

# Package ‘isdals’

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Life Sciences

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---

<i>agefat</i>	<i>Age and body fat percentage</i>
---------------	------------------------------------

---

**Description**

In order to relate the body fat percentage to age, researchers selected nine healthy adults and determined their body fat percentage.

**Usage**

`data(agefat)`

**Format**

A data frame with 9 observations on the following 2 variables.

`age` age of the subject

`fatpct` body fat percentage

**Source**

Ib Skovgaard (2004).Basal Biostatistik 2, Samfundslitteratur.

**Examples**

`data(agefat)`

---

aids	<i>Aids prevalence data</i>
------	-----------------------------

---

**Description**

Number of aids cases and deaths for a 19-year period.

**Usage**

```
data(aids)
```

**Format**

A data frame with 19 observations on the following 3 variables.

year a numeric vector

cases a numeric vector

deaths a numeric vector

**Examples**

```
data(aids)
```

---

alligator	<i>Alligator food preference</i>
-----------	----------------------------------

---

**Description**

Data on food preference for 59 alligators. It is of interest to examine if different sized alligators have different food preferences.

**Usage**

```
data(alligator)
```

**Format**

A data frame with 59 observations on the following 2 variables.

length length of the alligator (in meters)

food a factor with levels Fish Invertebrates Other representing the food preference

**Source**

Agresti, A. (2007). An Introduction to Categorical Data Analysis. Wiley

**Examples**

```
data(alligator)
library(VGAM)
model <- vglm(food ~ length, family=multinomial, data=alligator)
summary(model)
```

---

antibio

*Decomposition of organic material*

---

**Description**

The amount of organic material in heifer dung was measured after eight weeks of decomposition. The data come from 36 heifers from six treatment groups. The treatments are different types of antibiotics. Only 34 observations are available.

**Usage**

```
data(antibio)
```

**Format**

A data frame with 34 observations on the following 2 variables.

type a factor with the antibiotic treatments. Level: Alfacyp Control Enroflox Fenbenda Ivermect Spiramyc

org a numeric vector with the amount of organic material

**Source**

C. Sommer and B. M. Bibby (2002). The influence of veterinary medicines on the decomposition of dung organic matter in soil. *European Journal of Soil Biology*", 38, 115-159.

**Examples**

```
data(antibio)
```

---

binding

*Binding of antibiotics*

---

### Description

When an antibiotic is injected into the bloodstream, a certain part of it will bind to serum protein. This binding reduces the medical effect. As part of a larger study, the binding rate was measured for 12 cows which were given one of three types of antibiotics: chloramphenicol, erythromycin, and tetracycline

### Usage

```
data(binding)
```

### Format

A data frame with 12 observations on the following 2 variables.

antibiotic antibiotic type. Factor with levels Chlor Eryth Tetra

binding binding rate

### Source

G. Ziv and F. G. Sulman (1972). Binding of antibiotics to bovine and ovine serum. *Antimicrobial Agents and Chemotherapy*, 2, 206-213.

### Examples

```
data(binding)
```

---

birthweight

*Birth weight of boys and girls*

---

### Description

Data from a study that was undertaken to investigate how the sex of the baby and the age of the fetus influence birth weight during the last weeks of the pregnancy.

### Usage

```
data(birthweight)
```

**Format**

A data frame with 361 observations on the following 3 variables.

sex a factor with levels male female

age a numeric vector

weight a numeric vector

**Source**

Anette Dobson (2001). *An Introduction to Generalized Linear Models* (2nd ed.) Chapman and Hall.

**Examples**

```
data(birthweight)
## maybe str(birthweight) ; plot(birthweight) ...
```

---

bodyfat	<i>Body fat in women</i>
---------	--------------------------

---

**Description**

It is expensive and cumbersome to determine the body fat in humans as it involves immersion of the person in water. This dataset provides information on body fat, triceps skinfold thickness, thigh circumference, and mid-arm circumference for twenty healthy females aged 20 to 34. It is desirable if a model could provide reliable predictions of the amount of body fat, since the measurements needed for the predictor variables are easy to obtain.

**Usage**

```
data(bodyfat)
```

**Format**

A data frame with 20 observations on the following 4 variables.

Fat body fat

Triceps triceps skinfold measurement

Thigh thigh circumference

Midarm mid-arm circumference

**Source**

J. Neter and M.H. Kutner and C.J. Nachtsheim and W. Wasserman (1996). *Applied Linear Statistical Models*. McGraw-Hill

**Examples**

```
data(bodyfat)
```

---

butterfat	<i>Butterfat and dairy cattle</i>
-----------	-----------------------------------

---

**Description**

Average butterfat content (percentages) for random samples of 20 cows (10 two year olds and 10 mature (greater than four years old)) from each of five breeds.

**Usage**

```
data(butterfat)
```

**Format**

A data frame with 100 observations on the following 3 variables.

Butterfat a numeric vector

Breed a factor with levels Ayrshire Canadian Guernsey Holstein-Fresian Jersey

Age a factor with levels 2year Mature

**Source**

Hand et al. (1993). A Handbook of Small Data Sets. Chapman and Hall

**Examples**

```
data(butterfat)
```

---

cabbage	<i>Cabbage yield</i>
---------	----------------------

---

**Description**

Cabbage yield for different treatment methods and different fields

**Usage**

```
data(cabbage)
```

**Format**

A data frame with 16 observations on the following 3 variables.

method a factor with levels A C K N

yield a numeric vector

field a numeric vector

**Examples**

```
data(cabbage)
```

---

cancer2	<i>Tumor size and emission of radioactivity</i>
---------	---

---

**Description**

An experiment involved 21 cancer tumors. For each tumor the weight was registered as well as the emitted radioactivity obtained with a special medical technique (scintigraphic images). Three data points from large tumors were removed.

**Usage**

```
data(cancer2)
```

**Format**

A data frame with 18 observations on the following 3 variables.

```
id tumor id (numeric)
tumorwgt tumor weight
radioact emitted radioactivity (numeric)
```

**Source**

Shin et al. (2005). Noninvasive imaging for monitoring of viable cancer cells using a dual-imaging reporter gene. *The Journal of Nuclear Medicine*, 45, 2109-2115.

