RABIES BULLETIN EUROPE - Vol. 11/No 2/1987

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1. INTRODUCTION

This BULLETIN describes the reported rabies cases in Europe for the second quarter 1987. The situation in general appears under 2., and in individual countries under 2.1 - 2.26.

In the miscellaneous section under 3.1 information is given on two rabies conferences in October and November 1987. Under 3.2 a report is presented of a fatal rabies encephalitis despite appropriate post-exposure prophylaxis. - More and more experience is gained with a vaccinia virus recombinant, expressing the rabies virus glycoprotein. Some of these results on the immune response in different animals are described under 3.3.

The rabies case data are tabulated for the second quarter 1987 under 4.

The last part lists the official contributors to the BULLETIN.

The geographical distribution of cases in Europe in the second quarter 1987 is shown on the maps of Europe and Turkey in the Annex.

2. RABIES IN EUROPE, 2ND QUARTER 1987

During the second quarter 1987, 3863 cases of rabies were reported in Europe. These were 3260 cases in wild animals (84.4%) and 602 cases in domestic animals (15.6%). Of the cases in wild animals 2886 (74.7% of total) were foxes, 116 badgers, 118 other mustelids, 83 deer and 57 other and unspecified species. Of the 602 domestic animals 256 were dogs (of which 169 (66% of all dogs) were reported from Turkey, a country with dog-mediated rabies), 134 cats, 121 cattle, 11 horses, 74 small ruminants and 6 other domesticated animals. These data are summarized in Table 1.

The figures in Table 2 show accumulated totals of the first two quarters in 1987 for the European countries. Table 3 lists 'other animal species', less frequently involved in rabies.

Rabies-free countries in Europe participating in the surveillance were: Bulgaria, Finland, Ireland, Iceland, Norway, Portugal, Spain and Sweden. There were no cases reported from Greece and Italy, but their last indigenously acquired case was recorded less than two years ago.

Bat-rabies, serotype DUVENHAGE, continues to be on the rise. For the first time ever the Netherlands reported 7 cases. There were further reports from Denmark (11 cases) and the Federal Republic of Germany (2 cases).

One imported human case from India was recorded in the United Kingdom.

Individual country reports follow:

2.1 Rabies in Austria (AUT)
by E. Scharfen

During the second quarter 1987, 570 rabies cases in animals were recorded. In comparison with the previous quarter (461 cases) there was an increase by 23.6%, and compared to the second quarter of the previous year (348 cases) there was an increase by 63.8%. Of 564 rabid wild animals (98.9% of total) 465 were foxes (81.6%), 57 badgers (10%), 20 roe deer (3.5%), 17 martens (3%), 3 polecats and 2 others. Of 6 rabid domestic animals (1.1% of total), there were 2 dogs, 1 cat, 1 horse, 1 sheep and 1 goat.

There was rabies in the federal province Tyrol in the districts (Bezirke) Reutte and Kitzbühel. Furthermore, the disease occurred in the federal provinces Salzburg, Carinthia, Styria (except for the eastern districts), Burgenland, Lower Austria (to the north of the river Danube) and Upper Austria (the south of the district Gmunden, as well as to the north of the river Danube).

Rabies-free were the federal provinces Vorarlberg and Vienna.

2.2 Rabies in Belgium (BEL)
by J. Fontaine

During the second quarter 1987, 46 rabies cases were registered in 33 localities of the provinces Hainaut, Liège, Luxembourg and Namur; 22 cases occurred in domestic animals (3 dogs, 8 cats, 5 cattle, 5 sheep or goats and 1 domesticated rabbit) and 24 in wild animals (21 foxes, 1 badger, 1 mouse weasel and 1 roe deer).

This represents a decrease on rabies cases of 25% compared to the same quarter 1986 and of 13% compared to the first quarter 1987.

The majority of cases occurred in the provinces of Liège and Luxembourg. Yet, there was one locality infected in the centre of the province of Namur (3 cases); and two neighbouring localities were infected on the river Sambre in the province of Hainaut with one case each (one cat and one domesticated rabbit).

In the field trial area of oral fox vaccination in autumn 1986 (see as well BULLETIN 3/86, 3.3 and the map in the Annex), there were not more than 5 foxes recorded rabid during the first two quarters 1987, though 50 were recorded rabid in the adjacent area which is double the size.

A second oral vaccination campaign was carried out on 15 June 1987 in the same trial area.

2.3 Bulgaria (BUL)

The country remained rabies-free.

2.4 Rabies in Czechoslovakia (CZE)
by M. Capka and J. Neumann

During the second quarter of the year, 504 cases of rabies were registered (458 in the Czech Socialist Republic and 46 in the Slovak Socialist Republic). Compared to the first quarter there was an increase by 39 cases, i.e. 8.4%. In comparison with the same period of 1986, the total increased by 181, i.e. 56%.

Rabies was diagnosed most frequently in foxes - 458 cases; of other wildlife species there were 9 cases in martens, 2 in badgers, 2 in wild boars, 1 in a pole cat, 1 in a roe deer and 1 in a brown rat. Of the domestic animals there were 17 cases in cats and 13 in dogs. As to the percentage, 94% were in animals and 6% in domestic animals (compared to the same period in 1986 - wild animals 91.3% and domestic animals 8.7%).

