis
12 (12)	Arcanobacterium	(a) haemolyticum (b) pyogenes
13 (13)	Arcobacter	(a) butzeri (b) cryoaerophilus (c) spp
14 (14)	Arizona	spp
15 (15)	Bacillus	Cereus
16 (16)	Bacteroides	(a) fragilis (b) heparinolyticus@ (c) levii (d) salivus@ (e) spp

17 (17)	Bartonella	(a) bacilliformis (b) elizabethae (c) henselae (d) quintana (e) spp
18 (18)	Bordetella	(a) avium@ (b) bronchiseptica (c) parapertussis (d) pertussis (e) spp
19 (19)	Borrelia	(a) burgdorferi (b) duttonii (c) recurrentis (d) spp (e) vincenti
20 (20)	Brachyspira	(a) hyodysenteriae (b) innocens
21 (21)	Brucella	(a) canis (b) ovis (c) spp, excluding abortus, melitensis and suis
22 (22)	Burkholderia	(a) cepacia genomovars I (b) cepacia genomovars III (c) gladioli (d) multivorans (e) spp, excluding mallei and pseudomallei (f) stabilis (g) vietnamensis
23 (23)	Campylobacter	(a) coli (b) fetus, subspecies fetus (intestinalis) (c) fetus, subspecies venerealis (d) hyointestinalis (e) jejuni (f) lari (g) mucosalis@ (h) spp (i) sputorum
24 (24)	Capnocytophaga	spp
25 (25)	Cardiobacterium	hominis
26 (26)	Chlamydia	(a) pneumoniae (b) psittaci (non-avian strains) (c) trachomatis
27 (27)	Chryseobacterium	meningosepticum
28 (28)	Citrobacter	(a) diversus (b) freundii (c) spp



29 (29)	Clostridium	(a) chauvoei (b) colinum@ (c) difficile (d) haemolyticum (e) histolyticum (f) novyi (g) perfringens (h) septicum (i) sordellii (j) spiriforme@ (k) spp, excluding botulinum (l) tetani (m) villosum@
30 (30)	Corynebacterium	(a) amycolatum (b) cystitidis@ (c) diphtheriae (d) jeikeium (e) kutscheri@ (f) minutissimum (g) pilosum (h) pseudotuberculosis (i) renale (j) spp (k) ulcerans
31 (31)	Dietzia	maris
32 (32)	Dermabacter	hominis
33 (33)	Dermatophilus	congolensis
34 (34)	Dichelobacter	nodosus
35 (35)	Edwardsiella	tarda
36 (36)	Eikenella	corrodens
37 (37)	Enterobacter	(a) aerogenes/cloacae (b) spp
38 (38)	Enterococcus	(a) faecalis (b) faecium (c) spp
39 (39)	Ehrlichia	(a) sennetsu (b) spp
40 (40)	Erysipelothrix	Tonsillarum
41 (41)	Escherichia	(a) coli (b) coli enteroinvasive — EIEC (c) coli enteropathogenic — EPEC
42 (42)	Eubacterium	suis@
43 (43)	Fluoribacter	Bozemaniae
44 (44)	Francisella	(a) novicida (b) philomiragia
45 (45)	Fusobacterium	(a) necrophorum (b) spp
46 (46)	Gardnerella	vaginalis
47 (47)	Gordonia	spp

48 (48)	Haemophilus	(a) ducreyi (b) influenzae (c) influenzaemurium@ (d) paragallinarum (e) parainfluenzae (f) parasuis@ (g) piscium@ (h) somnus@ (i) spp
49 (49)	Helicobacter	(a) cinaedi (b) felis@ (c) fennelliae (d) mustelae (e) nemestrinae (f) pullorum (g) pylori
50 (50)	Hemobartonella	felis@
51 (51)	Kingella	kingae
52 (52)	Klebsiella	(a) granulomatis (b) oxytoca (c) pneumoniae (d) spp
53 (53)	Lactococcus	garvieae
54 (54)	Lawsonia	intracellularis@
55 (55)	Legionella	(a) micdadei (b) pneumophilia (c) spp
56 (56)	Leptospira	(a) bratislava (b) canicola/copenhageni (c) grippityphosa (d) hardjo (e) icterohaemorrhagiae (f) interrogans (g) pomona (h) sejroe (i) var ballum
57 (57)	Listeria	(a) ivanovii@ (b) monocytogenes (c) spp
58 (58)	Mannheimia	haemolytica
59 (59)	Moraxella	(a) bovis@ (b) caprae (c) catarrhalis (d) lacunata (e) phenylpyruvica (f) spp
60 (60)	Morganella	morganii

61 (61)	Mycobacterium	(a) africanum (b) asiaticum (c) avium complex (d) avium/intracellulare (e) bovis (f) bovis (BCG) (g) chelonae (h) fortuitum (i) kansasii (j) leprae (k) malmoense (l) marinum (m) microti (n) paratuberculosis (o) scrofulaceum (p) simiae (q) szulgai (r) ulcerans (s) xenopi
62 (62)	Mycoplasma	(a) caviae (b) hominis (c) pneumoniae (d) spp, excluding mycoides
63 (63)	Neisseria	(a) elongata (b) gonorrhoeae (c) meningitidis (d) spp
64 (64)	Neorickettsia	helminthoeca@
65 (65)	Nocardia	(a) asteroides (b) brasiliensis (c) caviae (d) farcinica (e) nova (f) otitidis-caviarum (g) pseudobrasiliensis (h) spp (i) transvalensis
66 (66)	Ochrobactrum	spp
67 (67)	Oligella	spp
68 (68)	Ornithobacterium	rhinotracheale@
69 (69)	Pandoraea	spp
70 (70)	Pantoea	agglomerans