**Examples**

```
data(cancer2)
```

---

cattle	<i>Hormone concentration in cattle</i>
--------	--

---

**Description**

As part of a larger cattle study, the effect of a particular type of feed on the concentration of a certain hormone was investigated. Nine cows were given the feed for a period, and the hormone concentration was measured initially and at the end of the period.

**Usage**

```
data(cattle)
```

**Format**

A data frame with 9 observations on the following 3 variables.

cow cow id  
initial initial hormone concentration (before treatment)  
final final hormone concentration (after treatment)

**Examples**

```
data(cattle)
```

---

chicken	<i>Weight gain for chickens</i>
---------	---------------------------------

---

**Description**

Twenty chickens were fed with four different feed types - five chickens for each type - and the weight gain was registered for each chicken after a period.

**Usage**

```
data(chicken)
```

**Format**

A data frame with 20 observations on the following 2 variables.

feed id of feed type. Numeric but it should be used a factor  
gain Weight gain (numeric)

**Source**

Anonymous (1949). Query 70. Biometrics, 250–251.

**Examples**

```
data(chicken)
```

---

chloro	<i>Chlorophyll concentration in winter wheat</i>
--------	--

---

**Description**

An experiment with winter wheat was carried in order to investigate if the concentration of nitrogen in the soil can be predicted from the concentration of chlorophyll in the plants. The chlorophyll concentration in the leaves as well as the nitrogen concentration in the soil were measured for 18 plants.

**Usage**

```
data(chloro)
```

**Format**

A data frame with 18 observations on the following 2 variables.

chloro chlorophyll concentration in leaves

nit nitrogen concentration in soil

**Source**

Experiment was carried out at the Royal Veterinary and Agricultural University in Denmark.

**Examples**

```
data(chloro)
```

---

cooling	<i>Tenderness of pork</i>
---------	---------------------------

---

**Description**

Two different cooling methods for pork meat were compared in an experiment with 18 pigs from two different groups: low or high pH content. After slaughter, each pig was split in two and one side was exposed to rapid cooling while the other was put through a cooling tunnel. After the experiment, the tenderness of the meat was measured.

**Usage**

```
data(cooling)
```

**Format**

A data frame with 18 observations on the following 4 variables.

pig a numeric vector with the id of the pig  
 ph pH concentration level. A factor with levels high low  
 tunnel Tenderness observed from tunnel cooling  
 rapid Tenderness observed from rapid cooling

**References**

A. J. Moller and E. Kirkegaard and T. Vestergaard (1987). Tenderness of Pork Muscles as Influenced by Chilling Rate and Altered Carcass Suspension. *Meat Science*, 27, p. 275–286.

**Examples**

```

data(cooling)
hist(cooling$tunnel[cooling$ph=="low"], main="",
      xlab="Tenderness (low pH)", col="lightgray", ylim=c(0,5), xlim=c(3,9))
hist(cooling$tunnel[cooling$ph=="high"], main="",
      xlab="Tenderness (high pH)", col="lightgray", ylim=c(0,5), xlim=c(3,9))

hist(cooling$tunnel[cooling$ph=="low"], freq=FALSE, main="",
      xlab="Tenderness (low pH)", col="lightgray", ylim=c(0,.5), xlim=c(3,9))
hist(cooling$tunnel[cooling$ph=="high"], freq=FALSE, main="",
      xlab="Tenderness (high pH)", col="lightgray", ylim=c(0,.5), xlim=c(3,9))

plot(cooling$tunnel, cooling$rapid,
      xlim=c(3,9), ylim=c(3,9),
      xlab="Tenderness (tunnel)", ylab="Tenderness (rapid)")

boxplot(cooling$tunnel, cooling$rapid, names=c("Tunnel", "Rapid"),
        ylab="Tenderness score")

```

---

cornyield

*Yield of corn after fertilizer treatment*

---

**Description**

Two varieties of corn were randomly assigned to the 8 plots in a completely randomized design so that each variety was planted on 4 plots. Four amounts of fertilizer (5, 10, 15, and 20 units) were randomly assigned to the 4 plots in which variety A was planted. Likewise, the same four amounts of fertilizer were randomly assigned to the 4 plots in which variety B was planted. Yield in bushels per acre was recorded for each plot at the end of the experiment.

**Usage**

```
data(cornyield)
```

**Format**

A data frame with 8 observations on the following 3 variables.

yield a numeric vector

variety a factor with levels A B

fertilizer a numeric vector

**Examples**

```
data(cornyield)
```

---

crabs	<i>Weight of crabs</i>
-------	------------------------

---

**Description**

The length and weight of 361 crabs. The crabs were measured at three different days and they were raised in three different vat types.

**Usage**

```
data(crabs)
```

**Format**

A data frame with 361 observations on the following 5 variables.

day id for day of measurement (a numeric vector)

date date of measurement (a numeric vector)

kar id of the vat type (a numeric vector)

lgth length of the crab in cm

wgt weight of the crab in grams

**Details**

Only crabs from day 1 (190692) are used in the isdals book.

**Source**

Experiment carried out at the Royal Veterinary and Agricultural University of Copenhagen.

**Examples**

```
data(crabs)
```

---

cuckoo

*Hatching of cuckoo eggs*

---

### Description

Cuckoos place their eggs in other birds' nests for hatching and rearing. Researchers investigated 154 cuckoo eggs and measured their size. The adoptive species is also registered (three types). It is believed that cuckoos choose the "adoptive parents" such that the cuckoo eggs are similar in size to the eggs of the adoptive species.

### Usage

```
data(cuckoo)
```

### Format

A data frame with 154 observations on the following 2 variables.

spec adoptive species. Factor with levels redstart whitethroat wren  
width width of egg (unit: half millimeters)

### Source

O.H. Latter (1905). The egg of *Cuculus Canorus*: An attempt to ascertain from the dimensions of the cuckoo's egg if the species is tending to break up into sub-species, each exhibiting a preference for some one foster-parent. *Biometrika*, 4, 363-373.

### Examples

```
data(cuckoo)
```

---

cucumber

*Disease spread in cucumber*

---

### Description

Spread of a disease in cucumbers depends on climate and amount of fertilizer. The amount of infection on standardized plants was recorded after a number of days, and two plants were examined for each combination of climate and dose.