Most cases were diagnosed in the region of North Bohemia (142) followed by the regions of West Bohemia (85), South Bohemia (70), South Moravia (55), East Bohemia (48), Central Bohemia (31), North Moravia (27), Central Slovakia (20), East Slovakia (14) and West Slovakia (12).

The disease penetrated the district of Komárno, free from rabies since July 1984. Most cases were reported in the districts of Chomutov (35) and Louny (30).

At present rabies is recorded in 520 communities of 78 districts (Czech Socialist Republic - 477 communities of 59 districts and Slovak Socialist Republic - 43 communities of 19 districts).

No case of the disease was reported in man.

2.5 Rabies in Germany, Democratic Republic (DDR)

During the second quarter 1987, 374 cases of rabies were registered in the Democratic Republic of Germany, 87 cases less than during the first quarter. Of the 374 cases were 302 (80.7%) in wild animals - 267 foxes, 10 badger, 17 stone martens and 8 roe deer, and 72 (19.3%) domestic animals - 27 dogs, 24 cats, 9 cattle, 3 horses, 8 sheep and one goat.

The distribution of cases in the country resembles the one in the previous quarter.

2.6 Bat Rabies in Denmark (DEN)

A total of 11 bat-rabies cases was diagnosed during the second quarter 1987, all occurring in Jutland.

Apart from bat-rabies, Denmark has remained free of rabies in terrestrial animals.

2.7 Rabies in Germany, Federal Republic (DEU)

A total of 856 rabies cases were reported during the second quarter 1987. There was only as far back as the second quarter 1978 a reporting

with less cases (741) in the Federal Republic of Germany (starting 1977 with the European rabies surveillance).

Looking at the distribution of cases for this quarter, one can clearly see areas that are either rabies free or have scattered single cases where oral anti-rabies vaccination of foxes has been practiced: the south of the federal states (Bundesländer) Baden-Wuerttemberg and Bavaria, an area of three federal states with a common border - Hessen (Hesse), Rheinland-Pfalz (the Palatinate), Nordrhein-Westfalen (Northrhine-Westfalia), and the eastern part of Lower Saxony. However, some areas like the north and north-west of Lower Saxony and the north and north-west of Northrhine-Westfalia had no rabies or only few cases for a long time; these areas were not vaccinated).

In many other areas, still recording a high incidence of rabies, oral vaccination has been started. The largest Bundesland, Bavaria, for instance, has been drawing up a plan on oral fox vaccination for several years according to financial resources, with a strategy as to where and when to best continue. The overall direction is from south to north.

Schleswig-Holstein, the northern-most Bundesland, had no rabies or few cases in terrestrial animals for some time, here foxes of an area along the eastern border were prophylactically vaccinated. During the prevailing quarter, two bat-rabies cases were registered in this Bundesland.

The involvement of animal species in the epizootic shows the usual effect of indoor-keeping of domestic pasture animals. During this quarter, there were 74 domestic animals affected (8.6% of total), compared to 782 wild animals. The figures for the previous quarters on domestic animals read as follows: 1/87 = 10.8%, 4/86 = 20%, 3/86 = 14.4%.

2.8 Finland (FIN)

The country remained rabies-free.

2.9 Rabies in France (FRA)
by J. Blancou

478 rabies cases were reported during the second quarter 1987, 182 cases less than during the previous quarter. 382 cases were registered in the fox (79.9% of total), 26 in other wild animals and 70 in domestic animals (6 dogs, 19 cats, 12 cattle, 31 small ruminants and 2 horses). The dèpartements (departments) with the greatest number of cases are: Doubs (66 cases), Meurthe et Moselle (48 cases) and Haute Saône (41 cases).

The rabies situation at the front remained, on the whole, stable.

2.10 Rabies in Greece (GRE)

During the second quarter of 1987, no case of rabies was reported in Greece.

2.11 Imported Human Rabies Case in the United Kingdom (GBR)
by S.D. Gardner

An eight year old boy was bitten by a dog while on holiday in India two months previously. He developed clinical rabies in March 1987 and died on 4th April. Rabies was confirmed by serological tests.

The patient did not receive anti-rabies treatment following the bite.

2.12 Rabies in Hungary (HUN)
by L. Koltai

During the second quarter 1987, 276 rabies cases were registered, compared to the second quarter 1986 (172 cases) a substantial increase (by 60.5%). As there was already an increase for the first quarter 1987, when compared to the same period in 1986 (by 54.3%), it is to be expected that the tendency prevails during the second half of this year.

Next to the fox (81.5% of total) cattle have taken the second place in the distribution of animals in the rabies epizootic (17 cattle = 6.2% of total). This is to be seen in connection with a more often practiced extensive keeping of cattle and, thus a greater possibility to be exposed to rabid foxes. On the other hand, preventive anti-rabies vaccinaiton of cattle is rarely applied.

Rabies cases were on the increase in areas where few cases occurred last year, indicating the cyclic character of the epizootic. Here are two examples:

Komitat (province)	2/86	2/87
Pest	7	37
Bács-Kiskun	3	28

2.13 Iceland (ISL)

The country remained rabies-free.

2.14 Ireland (IRE)

The country remained rabies-free.

2.15 Rabies in Italy (ITA)
by S. Prosperi

During the second quarter 1987, no case of rabies was reported in Italy. The last case reported occurred twelve months ago in the province of Trento in July 1986.

In November 1986 and in April 1987 field trials of oral fox vaccination have been carried out with strain SAD-B19, prepared in Tübingen, in the province of Trento. 9935 baits were distributed in 73 municipalities comprising an area of 764 km^2 at an altitude of below 1200 metres sea level.