71 (71)	Pasteurella	(a) aerogenes (b) anatipestifer@ (c) caballi@ (d) canis (e) dagmatis (f) granulomatis@ (g) haemolytica (h) multocida (serotypes B:2 and E:2) (i) multocida, except serotypes B:2 and E:2 (j) multocida, subspecies gallicida (k) multocida, subspecies multocida (l) multocida, subspecies septica (m) pneumotropica (n) spp
72 (72)	Peptostreptococcus	(a) anaerobius (b) indolicus@ (c) spp
73 (73)	Plesiomonas	shigelloides
74 (74)	Porphyromonas	spp
75 (75)	Prevotella	(a) melaninogenica (b) spp
76 (76)	Propionibacterium	propionicum
77 (77)	Proteus	(a) mirabilis (b) penneri (c) spp (d) vulgaris
78 (78)	Providencia	(a) alcalifaciens (b) rettgeri (c) spp
79 (79)	Psychrobacter	(a) immobilis (b) phenylpyruvicus
80 (80)	Pseudomonas	(a) aeruginosa (b) spp
81 (81)	Ralstonia	spp
82 (82)	Rhodococcus	(a) equi (b) spp
83 (83)	Rickettsia	(a) akari (b) australis (c) canadensis (d) conorii (e) helvetica (f) montanensis (g) parkeri (h) rhipicephali (i) spp, excluding prowazekii and rickettsii (j) tsutsugamuchi (k) typhi (mooseri)
84 (84)	Rothia	(a) dentocarosia (b) mucilagenosas

85 (85)	Salmonella	(a) abortus equi (c) agona (e) arizonae (g) derby (i) enteritidis (k) heidelberg (m) newport (o) paratyphi A, B and C (q) spp (s) typhimurium	(b) abortus ovis (d) anatum (f) choleraesuis (h) dublin (j) gallinarum@ (l) montevideo (n) (other serovars) (p) pullorum@ (r) typhi (t) typhisuis@
86 (86)	Serpulina	spp	
87 (87)	Serratia	(a) liquefaciens (b) marcescens	
88 (88)	Shigella	(a) boydii (b) dysenteriae (other than Type 1) (c) flexneri (d) sonnei	
89 (89)	Staphylococcus	(a) aureus (b) aureus (MRSA) (c) epidermidis (d) intermedius@	
90 (90)	Stenotrophomonas	maltophilia	
91 (91)	Streptobacillus	(a) moniliformis (b) spp	
92 (92)	Streptococcus	(a) agalactiae (b) bovis (c) dysgalactiae (d) equi (e) pneumoniae (f) pyogenes (g) spp (h) suis (i) uberis	
93 (93)	Taylorella	equigenitalis@	
94 (94)	Treponema	(a) carateum (b) pallidum (c) pertenuae (d) spp (e) vincentii	
95 (95)	Tsukamurella	spp	
96 (96)	Ureaplasma	urealyticum	
97 (97)	Vagococcus	salmoninarum@	
98 (98)	Vibrio	(a) cholerae (b) parahaemolyticus (c) spp (d) vulnificus	
99 (99)	Yersinia	(a) enterocolitica (b) pseudotuberculosis (c) ruckeri@	

**Fungi**

Item	Column 1 Genus	Column 2 Species
1 (1)	Aspergillus	(a) flavus (b) fumigatus (c) nidulans (d) niger (e) oryzae (f) terreus
2 (2)	Blastomyces	dermatitidis (formerly: Ajellomyces dermatitidis)
3 (3)	Candida	(a) albicans (b) glabrata (c) guilliermondii (d) krusei (e) parapsilosis
4 (4)	Cladophialophora	bantiana (formerly: Cladosporium bantianum)
5 (5)	Cladosporium	carrionii
6 (6)	Cryptococcus	neoformans
7 (7)	Emmonsia	parva
8 (8)	Epidermophyton	floccosum
9 (9)	Histoplasma	(a) capsulatum (formerly: Ajellomyces capsulatum) (b) capsulatum var capsulatum (c) capsulatum var duboisii (d) capsulatum var farciminosum
10 (10)	Loboa	loboi
11 (11)	Microsporium	(a) audouinii (b) canis (c) distortum (d) equinum (e) ferrugineum (f) fulvum (g) gypseum (h) nanum (i) persicolor (j) praecox (k) vanbreuseghemii
12 (12)	Paracoccidioides	brasiliensis
13 (13)	Penicillium	marneffeii
14 (14)	Sporothrix	(a) Schenckii var luriei (b) Schenckii var schenckii
15 (15)	Trichophyton	(a) concentricum (b) equinum/autotrophicum (c) equinum/equinum (d) gourvilii (e) megninii (f) mentagrophytes/erinacei (g) mentagrophytes/interdigitale (h) mentagrophytes/nodulare (i) mentagrophytes/mentagrophytes (j) mentagrophytes/quinckeanum (k) rubrum (l) schoenleinii (m) simii (n) sudanese (o) tonsurans (p) violaceum (q) yaoundei