### Usage

```
data(cucumber)
```

**Format**

A data frame with 12 observations on the following 3 variables.

disease a numeric vector

climate a factor with levels A (change to day temperature 3 hours before sunrise) and B (normal change to day temperature)

dose a numeric vector with dose of applied fertilizer

**Source**

de Neergaard, E. et al (1993). Studies of *Didymella bryoniae*: the influence of nutrition and cultural practices on the occurrence of stem lesions and internal and external fruit rot on different cultivars of cucumber. *Netherlands Journal of Plant Pathology*. 99:335-343

**Examples**

```
data(cucumber)
```

---

dhl	<i>Running times from relay race</i>
-----	--------------------------------------

---

**Description**

Running times from 5 times 5 km relay race in Copenhagen 2006, held over four days. The sex distribution in the team classifies the teams into six groups. Total running time for a team (not each participant) is registered.

**Usage**

```
data(dhl)
```

**Format**

A data frame with 24 observations on the following 6 variables.

day race day. A factor with levels Monday Thursday Tuesday Wednesday

men number of men on the team (numeric)

women number of men on the team (numeric)

hours hours of running (should be combined with minutes and seconds)

minutes minutes of running (should be combined with hours and seconds)

seconds seconds of running (should be combined with hours and minutes)

**Details**

The total running time for the team (not for each participant) is registered. On average, there are 800 teams per combination of race day and sex group. The dataset contains median running times.

**Source**

<http://www.sparta.dk>

**Examples**

```
data(dh1)
attach(dh1)
totaltime <- 60*60*hours + 60*minutes + seconds ## Total time in seconds
```

---

digestcoefs

*Effect of NaOH treatment of straw on digestibility*

---

**Description**

In an experiment with six horses the digestibility coefficient was measured twice for each horse: once after the horse had been fed straw treated with NaOH and once after the horse had been treated ordinary straw.

**Usage**

```
data(digestcoefs)
```

**Format**

A data frame with 6 observations on the following 3 variables.

horse horse id

ordinary digestibility coefficient corresponding to ordinary straw

naoh digestibility coefficient corresponding to NaOH treated straw

**Source**

Ib Skovgaard (2004). Basal Biostatistik 2. Samfundslitteratur.

**Examples**

```
data(digestcoefs)
```

---

dioxin

*dioxin in water*

---

### Description

Over a period of 14 years from 1990 to 2003, environmental agencies monitored the average amount of dioxins found in the liver of crabs at two different monitoring stations located some distance apart from a closed paper pulp mill. The outcome is the average total equivalent dose (TEQ), which is a summary measure of different forms of dioxins with different toxicities found in the crabs

### Usage

```
data(dioxin)
```

### Format

A data frame with 28 observations on the following 3 variables.

site a factor with levels a b corresponding to the two monitoring stations

year the year

TEQ a numeric vector for the total equivalent dose

### Source

C. J. Schwarz (2013). Sampling, Regression, Experimental Design and Analysis for Environmental Scientists, Biologists, and Resource Managers. Course Notes.

### Examples

```
data(dioxin)
## maybe str(dioxin) ; plot(dioxin) ...
```

---

duckweed

*Growth of duckweed*

---

### Description

Growth of duckweed (Lemna) by counting the number of leaves every day over a two-week period

### Usage

```
data(duckweed)
```

**Format**

A data frame with 14 observations on the following 2 variables.

days a numeric vector

leaves a numeric vector

**Source**

E. Ashby and T. A. Oxley (1935). The interactions of factors in the growth of Lemna. *Annals of Botany*. 49:309-336

**Examples**

```
data(duckweed)
```

---

eels	<i>Frequency of signals from electric eels</i>
------	--

---

**Description**

The investigation of water temperatures influence on the frequency of these electrical signals

**Usage**

```
data(eels)
```

**Format**

A data frame with 21 observations on the following 2 variables.

temp the water temperature measured in degrees Celsius

freq the frequency of of the emitted signal measured in Hz

**Source**

Data were supplied from the course "Biostatistik, Geostatistik samt Sandsynlighedsteori og Statistik" held at Aarhus University in 2002.

**Examples**

```
data(eels)
```

---

elisa	<i>Optical density for dilutions of a standard dissolution with ubiquitin antibody</i>
-------	--

---

**Description**

As part of a so-called ELISA experiment, the optical density was measured for various dilutions of two different dissolutions with ubiquitin antibody. One dissolution was standard, whereas the other was serum from mice. For each dilution, the mixture proportion describes how many times the original ubiquitin dissolution has been thinned.

**Usage**

```
data(elisa)
```

**Format**

A data frame with 16 observations on the following 3 variables.

type type of dissolution. Factor with levels mouse std

mix a numeric vector describing how many times the original ubiquitin dissolution was thinned

od optical density

**Source**

The data was generated by Marianne Freisleben in her work for the master's thesis at the University of Copenhagen.

**Examples**

```
data(elisa)
```

---

farmprice	<i>Relation between soil area and price for farms</i>
-----------	---

---

**Description**

In February 2010, 12 production farms were for sale in a municipality on Fuen island in Denmark. The dataset contains the soil area in thousands of square meters and the price in thousands of DKK.

**Usage**

```
data(farmprice)
```

**Format**

A data frame with 12 observations on the following 2 variables.

area area of soil in thousands of square meters

price price in thousands of DKK

**Examples**

```
data(farmprice)
```

---

fev

*Forced expiratory volume in children*

---

**Description**

Dataset to examine if respiratory function in children was influenced by exposure to smoking at home.

**Usage**

```
data(fev)
```

**Format**

A data frame with 654 observations on the following 5 variables.

Age age in years

FEV forced expiratory volume in liters

Ht height measured in inches

Gender gender (0=female, 1=male)

Smoke exposure to smoking (0=no, 1=yes)

**Source**

I. Tager and S. Weiss and B. Rosner and F. Speizer (1979). Effect of Parental Cigarette Smoking on the Pulmonary Function of Children. *American Journal of Epidemiology*. 110:15-26

**Examples**

```
data(fev)
```

---

geneexp	<i>Gene expression</i>
---------	------------------------

---

**Description**

Two groups were compared in an experiment with six microarrays. Two conditions (the test group and the reference group) were examined on each array and the amount of protein synthesized by the gene (also called the gene expression) was registered.