Furthermore, this trial has been carried out in 3 municpalities of Bolzano province.

2.16 Rabies in Luxembourg (LUX)
by R. Frisch

During the second quarter 1987, only 4 cases were registered in foxes, all of them in April. Compared to the second quarter 1986 there were 9 cases less and compared to the first quarter 1987 7 cases less.

There may be two reasons for this favourable development of the rabies epizootic: the two field trials on oral vaccination of foxes, covering the entire country of the Grand Duchy of Luxembourg (19./20. September 1986 and 9./10. May 1987) and a reduction of cases generally experienced after a period with a high frequency of cases (there were 114 cases during the last two quarters 1986).

2.17 Bat Rabies in the Netherlands (NET)
by J.H.M. Nieuwenhuijs

The first case of bat-rabies in the Netherlands occurred on 30 May 1987 (type DUVENHAGE) and was found in the province of Friesland in the north of the country.

Since July 1986 a rabies surveillance programme had been started on bats. Till May 1987 23 bats sent to the Central Veterinary Institute, Lelystad, had been found negative. At the end of June 1987 about 100 bats have been examined and 7 bats were found to be positive.

Five of the positive bats originated from the province of Friesland, one was found in the surroundings of the town Den Haag in the province of Zuid-Holland and one was found in the neighbourhood of the town Hilversum in the middle of the Netherlands in the province of Noord-Holland.

Apart from bat-rabies, the Netherlands remained rabies-free in terrestrial animals.

2.18 Norway (NOR)

The country remained rabies-free.

2.19 Rabies in Poland (POL)
by J. Kolacz

A total of 345 cases of rabies were reported during the second quarter 1987. That is an increase of 58% compared to the same period in

1986 (145 cases) and also an increase of 8.2% to the first quarter of this year (317).

87.5% of the total cases were registered in wild animals, mainly in the fox (71% of total). Others were raccoon dogs (4.9%), martens (4.6%), dogs (4.6%), farm animals (4%), cats (3.7%), badgers (2.9%), roe deer (2.9%).

Fifteen provinces (there are a total of 49) were rabies-free during the said period.

2.20 Rabies in Portugal (POR)

The country remained rabies-free.

2.21 Rabies in Romania (ROM)

There were 10 rabies cases reported in Romania during the second quarter 1987, 8 less than during the previous quarter. 5 cases occurred in foxes, 2 in sheep and 1 each in a dog, a cat and a bovine.

The cases were scattered throughout the country. Seven provinces were affected. 8 cases were reported from the northern half of the country, 2 from the south-east.

2.22 Rabies in Spain (SPA)

The country remained rabies-free.

2.23 Sweden (SWE)

The country remained rabies-free.

2.24 Rabies in Switzerland (SWI)
by A.I. Wandeler

During the second quarter of 1987, the Swiss Rabies Diagnostic Center received 441 animals for examination. 26 (6%) of these were positive for rabies compared to 24 (3% of 919) in the previous quarter and 23 (4% of 565) in the second quarter of 1986. 23 were observed in foxes, 1 in a badger 1 in a cat and 1 in a goat.

One positive fox was registered in the canton Valais close to lake Geneva and one in canton Geneva. All other rabid animals originated from the western Jura mountains. Part of this area has been treated by oral fox immunization for the first time this spring.

One person was bitten by the rabid cat, no other bite exposures were recorded in the second quarter of 1987. The number of people treated for non-bite exposures is not known.

2.25 Rabies in Turkey (TUR)

During the second quarter 1987, 242 rabies cases were registered in Turkey. As in the previous quarter the provinces Izmir and Samsun were most affected by the disease with 34 and 22 cases respectively. The two provinces were followed by 6 provinces with 10 to 14 cases: Adana (10), Istanbul (12), Kütahya (14), Manisa (10), Ordu (12) and Sinop (11). All other provinces reported less than 10 cases.

Of the 242 cases were 232 (95.9%) in domestic animals (169 dogs, 17 cats, 36 cattle, 1 horse, 6 sheep and 3 other domesticated herbivores) and 10 in house mice.

In comparison with the previous quarter (354 cases) there was a decrease by 112 cases (31.6%).

2.26 Rabies in Yugoslavia (YUG)

113 cases of rabies were reported in Yugoslavia during the second quarter 1987. Of these were 108 in foxes and 2 other wild animals and 3 in domestic animals (1 dog and 2 cats).

Most of the cases (53) were reported in Slovenia. There was a concentration of cases in three districts: Logatec, Kamnik and Domzale. Cases in other parts of the country were scattered. Again, like in the previous quarter, there were 2 cases in Serbia in foxes, near the eastern state border to Romania and Bulgaria, where urban or dog-mediated rabies would have been expected.

3. MISCELLANEOUS

3.1 Information on two conferences

This fall there will be two international conferences on rabies, one in Italy and one in Belgium. Both meetings will deal with the oral vaccination against rabies: with the two attenuated vaccines produced in Switzerland and the Federal Republic of Germany, already widely used in field trials in Europe; and with the more recently developed vaccinia rabies recombinant virus vaccine produced in France, reporting first experience gained in laboratory trials (see as well under 3.3 in this BULLETIN).

1.)
Title: Wildlife rabies: results and prospects of oral vaccination in Europe.
Time: 19. - 21. October 1987
Place: Sirmione-Lago di Garda, Palazzo dei Congressi (Provincia di Brescia)
Organizers:
Istituto Pasteur, Fond. Cenci-Bolognetti (Università "La Sapienza" Roma)
and
Fond.Ente Eniziative Zooprofilattiche
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Via Bianchi 1 - 21100 Brescia -
Tel. 030/42161
c/o Istituto Zooprofilattico Brescia)

2.)
Title: Eradication of rabies in foxes.
Time: 18. - 19. November 1987
Place: Brussels
Organizers:
Department of Virology-Immunology,
Faculty of Veterinary Medicine of the University of Liège
and the Fo.Re.Ra., Brussels,
The Institut Pasteur of Brabant, Brussels
Commission of the European Community, Brussels
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3.2 Fatal rabies encephalitis despite appropriate post-exposure prophylaxis

In a publication with the above title a case report is given which may indicate for the first time a fatal rabies encephalitis developing after appropriate post-exposure prophylaxis with human diploid-cell vaccine and immune globulin.

The case report (slightly shortended):

A 19-year-old man had been bitten on the finger by a yellow mongoose (Cynictis penicillata). The animal was immediately captured and killed, and rabies-virus antigen was demonstrated in its brain tissue.

Within 13 hours of being bitten the patient had received adequate wound toilet and one dose of human diploid-cell vaccine injected intramuscularly (i.m.) into the gluteal region. In addition he received 20 IU of rabies immune globuline per kilogram of body weight, of which 1 ml was infiltrated into the wound site and the remainder injected i.m. into the deltoid muscle. The vaccine was again administered by i.m. injection into the gluteal region on days 3, 7, and 14. On day 21, paresthesia of the bitten arm developed, and on day 27, agitation, dysphagia, hydrophobia, and pyrexia were observed. The serum rabies-antibody titer was at that time 1:8. Cerebrospinal fluid, conjunctival impressions and saliva were negative for rabies. On day 28, the patient received the final dose of vaccine. His condition gradually deteriorated. On day 30, 600 ml of pooled human hyperimmune rabies serum was administered, without improvement. Despite intensive supportive care the patient died on day 37.

The antibody titer had risen to 1:256 on the day before death. At autopsy, Negri bodies were demonstrated in the brain and rabies virus was isolated. Neutralisation tests confirmed that the isolate was rabies virus.

Discussion:

The authors offer possible explanations to the unfavourable course in this patient despite prompt institution of recommended post-exposure prophylaxis.

Amonst others, the route of administration may be of importance, as injections into the gluteal region are frequently into fat. - It should be considered whether the recommended dose for the rabies immune globuline (20 IU per kilogramm) could be insufficient.

The patient had very low antibody titers and a defective vaccine could be assumed. However, another patient vaccinated at the same time with the same lot of vaccine had a titer of 1:512 by day 23. Two further vaccine tests showed adequate immunogenicity.

The patient's immune response must come into question. A serologic test for human immunodeficiency virus was negative and no factors were present to place the patient at high risk for the aquired immunodeficiency syndrome.

Minor antigenic differences between the infecting strain and the vaccinating strain seem unlikely, since titers to the vaccinating strain were inadequate and the usual wild type of rabies was found on autopsy.

The authors conclude: the fatal rabies encephalitis developed in the patient receiving prompt and adequate post-exposure prophylaxis. The possibility of an underlying immune-deficiency state is moot. However, this case should lead to reevaluation of the recommended dose and the route of administration of both human diploid-cell vaccine and rabies immune globulin.

(Taken from: "Fatal rabies encephalitis despite appropriate post-exposure prophylaxis", by M. Shill, R.D. Baynes and S.D. Miller, in The New England Journal of Medicine, 316, No. 20, pp 1257-1258, May 14, 1987).

3.3 Immune response to a vaccinia virus recombinant expressing the rabies virus glycoprotein

Vaccinia virus has recently been used as a "carrier" for surface components of a wide range of viruses. The genetic information coding for the surface glycoprotein of another virus can be incorporated into the vaccinia virus genome at the site of the thymidine kinase gene. A vaccinia recombinant expressing the surface antigen for rabies had shown to induce virus neutralizing antibodies against the incorporated antigen. Initial tests with mice and rabbits using both live and inactivated vaccine, reveiled that the vaccinated animals resisted challenge by a pathogenic strain of rabies virus.

The following are abstracts of papers studying three animals, the red fox (Vulpes vulpes), the raccoon (Procyon lotor) and the striped skunk (Mephitis mephitis) with the above mentioned vaccinia virus recombinant expressing the rabies glycoprotein. The red fox is the main host of the epizootic in Central Europe. The raccoon, once significant as a rabies host within southeastern North America, was more recently responsible for an intensive epizootic in the mid-Atlantic region. The skunk ranks first in United States in importance as rabies vector and second in Canada.

The fox

The authors summarize: the administration of vaccinia virus or the recombinant harbouring the rabies surface antigen gene is innocuous to foxes; the recombinant virus can elicit the production of titres of rabies-neutralizing antibodies equal or superior to those obtained with conventional vaccine, and 10^8 plaque-forming units of the recombinant virus administered subcutaneously, introdermally or orally confers complete protection to severe challenge infection with street rabies virus.

The results of the study of 33 foxes are shown in the table (see page 12).