**Usage**

```
data(geneexp)
```

**Format**

A data frame with 6 observations on the following 3 variables.

```
array array id
test gene expression level for test group
reference gene expression level for reference group
```

**Source**

Fictitious data.

**Examples**

```
data(geneexp)
```

---

gestation	<i>Gestation period for 13 horses</i>
-----------	---------------------------------------

---

**Description**

The length of the gestation period (the period from conception to birth) was registered for 13 horses.

**Usage**

```
data(gestation)
```

**Format**

A data frame with 13 observations on the following variable.

```
gest length of gestation period
```

**Source**

Fictious (but realistic) data.

**Examples**

```
data(gestation)
```

---

hazard

*Sorption of hazardous organic solvents*

---

**Description**

The sorption was measured for a variety of hazardous organic solvents. The solvents were classified into three types (esters, aromatics, and chloroalkanes), and the purpose was to examine differences between the three types.

**Usage**

```
data(hazard)
```

**Format**

A data frame with 32 observations on the following 2 variables.

type type of solvent. Factor with levels aromatic chlor estere

sorption sorption measurements

**Source**

J.D. Ortego, T.M Aminabhavi, S.F. Harlapur, R.H. Balundgi (1995). A review of polymeric geosyn-  
thetics used in hazardous waste facilities. Journal of Hazardous Materials, 42, 115-156.

**Examples**

```
data(hazard)
```

---

herring

*Nematodes in herring fillets*

---

### Description

An experiment was carried out in order to investigate the migration of nematodes in Danish herrings. The fish were allocated to eight different treatment groups corresponding to different combinations of storage time and storage conditions until filleting. After filleting, it was determined whether nematodes were present in the fillet or not.

### Usage

```
data(herring)
```

### Format

A data frame with 884 observations on the following 4 variables.

`group` a numeric vector that is the combination of storage and time

`time` a numeric vector that contains the duration of storage in hours before the fish is filleted

`condi` a numeric vector representing the storage condition

`fillet` a numeric vector to indicate the presence of nematodes (1) or absence of nematodes (0)

### Details

The variable `group` is the combination of storage condition and storage time. Notice that a storage time 0 is equivalent to storage condition 0 and that no fish were stored 132 hours under condition 4. Hence, there are only 8 combinations; i.e., 8 levels of the `group` variable.

### Source

A. Roepstorff and H. Karl and B. Bloemsma and H. H. Huss (1993). Catch handling and the possible migration of *Anisakis* larvae in herring, *Clupea harengus*. *Journal of Food Protection*. 56:783-787.

### Examples

```
data(herring)
## maybe str(herring) ; plot(herring) ...
```

---

hormone	<i>Hormone concentration in cattle</i>
---------	--

---

**Description**

As part of a larger cattle study, the effect of two types of feed on the concentration of a certain hormone was investigated. Twenty cows were given the feed for a period, and the hormone concentration was measured initially and at the end of the period.

**Usage**

```
data(hormone)
```

**Format**

A data frame with 20 observations on the following 3 variables.

feed a numeric vector

initial a numeric vector

final a numeric vector

**Examples**

```
data(hormone)
```

---

inhibitor	<i>Enzyme experiment with inhibitors</i>
-----------	--

---

**Description**

The data comes from an enzyme experiment with inhibitors. The enzyme acts on a substrate that was tested in six concentrations between 10 micro M and 600 micro M. Three concentrations of the inhibitor were tested, namely 0 (controls), 50 micro M and 100 micro M. There were two replicates for each combination yielding a total of 36 observations of reaction rate.

**Usage**

```
data(inhibitor)
```

**Format**

A data frame with 36 observations on the following 3 variables.

Iconc Inhibitor concentration in micro Mole (numeric vector)

Sconc Substrate concentration in micro Mole (numeric vector)

RR Reaction rate (numeric vector)

**Source**

The experiment was carried out by students at a biochemistry course at University of Copenhagen.

**Examples**

```
data(inhibitor)
```

---

interspike

*Interspike intervals for neuron from guinea pigs*

---

**Description**

A study of the membrane potential for neurons from guinea pigs was carried out. The data consists of 312 measurements of interspike intervals; that is, the length of the time period between spontaneous firings from a neuron.

**Usage**

```
data(interspike)
```

**Format**

A data frame with 312 observations on the following variable.

interval length of the interspike intervals

**Source**

Petr Lansky, Pavel Sanda and Jufang He (2006). The parameters of the stochastic leaky integrate-and-fire neuronal model. *Journal of Computational Neuroscience*, 21, 211-223.

**Examples**

```
data(interspike)
```

---

jellyfish

*Dimensions of jellyfish*

---

**Description**

Dimensions in millimetres are given of two samples of jellyfish from Hawkesbury River in New South Wales, Australia

**Usage**

```
data(jellyfish)
```

**Format**

A data frame with 46 observations on the following 3 variables.

Location a factor with levels Dangar Salamander

Width the width of the jellyfish in mm

Length the length of the jellyfish in mm

**Source**

Hand D.J., Daly F., Lunn A.D., McConway K.J., Ostrowski E. (1993) A Handbook of Small Data Sets. London: Chapman & Hall. Data set 335.

**Examples**

```
data(jellyfish)
```

---

lameness

*Lameness scores for horses*

---

**Description**

A score measuring the symmetry of the gait for eight trotting horses. Each horse was tested twice, namely while it was clinically healthy and after mechanical induction of lameness in a fore limb.

**Usage**

```
data(lameness)
```

**Format**

A data frame with 8 observations on the following 3 variables.

horse a numeric vector with an id of the horse

lame the symmetry score when the horse is lame

healthy the symmetry score when the horse is healthy

**Source**

A.T. Jensen, H. Sorensen, M.H. Thomsen and P.H. Andersen (2010). Quantification of symmetry for functional data with application to equine lameness classification. Submitted manuscript.

**Examples**

```
data(lameness)
```

---

lifespan	<i>Length of gestation period and lifespan for horses</i>
----------	---

---

**Description**

Length of the gestation period (period from conception to birth) and the lifespan (duration of life) for seven horses.

**Usage**

```
data(lifespan)
```

**Format**

A data frame with 7 observations on the following 2 variables.

lifespan duration of life (years)

gestation length of gestation period (days)

**Source**

Probably fictitious data.