Interesting is an observation on transmissibility. Four unvaccinated test animals were kept together (animals of the opposite sex) with four receiving the recombinant virus by direct application into the mouth. Of the four control animals, three had no rabies neutralizing antibodies and succumbed to challenge (not shown in the table), one had significant levels of rabies-neutralizing antibodies and resisted severe challenge infection. Subsequent investigation into possible mechanisms of transmission reveiled that both the relevant vaccinated male and control female consistently displayed aggressive behaviour, and reciprocal biting was observed within a few minutes of oral vaccination.

Table 1 Rabies-neutralizing antibodies and resistance to challenge

Vaccine and route	Dose (PFU)	Animals	Rabies neutralizing antibody titre*	Mean titre	Resistance to challenge†	Fraction surviving
No vaccine		#	0	NA	−	0/6
Conventional vaccine subcutaneous‡		440	1.21	1.49	+	2/2
		441	1.77		+	
VVTGgRAB, intradermal§	10^8	446	3.03	2.82	+	2/2
		449	2.61		+	
VVTGgRAB, subcutaneous§	10^8	439	3.03	NA	+	2/2
		442	0		+	
VVTGgRAB, oral scarified‖	10^8	437	1.91	2.4	+	4/4
		438	2.33		+	
		447	2.61		+	
		452	2.75		+	
VVTGgRAB, oral‖	10^4	408	1.35	NA	+	1/4
		427	0		−	
		428	0		−	
		429	0		−	
	10^6	416	0.8	0.4	+	2/4
		425	0.8		+	
		426	0		−	
		430	0		−	
	10^8	414	2.33	2.57	+	4/4
		431	2.61		+	
		433	2.61		+	
		451	2.75		+	
VVTGgRAB in bait	10^8	411	1.07	1.8	−¶	4/5
		412	1.63		+	
		420	2.61		+	
		423	2.19		+	
		424	1.49		+¶	

Rabies neutralizing antibody titres were determined in accordance with recommendations laid down by the World Health Organisation[27]. Titres are expressed as the $\log_{10}$ of the final neutralizing dilution (FND). For conversion to international units (IU) IU = 59/[antilog (3.5 − log FND)]. Foxes were monitored for 50 days following challenge and the presence of rabies virus in the brain of the animals succumbing to challenge was verified by immunoflorescence (not shown). Challenge virus GS6 (street virus comprising salivary glands from rabid foxes dispersed in phosphate-buffered saline (PBS) (20% w/v) as described previously[28]) was injected in a volume of 1 ml containing 5,700 mouse LD_{50} units (intracerebral), ~17,000 fox LD_{50} units (intramuscular). Vaccinia Copenhagen strain and VVgRAB were grown on tissue culture cells as described elsewhere[29]. Supernatants were recovered, the cell pellets homogenized, recentrifuged and pooled with the supernatant. Virus was purified by sedimentation through a sucrose cushion (36% w/v) for 2 h, 14,000 r.p.m., Beckman SW28 rotor. Pellets were suspended into PBS, sonicated briefly and banded by centrifugation on a sucrose gradient (20–40% w/v; 12,000 r.p.m., 45 min, SW28) before diluting (PBS) to the required concentration. Virus was titred on BHK21 cells. NA, not applicable.

* Only the 28-day titre is given.

† +, Resisted challenge, −, succumbed to rabies. All animals not resisting died between 15 and 25 days after challenge.

‡ 'Rabisin ND' vaccine, lot 5532; neutralizing antibody titres obtained with live attenuated virus are similar (not shown).

§ Virus was inoculated intradermally as described (see text); subcutaneous injections were performed in a volume of 1 ml.

‖ Virus was administered by direct application into the mouth by syringe (vol. 1 ml).

¶ Two animals were observed to have ingested only a part of the vaccine.

Four animals were vaccinated with vaccinia virus Copenhagen strain, two animals received no treatment.

Another observation was that one animal (442 in the table) had undetectable levels of rabies-neutralizing antibodies also resisted challenge, attesting to the relevance of cell-mediated immunity in defence against rabies.

(Taken from: "Oral vaccination of the fox against rabies using a live recombinant vaccinia virus", by J. Blancou, M.P. Kieny, R. Lathe, J.P. Lecocq, P.P. Pastoret, J.P. Soulebot and P. Desmettre. Nature, 322, 373-375 (1986)).

The raccoon

The serological response to the vaccinia virus expressing the rabies virus glycoprotein is similarly presented in a study with raccoons. The table gives a vaccination schedule by a variety of routes and subsequently a challenge to rabies virus.

Table 1: Immunization of raccoons with a vaccinia-rabies glycoprotein recombinant (V-RG vaccine)

Vaccine Route	Dose (pfu/ml)	Number of Animals	Rabies Virus Antibody Titer*	Proporation Surviving Rabies Challenge**
ID	10^7	3	9.0-18.0	3/3
IM	$10^{7.8}$	3	6.0-18.0	$2/3^{\S}$
Oral	10^8	6	0.7-54.0	6/6
Sponge	10^8	8	0.6-54.0	8/8
Baits		10	0.6-18.0	$8/10^{9}$
Oral (inactivated)		6	<0.3	0/6
Controls		17	<0.3	1/17

Legend for Table 1:

* Rabies virus-neutralizing antibody titers listed as the range of values in IU/ml, as determined 16-28 days after V-RG immunization.

** Raccoons were inoculated IM with $10^{5.5}$ $MICLD_{50}$ of rabies street virus strain MD 5951 at 28, $^{\S}63$, or $^{9}205$ days following primary immunization.