**Examples**

```
data(lifespan)
```

---

`listeria`*Listeria growth in experiment with mice*

---

**Description**

Ten wildtype mice and ten RIP2-deficient mice, i.e., mice without the RIP2 protein, were used in the experiment. Each mouse was infected with listeria, and after three days the bacteria growth was measured in the liver or spleen. Errors were detected for two liver measurements, so the total number of observations is 18.

**Usage**

```
data(listeria)
```

**Format**

A data frame with 18 observations on the following 3 variables.

`organ` a factor with levels `liv spl` telling where the measurement was taken

`type` a factor with levels `rip2 wild` corresponding to the mouse type

`growth` bacteria growth

**Source**

Anand, P. K., Tait, S. W. G., Lamkanfi, M., Amer, A. O., Nunez, G., Pagès, G., Pouyssegur, J., McGargill, M. A., Green, D. R., and Kanneganti, T.-D. (2011). TLR2 and RIP2 pathways mediate autophagy of listeria monocytogenes via extracellular signal-regulated kinase (ERK) activation. *Journal of Biological Chemistry*, 286:42981-42991.

**Examples**

```
data(listeria)
```

---

`logit`*Compute the logit*

---

**Description**

Compute the logit of a probability

**Usage**

```
logit(p)
```

**Arguments**

`p` a probability between 0 and 1

**Value**

A number with list with class `htest` containing the following components:

**Author(s)**

Claus Ekstrom <ekstrom@sund.ku.dk>

---

lucerne *Fertility of lucerne*

---

**Description**

Ten plants were used in an experiment of fertility of lucerne. Two clusters of flowers were selected from each plant and pollinated. One cluster was bent down, whereas the other was exposed to wind and sun. At the end of the experiment, the average number of seeds per pod was counted for each cluster and the weight of 1000 seeds was registered for each cluster.

**Usage**

```
data(lucerne)
```

**Format**

A data frame with 10 observations on the following 5 variables.

`plant` plant id

`seeds.exp` average number of seeds per pod from cluster exposed to sun and wind

`wgt.exp` weight of 1000 seeds from cluster exposed to sun and wind

`seeds.bent` average number of seeds per pod from cluster that was bent down

`wgt.bent` weight of 1000 seeds from cluster that was bent down

**Source**

H.L. Petersen (1954). Pollination and seed setting in lucerne. Kgl. Veterinaer og Landbohojskole, Aarsskrift 1954, 138-169.

**Examples**

```
data(lucerne)
```

---

mackerel	<i>Nematodes in mackerel</i>
----------	------------------------------

---

### Description

Data to examine if cooling right after catching prevents nematodes (roundworms) from moving from the belly of mackerel to the fillet. A total of 150 mackerels were investigated and their length, number of nematodes in the belly, and time before counting the nematodes in the fillet were registered. The response variable is binary: presence or absence of nematodes in the fillet.

### Usage

```
data(mackerel)
```

### Format

A data frame with 150 observations on the following 7 variables.

length a numeric vector

visc a numeric vector

left a numeric vector

right a numeric vector

fillet a numeric vector

portion a numeric vector

time a numeric vector

### Source

A. Roepstorff and H. Karl and B. Bloemsma and H. H. Huss (1993). Catch handling and the possible migration of *Anisakis* larvae in herring, *Clupea harengus*. *Journal of Food Protection*. 56:783-787.

### Examples

```
data(mackerel)
## maybe str(mackerel) ; plot(mackerel) ...
```

---

`malaria`*Parasite counts for children with malaria*

---

**Description**

A medical researcher took blood samples from 31 children who were infected with malaria and determined for each child the number of malaria parasites in 1 ml of blood.

**Usage**

```
data(malaria)
```

**Format**

A data frame with 31 observations on the following variable.

```
parasites the number of malaria parasites
```

**Source**

M.L. Samuels and J.A. Witmer (2003). *Statistics for the Life Sciences* (3rd ed.). Pearson Education, Inc., New Jersey.

**References**

C. B. Williams (1964) *Patterns in the Balance of Nature*. Academic Press, London.

**Examples**

```
data(malaria)
```

---

`massspec`*Comparison of mass spectrometry methods*

---

**Description**

Two common methods are GC-MS (gas chromatography-mass spectrometry) and HPLC (high performance liquid chromatography). The biggest difference between the two methods is that one uses gas while the other uses liquid. We wish to determine if the two methods measure the same amount of muconic acid in human urine.

**Usage**

```
data(massspec)
```

**Format**

A data frame with 16 observations on the following 3 variables.

sample a numeric vector

hplc a numeric vector

gcms a numeric vector

**Examples**

```
data(massspec)
```

---

mincedmeat

*Weight of packs with minced meat*

---

**Description**

In meat production, packs of minced meat are specified to contain 500 grams of minced meat. A sample of ten packs was drawn at random and the weights (in grams) of the content was recorded.

**Usage**

```
data(mincedmeat)
```

**Format**

A data frame with 10 observations on the following variable.

wgt weight of minced meat in grams

**Source**

Fictitious data.

**Examples**

```
data(mincedmeat)
```

---

`oilvit`*Utilization of vitamin A*

---

**Description**

In an experiment on the utilization of vitamin A, 20 rats were given vitamin A over a period of three days. Ten rats were fed vitamin A in corn oil and ten rats were fed vitamin A in castor oil (American oil). On the fourth day, the liver of each rat was examined and the vitamin A concentration in the liver was determined.

**Usage**`data(oilvit)`**Format**

A data frame with 20 observations on the following 2 variables.

`type` type of oil. A factor with levels am corn

`avit` vitamin A concentration in liver

**Source**

C.I.Bliss (1967). Statistics in Biology. McGraw-Hill, New York

**Examples**`data(oilvit)`

---

`OORdata`*pH and enzyme activity*

---

**Description**

A new enzyme, OOR, makes it possible for a certain bacteria species to develop on oxalate. In an experiment the enzyme activity (micromole per minute per mg) was measured and registered for 29 different pH-values.

**Usage**`data(OORdata)`**Format**

A data frame with 29 observations on the following 2 variables.