The authors state that regardless of the method of vaccine administration, no abnormal clinical behaviour, nor gross or histopathological lesions referable to the vaccine was observed at any time in vaccinated animals. No survivorship differences were apparent post-rabies challenge when routes of infection were compared. Total protection was observed in those animals ingesting the vaccinia virus recombinant in bait and challenged one months later, vs. 80% protection in those animals challenged six months post-bait reception. When the proportion of surviving racoons receiving live vaccinia virus recombinant by all routs is combined, greater than 90% protection was achieved.

(Taken from: "Preliminary studies on the immunization and field baiting trials of raccoons against rabies", by C.E. Rupprecht, D.H. Johnston, A. Hamir, B. Dietzschold and H. Koprowski, paper given at the WHO Workshop on Oral Immunization of Wildlife against Rabies in Europe (INTORAL) with the participation of OIE, Tübingen, 9-10 October 1986).

The skunk

The abstract of the paper of the study on skunks reads as follows:

Striped skunks (Mephitis mephitis) were vaccinated with a vaccinia virus recombinant expressing the rabies virus glycoprotein. Virus neutralizing antibodies to rabies virus were present at 14 days post-vaccination by the following routes: scarification (6/6), intramuscular (4/4) and intestinal (5/8). Six out of seven skunks that ate vaccine filled baits had virus neutralizing antibodies at 28 days. When challenged intramuscularly with street virus, the survival rates were 5/7 for the bait-fed group, 4/8 for the intestinal group, 3/4 for the intramuscular group, 5/6 for the animals that were scarified, and 0/8 for the animals that were scarified, and 0/8 for controls. This is the first report of a high rate of immunization of skunks with a rabies vaccine administered orally.

The table gives the results more detailed.

TABLE I. Vaccination of Skunks with VVRG

Vaccination Route and Skunk No.	Virus Neutralizing Antibody Titers (I.U.)					Response to Challenge
	Day 0	Day 14	Day 28	Day 60	Day 90	
Oral						
1	0	0.41	2.52	2.35	0.85	S
2	0	0	0.17	0.22	0	S
3	0	0	1.43	0.35	0.17	R (19)
4	0	0	2.43	0.65	0.24	S
5	0	0	0	0	0	D (13)
6	0	0	4.61	4.59	1.41	S
7	0	0	0.78	1.20	0.39	S
8*	0	0	0	0	0	R (43)
Intestinal						
1	0	0	0	0	0	R (26)
2	0	0	0	0	0	R (25)
3	0	3.48	1.35	3.78	0.96	S
4	0	2.13	2.07	1.04	0.28	S
5	0	0	0	0	0	R (25)
6	0	14.4	10.6	3.76	1.70	S
7	0	1.59	0.87	0.80	0.52	S
8	0	2.74	0.85	0.65	0.52	R (27)
Intramuscular						
1	0	22.3	12.5	1.20	0.37	R (19)
2	0	21.4	14.4	8.37	3.78	S
3	0	37.4	20.4	2.61	2.87	S
4	0	19.6	15.2	13.8	7.54	S
Scarification						
1	0	156	34.3	4.57	2.61	S
2	0	44.5	6.78	1.93	0.35	R (70)
3	0	159	15.7	2.57	1.39	S
4	0	68.5	5.35	2.30	0.70	S
5	0	101	11.1	2.37	0.70	S
6	0	48.4	11.1	2.65	0.70	S

R = Succumbed to rabies on challenge; FA positive (Day euthanized/died)
S = Survived 90 day postchallenge observation period
D = Death not due to rabies; FA negative (Day of death)
*Did not eat bait
Controls died or were euthanized between days 22-30 postchallenge

Vaccinated and control animals were challenged intramuscularly at three months postvaccination. One skunk in the bait group died of a

bacterial infection. Two of the skunks developed rabies, including the one which did not consume the bait. Rabies occurred in four out of eight animals in the intestinal group, and one skunk in each of the intramuscular and scarified groups. In each group, one skunk which had developed rabies virus specific antibodies became rabid. All animals in the control group developed rabies between the third and fourth week after challenge. The vaccinated animals that were not protected became rabid over the same time period except for the rabid scarified skunk that began to display clinical signs at nine weeks postchallenge.

The authors conclude: the results presented in the communication indicate that, subject to successful safety testing, the vaccinia virus recombinant could be used as an effective oral vaccine against rabies in skunks in field trials.

(Taken from: "Immune response in skunks to a vaccinia virus recombinant expressing the rabies virus glycoprotein", by N.D. Tolson, K.M. Charlton, R.B. Stewart, J.B. Campbell and T.J. Wiktor in Can.J.Vet.Res. 51, 363-366 (1987)).