`ph` pH value (a numeric vector)

`act` enzyme activity measured in micromole per minute per mg (a numeric vector)

**Source**

Pierce, E., Becker, D. F., and Ragsdale, S. W. (2010). Identification and characterization of oxalate oxidoreductase, a novel thiamine pyrophosphate- dependent 2-oxoacid oxidoreductase that enables anaerobic growth on oxalate. *Journal of Biological Chemistry*, 285:40515-40524.

**Examples**

```
data(OORdata)
```

---

```
paperstr
```

```
Tensile strength of Kraft paper
```

---

**Description**

Tensile strength in pound-force per square inch of Kraft paper (used in brown paper bags) for various amounts of hardwood contents in the paper pulp.

**Usage**

```
data(paperstr)
```

**Format**

A data frame with 19 observations on the following 2 variables.

hardwood hardwood content

strength tensile strength in pound-force per square inch

**Source**

G. Joglekar and J. H. Schuenemeyer and V. LaRiccia (1989). Lack-of-Fit Testing When Replicates Are Not Available. *The American Statistician*. 43:135-143

**Examples**

```
data(paperstr)
```

---

phosphor	<i>Phosphor concentration in plants during growth</i>
----------	---

---

**Description**

In a plant physiological experiment the amount of water-soluble phosphorous (among others) was measured in the plants, as a percentage of dry matter. The phosphorous concentration was measured nine weeks during the growth season, and the averages over the plants in the experiments was reported.

**Usage**

```
data(phosphor)
```

**Format**

A data frame with 9 observations on the following 2 variables.

week week number

phos phosphor concentration (average over the plants)

**Source**

Ib Skovgaard (2004). Basal Biostatistik 2, Samfundslitteratur.

**Examples**

```
data(phosphor)
```

---

picloram	<i>Picolram and herbicide efficacy</i>
----------	--

---

**Description**

A small dataset for evaluating the effects of increasing pplication rates of picloram for control of tall larkspur.

**Usage**

```
data(picloram)
```

**Format**

A data frame with 313 observations on the following 3 variables.

replicate a factor with levels 1 2 3 corresponding to the three replicates (locations) used

dose the dose of picloram used in kg ae/ha

status a numeric vector. 0 means the plant survived, 1 that it died

**Source**

David L. Turner, Michael H. Ralphs and John O. Evans (1992): Logistic Analysis for Monitoring and Assessing Herbicide Efficacy. Weed Technology

**Examples**

```
data(picloram)
```

---

pillbug

*Effect of stimuli on pillbugs*

---

**Description**

An experiment on the effect of different stimuli was carried out with 60 pillbugs. The bugs were split into three groups: 20 bugs were exposed to strong light, 20 bugs were exposed to moisture, and 20 bugs were used as controls. For each bug it was registered how many seconds it used to move six inches.

**Usage**

```
data(pillbug)
```

**Format**

A data frame with 60 observations on the following 2 variables.

time number of seconds it took the pillbug to move six inches  
group treatment. A factor with levels Control Light Moisture

**Source**

Samuels and Witmer (2003). Statistics for the Life Sciences (3rd ed.). Pearson Education, Inc., New Jersey.

**Examples**

```
data(pillbug)
```

---

pine	<i>Height and diameter of pines</i>
------	-------------------------------------

---

**Description**

The data consist of height and diameter (in breast height) measurements from 18 pine trees.

**Usage**

```
data(pine)
```

**Format**

A data frame with 18 observations on the following 2 variables.

diam diameter of the pine tree

height height of the pine tree

**Source**

J.N.R. Jeffers (1959). *Experimental Design and Analysis in Forest Research*. Almqvist and Wiksell, Stockholm.

**Examples**

```
data(pine)
```

---

poison	<i>Effects of insecticides on mortality</i>
--------	---

---

**Description**

The data concerns three insecticides (rotenone, deguelin, and a mixture of those). A total of 818 insects were exposed to different doses of one of the three insecticides. After exposure, it was recorded if the insect died or not.

**Usage**

```
data(poison)
```

**Format**

A data frame with 818 observations on the following 3 variables.

status status of insect: dead=1, alive=0 (numeric vector)

poison type of insecticide. A factor with levels D (deguelin) M (mixture) R (rotenone)

logdose natural logarithm of dose of insecticide

**Source**

D.J. Finney (1952). Probit analysis. Cambridge University Press, England.

**Examples**

```
data(poison)
```

---

pork	<i>Pork colour over time</i>
------	------------------------------

---

**Description**

Investigation of meat quality of pork through color stability of pork chops. The color was measured from a pork chop from each of ten pigs at days 1, 4, and 6 after storage.

**Usage**

```
data(pork)
```

**Format**

A data frame with 30 observations on the following 3 variables.

brightness a numeric vector

day a numeric vector

pig a numeric vector

**Examples**

```
data(pork)
```

---

puromycin	<i>Enzyme experiment</i>
-----------	--------------------------

---

**Description**

In an experiment with the enzyme puromycin, the rate of the reaction,  $V$ , was measured twice for each of six concentrations  $C$  of the substrate.

**Usage**

```
data(puromycin)
```

**Format**

A data frame with 12 observations on the following 2 variables.

conc concentration of the substrate (numeric vector)

rate rate of reaction (numeric vector)

**Source**

Unknown

**Examples**

```
data(puromycin)
```

---

ratliver

*Drugs in rat's livers*

---

**Description**

An experiment was undertaken to investigate the amount of drug present in the liver of a rat. Nineteen rats were randomly selected, weighed, placed under a light anesthetic, and given an oral dose of the drug. It was believed that large livers would absorb more of a given dose than a small liver, so the actual dose given was approximately determined as 40 mg of the drug per kilogram of body weight. After a fixed length of time, each rat was sacrificed, the liver weighed, and the percent dose in the liver was determined.

**Usage**

```
data(ratliver)
```

**Format**

A data frame with 19 observations on the following 4 variables.

BodyWt body weight of each rat in grams

LiverWt weight of liver in grams

Dose relative dose of the drug given to each rat as a fraction of the largest dose

DoseInLiver proportion of the dose in the liver

**Source**

S. Weisberg (1985). Applied Linear Regression (2nd ed.). John Wiley and Sons

**Examples**

```
data(ratliver)
```

---

ratweight	<i>Weight gain of rats</i>
-----------	----------------------------

---

**Description**

Data contains the weight gain for rats fed on four different diets: combinations of protein source (beef or cereal) and protein amount (low and high)

**Usage**

```
data(ratweight)
```

**Format**

A data frame with 40 observations on the following 3 variables.

Gain a numeric vector

Protein a factor with levels Beef Cereal

Amount a factor with levels High Low

**Source**

Hand et al. (1993). A Handbook of Small Data Sets. Chapman and Hall

**Examples**

```
data(ratweight)
```

---

residualplot	<i>Plots a standardaized residual</i>
--------------	---------------------------------------

---

**Description**

Plots a standardized residual plot from an lm object and provides additional graphics to help evaluate the variance homogeneity and mean.

**Usage**

```
residualplot(object, bandwidth = 0.3, ...)
```

**Arguments**

object an lm object

bandwidth The width of the window used to calculate the local smoothed version of the mean and the variance. Value should be between 0 and 1 and determines the percentage of the windowwidth used

... Arguments passed to plot.

**Details**

Plots a standardized residual plot from an lm object and provides additional graphics to help evaluate the variance homogeneity and mean.

The brown area is a smoothed estimate of  $1.96 \cdot \text{SD}$  of the standardized residuals in a window around the predicted value. The brown area should largely be rectangular if the standardized residuals have more or less the same variance.

The dashed line shows the smoothed mean of the standardized residuals and should generally follow the horizontal line through (0,0).

**Value**

Produces a standardized residual plot

**Author(s)**

Claus Ekstrøm <ekstrom@sund.ku.dk>

**Examples**

```
# Linear regression example
x <- rnorm(100)
y <- rnorm(100, mean=.5*x)
model <- lm(y ~ x)
residualplot(model)
```

---

ricestraw

*Weight increase for cattle fed with rice straw*

---

**Description**

Weight gain of cattle fed with rice straw to see if rice straw can replace wheat straw as potential feed for slaughter cattle in Tanzania

**Usage**

```
data(ricestraw)
```

**Format**

A data frame with 35 observations on the following 2 variables.

time number of days that the calf has been fed rice straw

weight weight gain (in kg) since the calf was first fed rice straw

**Source**

Ph.D. project at the Faculty of LIFE Sciences, University of Copenhagen

**Examples**

```
data(ricestraw)
plot(ricestraw$time, ricestraw$weight)
lm(weight ~ time, data=ricestraw)
```

---

riis	<i>Emission of greenhouse gas</i>
------	-----------------------------------

---

**Description**

In order to study emission of greenhouse gasses in forests, 14 paired values of water content in the soil and emission of N<sub>2</sub>O were collected.

**Usage**

```
data(riis)
```

**Format**

A data frame with 14 observations on the following 2 variables.

water content of water in soil, measured as a volume percentage (numeric vector)

N<sub>2</sub>O emission of N<sub>2</sub>O, measured as micrograms per square metre per hour (numeric vector)

**Source**

Jesper Riis Christiansen, Department of Geosciences and Natural Resource Management, University of Copenhagen.

**Examples**

```
data(riis)
```

---

ryegrass	<i>Effect of ferulic acid on ryegrass growth</i>
----------	--

---

**Description**

24 perennial ryegrass plants have been treated with different concentrations of ferulic acid, and the length of the root has been measured after a period of time

**Usage**

```
data(ryegrass)
```

**Format**

A data frame with 24 observations on the following 2 variables.

conc concentration of ferulic acid in mM (numeric vector)

root1 length of root in cm (numeric vector)

**Source**

Inderjit, Streibig, J. C., and Olofsdotter, M. (2002). Joint action of phenolic acid mixtures and its significance in allelopathy research. *Physiologia Plantarum*, 114:422-428.

**Examples**

```
data(ryegrass)
```

---

salmon	<i>Parasite counts for salmon</i>
--------	-----------------------------------

---

**Description**

An experiment with two different salmon stocks, from River Conon in Scotland and from River Atran in Sweden, was carried out. Thirteen fish from each stock were infected and after four weeks the number of a certain type of parasites was counted for each of the 26 fish.

**Usage**

```
data(salmon)
```

**Format**

A data frame with 26 observations on the following 2 variables.

stock origin of the fish. A factor with levels atran conon

parasites a numeric vector with the parasite counts

**Source**

Heinecke, R. D, Martinussen, T. and Buchmann, K. (2007). Microhabitat selection of *Gyrodactylus salaris* Malmberg on different salmonids. *Journal of Fish Diseases*, 30, 733-743.

**Examples**

```
data(salmon)
```

---

sarcomere	<i>Sarcomere length and meat tenderness</i>
-----------	---

---

**Description**

The average sarcomere length in the meat and the corresponding tenderness as scored by a panel of sensory judges was examined. A high score corresponds to tender meat.

**Usage**

```
data(sarcomere)
```

**Format**

A data frame with 24 observations on the following 3 variables.

```

pig factor with levels 1–24. Pid id
sarc.length numeric Sarcomere length
tenderness numeric Meat tenderness score

```

**References**

A. J. Moller and E. Kirkegaard and T. Vestergaard (1987). Tenderness of Pork Muscles as Influenced by Chilling Rate and Altered Carcass Suspension. *Meat Science*, 27, p. 275–286.

**Examples**

```

data(sarcomere)
cor(sarcomere$sarc.length, sarcomere$tenderness)

```

---

seal	<i>Size of seal population from 1952 to 1962</i>
------	--

---

**Description**

The number of seals in a population were counted each year during a period of 11 years, from 1952 to 1962.

**Usage**

```
data(seal)
```

**Format**

A data frame with 11 observations on the following 2 variables.

```

year year of seal count
size number of seals in population

```

**Source**

J. Verzani (1005). Using R for Introductory Statistics. Chapman & Hall/CRC, London

**Examples**

```
data(seal)
```

---

soap

*Quality of soap*

---

**Description**

The electric conductance was measured for 32 pieces of soap in 4 groups (8 pieces in each group). The content of fatty acid differs between the groups. Quality of soap is mainly determined by its content of fatty acid, which can be determined with a chemical analysis. It is much easier to measure the electric conductance, and it is therefore of interest if there is a simple relation between the two.