TABLE 1

EUR EUROPE 2/87 RABIES CASES 1. 4.87 - 30. 6.87

LOCATION	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
CODE NAME	DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
AUT AUSTRIA	2	1	-	1	2	-	6	465	57	20	21	1	564		570
BEL BELGIUM	3	8	5	-	5	1	22	21	1	1	1	-	24		46
BUL BULGARIA *							0						0		0
CZE CZECHOSLOVAKIA	13	17	-	-	-	-	30	458	2	10	1	3	474		504
DDR GERMAN DEM. REPUBLIC	27	24	9	3	9	-	72	267	10	17	8	-	302		374
DEN DENMARK							0	-	-	-	-	11	11		11
DEU FED.REP. OF GERMANY	8	18	31	4	12	1	74	683	26	39	30	4	782		856
FIN FINLAND *							0						0		0
FRA FRANCE	6	19	12	2	31	-	70	382	8	12	5	1	408		478
GBR UNITED KINGDOM							0						0	1	1
GRE GREECE *							0						0		0
HUN HUNGARY	10	13	17	-	2	1	43	225	1	1	6	-	233		276
IRE IRELAND *							0						0		0
ISL ICELAND *							0						0		0
ITA ITALY *							0						0		0
LUX LUXEMBOURG							0	4	-	-	-	-	4		4
NET NETHERLANDS							0	-	-	-	-	7	7		7
NOR NORWAY *							0						0		0
POL POLAND	16	13	10	-	4	-	43	245	10	18	11	18	302		345
POR PORTUGAL *							0						0		0
ROM ROMANIA	1	1	1	-	2	-	5	5	-	-	-	-	5		10
SPA SPAIN *							0						0		0
SWE SWEDEN *							0						0		0
SWI SWITZERLAND + LIECHT	-	1	-	-	1	-	2	23	1	-	-	-	24		26
TUR TURKEY	169	17	36	1	6	3	232	-	-	-	-	10	10		242
YUG YUGOSLAVIA	1	2	-	-	-	-	3	108	-	-	-	2	110		113
TOTAL	256	134	121	11	74	6	602	2886	116	118	83	57	3260	1	3863
PER CENT	6.6	3.5	3.1	0.3	1.9	0.2	15.6	74.7	3.0	3.1	2.1	1.5	84.4	0.0	100.0

* NO CASES.

TABLE 2

EUR EUROPE 1-2/87 RABIES CASES 1. 1.87 - 30. 6.87

LOCATION CODE	NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
AUT	AUSTRIA	2	2	4	1	3	–	12	890	64	27	37	1	1019		1031
BEL	BELGIUM	3	12	14	1	8	1	39	54	3	2	1	–	60		99
BUL	BULGARIA *							0						0		0
CZE	CZECHOSLOVAKIA	17	33	–	–	2	–	52	889	2	13	10	3	917		969
DDR	GERMAN DEM. REPUBLIC	58	49	15	4	24	–	150	605	13	35	29	3	685		835
DEN	DENMARK							0	–	–	–	–	12	12		12
DEU	FED.REP. OF GERMANY	21	53	71	13	44	1	203	1622	48	65	109	7	1851		2054
FIN	FINLAND *							0						0		0
FRA	FRANCE	21	42	47	4	53	–	167	925	9	20	13	4	971		1138
GBR	UNITED KINGDOM							0						0	1	1
GRE	GREECE *							0						0		0
HUN	HUNGARY	31	35	26	–	3	5	100	730	1	3	10	–	744		844
IRE	IRELAND *							0						0		0
ISL	ICELAND *							0						0		0
ITA	ITALY *							0						0		0
LUX	LUXEMBOURG	–	1	3	–	1	–	5	10	–	–	–	–	10		15
NET	NETHERLANDS							0	–	–	–	–	7	7		7
NOR	NORWAY *							0						0		0
POL	POLAND	26	29	13	1	4	6	79	479	10	26	28	40	583		662
POR	PORTUGAL *							0						0		0
ROM	ROMANIA	3	2	1	1	5	–	12	16	–	–	–	–	16		28
SPA	SPAIN *							0						0		0
SWE	SWEDEN *							0						0		0
SWI	SWITZERLAND + LIECHT	1	1	1	1	1	–	5	43	1	1	–	–	45		50
TUR	TURKEY	437	57	63	4	8	7	576	1	–	–	–	19	20		596
YUG	YUGOSLAVIA	8	7	–	–	1	–	16	231	–	–	1	2	234		250
TOTAL		628	323	258	30	157	20	1416	6495	151	192	238	98	7174	1	8591
PER CENT		7.3	3.8	3.0	0.3	1.8	0.2	16.5	75.6	1.8	2.2	2.8	1.1	83.5	0.0	100.0

* NO CASES.

TABLE 3

EUR EUROPE 2/87

RABIES CASES
'OTHER ANIMAL SPECIES'

1. 4.87 - 30. 6.87

LOCATION CODE NAME	OTHER DOMESTIC ANIMALS				OTHER WILD ANIMALS								TOTAL
	DONKEY	PIG	OTH.DOM HERBIVO	DOMEST RABBIT	RACOON DOG	WILD CAT	WILD BOAR	HEDGEHOG	INSECT. BAT	BLACK RAT	HOUSE MOUSE	OTHER	
AUT AUSTRIA	-	-	-	-	-	-	1	-	-	-	-	-	1
BEL BELGIUM	-	-	-	1	-	-	-	-	-	-	-	-	1
CZE CZECHOSLOVAKIA	-	-	-	-	-	-	2	-	-	1	-	-	3
DEN DENMARK	-	-	-	-	-	-	-	-	11	-	-	-	11
DEU FED.REP. OF GERMANY	1	-	-	-	-	-	1	1	2	-	-	-	5
FRA FRANCE	-	-	-	-	-	1	-	-	-	-	-	-	1
HUN HUNGARY	-	1	-	-	-	-	-	-	-	-	-	-	1
NET NETHERLANDS	-	-	-	-	-	-	-	-	7	-	-	-	7
POL POLAND	-	-	-	-	17	-	-	-	-	1	-	-	18
TUR TURKEY	-	-	3	-	-	-	-	-	-	-	10	-	13
YUG YUGOSLAVIA	-	-	-	-	-	-	-	-	-	-	-	2	2
TOTAL	1	1	3	1	17	1	4	1	20	2	10	2	63
PER CENT	1.6	1.6	4.8	1.6	27.0	1.6	6.3	1.6	31.7	3.2	15.9	3.2	100.0