**Usage**

```
data(soap)
```

**Format**

A data frame with 32 observations on the following 3 variables.

group the groups of soap (notice: numeric vector, not factor)

fattyacid content of fatty acid in percent (numeric vector)

conduct electric conductance in milli Siemens (numeric vector)

**Source**

Unknown

**Examples**

```
data(soap)
```

---

soybean

*Stress and growth for soybeans*

---

**Description**

An experiment was carried out with 26 soybean plants. The plants were pairwise genetically identical, so there were 13 pairs in total. For each pair, one of the plants was 'stressed' by being shaken daily, whereas the other plant was not shaken. After a period the plants were harvested and the total leaf area was measured for each plant.

**Usage**

```
data(soybean)
```

**Format**

A data frame with 13 observations on the following 3 variables.

pair id of the pair of plants

stress Total leaf area of stressed plant

nostress total leaf area of control plant

**Examples**

```
data(soybean)
```

---

stearicacid

*Digestibility percentage of fat for various levels of stearic acid*

---

**Description**

The average digestibility percent was measured for nine different levels of stearic acid proportion

**Usage**

```
data(stearicacid)
```

**Format**

A data frame with 9 observations on the following 2 variables.

stearic.acid Percentage of stearic acid

digest Average digestibility percentage

**Source**

Jorgensen, G. and Hansen, N.G. (1973). Fedtsyresammensætningens indflydelse paa fedstoffers fordøjelighed. Landøkonomisk Forsøgslaboratorium.

**Examples**

```
data(stearicacid)
lm(digest ~ stearic.acid, data=stearicacid)
```

---

stomach

*Stomach experiment*

---

**Description**

Fifteen subjects participated in an experiment related to overweight and got a standardized meal. The interest was, among others, to find relationships between the time it takes from a meal until the stomach is empty again and the concentration of a certain hormone.

**Usage**

```
data(stomach)
```

**Format**

A data frame with 15 observations on the following 2 variables.

conc hormone concentration

empty time from meal until the stomach is empty

**Source**

Ib Skovgaard (2004). Basal Biostatistik 2. Samfundslitteratur.

**Examples**

```
data(stomach)
```

---

tartar

*Tartar for dogs*

---

### Description

A dog experiment was carried out in order to examine the effect of two treatments on the development of tartar. Apart from the two treatment groups there was also a control group. Twenty-six dogs were used and allocated to one of the three groups. After four weeks each dog was examined, and the development of tartar was summarized by an index.

### Usage

```
data(tartar)
```

### Format

A data frame with 26 observations on the following 2 variables.

treat treatment. A factor with levels Control HMP P207

index a numeric vector with the tartar index

### Examples

```
data(tartar)
```

---

tetra

*Growth of lettuce plants treated with herbicide*

---

### Description

68 lettuce plants were treated with the herbicide tetraeurin-A in different concentrations. After 5 days each plant was harvested and the root length in cm was registered.

### Usage

```
data("tetra")
```

### Format

A data frame with 68 observations on the following 2 variables.

konz concentration of herbicide (numeric vector)

root root length in cm (numeric vector)

**Source**

Belz, R., Cedergreen, N., and Sørensen, H. (2008). Hormesis in mixtures - Can it be predicted. *Science of the Total Environment*, 404:77-87.

**Examples**

```
data(tetra)
```

---

thumbtack	<i>Throwing thumbtacks</i>
-----------	----------------------------

---

**Description**

A brass thumbtack was thrown 100 times and it was registered whether the pin was pointing up or down towards the table upon landing.

**Usage**

```
data(thumbtack)
```

**Format**

The format is: int [1:100] 1 1 0 0 1 1 0 1 0 0 ...

**Details**

1 corresponds to "tip pointing down" and 0 corresponds to "tip pointing up"

**References**

Mats Rudemo (1979). *Statistik og sandsynlighedslaere med biologiske anvendelser*. Del 1: Grundbegreber.

**Examples**

```
data(thumbtack)
mean(thumbtack)
```

---

turtles	<i>Clutch size of turtles</i>
---------	-------------------------------

---

**Description**

Data to examine the effect of turtle carapace length on the clutch size of turtles.

**Usage**

```
data(turtles)
```

**Format**

A data frame with 18 observations on the following 2 variables.

length a numeric vector

clutch a numeric vector

**Source**

K. G. Ashton and R. L. Burke and J. N. Layne (2007). Geographic variation in body and clutch size of gopher tortoises. *Copeia*. 49:355-363.

**Examples**

```
data(turtles)
## maybe str(turtles) ; plot(turtles) ...
```

---

urinary	<i>Feline urinary tract disease</i>
---------	-------------------------------------

---

**Description**

The impact of food intake and exercise as possible explanatory variables for the urinary tract disease in cats.

**Usage**

```
data(urinary)
```

**Format**

A data frame with 74 observations on the following 3 variables.

disease a factor with levels no yes

food a factor with levels excessive normal

exercise a factor with levels little much

**Source**

Willeberg P (1976). Interaction effects of epidemiologic factors in the feline urological syndrome. *Nordisk Veterinaer Medicin*, 28, 193-200

**Examples**

```
data(urinary)
head(urinary)
```

---

 vitamina

*Food intake for Danish people 1985*


---

**Description**

The daily food intake was studied for 2224 subjects, and the content of many different vitamins and substances were measured,

**Usage**

```
data(vitamina)
```

**Format**

A data frame with 2224 observations on the following 20 variables.

```
person subject id (a numeric vector)
wt weight (kg)
ht height (cm)
sex sex: 1 for male, 2= for female
age age
bmr basal metabolic rate
E_bmr energy divided by bmr
energi energy content (kJ)
Avit vitamin A (RE)
retinol retinol (microgram)
betacar beta-caroten (microgram)
Dvit vitamin D (microgram)
Evit vitamin E (alphaTE)
B1vit vitamin B1 (milligram)
B2vit vitamin B2 (milligram)
niacin niacin (NE)
B6vit vitamin B6 (milligram)
folacin folacin (microgram)
B12vit vitamin B12 (microgram)
Cvit vitamin C (milligram)
```

**Details**

Only variables Avit and bmr are used in the "Introduction to Statistical Data Analysis for the Life Sciences" book.

**Source**

J. Haraldsdottir, J.H. Jensen, A. Moller (1985). Danskernes kostvaner 1985, Hovedresultater. Levnedsmiddelstyrelsen, publikation nr. 138.

**Examples**

```
data(vitamina)
```

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