AUT AUSTRIA — RABIES CASES — 1. 4.87 - 30. 6.87

LOCATION CODE	NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
103	EISENSTADT-LAND							0	1	-	-	-	-	1		1
104	GUESSING							0	15	-	-	-	-	15		15
105	JENNERSDORF							0	12	2	-	-	-	14		14
106	MATTERSBURG							0	2	-	-	-	-	2		2
107	NEUSIEDL AM SEE							0	1	-	-	-	-	1		1
108	OBERPULLENDORF							0	2	-	-	-	-	2		2
109	OBERWART							0	10	1	-	-	-	11		11
201	KLAGENFURT-STADT							0	1	-	-	-	-	1		1
204	KLAGENFURT-LAND							0	1	-	-	1	-	2		2
205	SANKT VEIT AN DER GL	-	-	-	-	1	-	1	34	4	1	3	-	42		43
206	SPITTAL AN DER DRAU	1	-	-	-	-	-	1	36	1	1	-	-	38		39
207	VILLACH-LAND							0	14	2	-	-	-	16		16
209	WOLFSBERG	-	-	-	-	1	-	1	3	-	-	-	-	3		4
210	FELDKIRCHEN							0	16	-	1	3	-	20		20
307	BRUCK AN DER LEITHA							0	1	-	-	-	-	1		1
308	GAENSERNDORF							0	-	-	-	-	1	1		1
310	HOLLABRUNN							0	6	-	-	-	-	6		6
311	HORN							0	5	-	-	-	-	5		5
313	KREMS AN DER DONAU-L							0	2	-	1	-	-	3		3
316	MISTELBACH							0	2	-	1	-	-	3		3
322	WAIDHOFEN AN DER THA							0	3	1	-	-	-	4		4
325	ZWETTL							0	1	-	-	-	-	1		1
406	FREISTADT							0	3	1	1	-	-	5		5
407	GMUNDEN							0	11	-	-	-	-	11		11
413	ROHRBACH							0	-	1	-	-	-	1		1
502	HALLEIN							0	6	-	-	-	-	6		6
503	SALZBURG-LAND							0	5	3	-	3	-	11		11
504	SANKT JOHANN IM PONG							0	6	-	-	-	-	6		6
505	TAMSWEG							0	1	-	-	-	-	1		1
506	ZELL AM SEE							0	33	4	-	2	-	39		39
601	GRAZ-STADT							0	1	-	-	-	-	1		1
603	DEUTSCHLANDSBERG							0	3	-	1	-	-	4		4
606	GRAZ-LAND	1	-	-	-	-	-	1	31	3	1	1	-	36		37
608	JUDENBURG							0	14	-	1	1	-	16		16
609	KNITTELFELD							0	11	1	1	3	-	16		16
610	LEIBNITZ							0	1	-	-	-	-	1		1
611	LEOBEN	-	-	-	1	-	-	1	57	18	4	1	-	80		81
612	LIEZEN							0	63	7	2	-	-	72		72
614	MURAU							0	23	-	-	1	-	24		24
615	RADKERSBURG							0	-	-	-	1	-	1		1
616	VOITSBERG							0	17	3	4	1	-	25		25
617	WEIZ							0	-	1	-	-	-	1		1
704	KITZBUEHEL							0	4	-	-	-	-	4		4
708	REUTTE	-	1	-	-	-	-	1	7	4	-	-	-	11		12
TOTAL		2	1	0	1	2	0	6	465	57	20	21	1	564	0	570
PER CENT		0.4	0.2	0.0	0.2	0.4	0.0	1.1	81.6	10.0	3.5	3.7	0.2	98.9	0.0	100.0

RABIES CASES 1. 4.87 - 30. 6.87

LOCATION CODE	NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
BEL	BELGIUM															
HH	HAINHAUT	-	1	-	-	-	1	2						0		2
LG	LIEGE	1	2	1	-	-	-	4	10	1	1	-	-	12		16
LX	LUXEMBOURG	2	5	4	-	4	-	15	9	-	-	1	-	10		25
NA	NAMUR	-	-	-	-	1	-	1	2	-	-	-	-	2		3
TOTAL		3	8	5	0	5	1	22	21	1	1	1	0	24	0	46
PER CENT		6.5	17.4	10.9	0.0	10.9	2.2	47.8	45.7	2.2	2.2	2.2	0.0	52.2	0.0	100.0
DEN	DENMARK															
050	SONDERJYLLAND							0	-	-	-	-	1	1		1
055	RIBE							0	-	-	-	-	1	1		1
060	VEJLE							0	-	-	-	-	6	6		6
065	RINGKOBING							0	-	-	-	-	1	1		1
070	ARHUS							0	-	-	-	-	2	2		2
TOTAL		0	0	0	0	0	0	0	0	0	0	0	11	11	0	11
LUX	LUXEMBOURG															
00	LUXEMBOURG-VILLE							0	1	-	-	-	-	1		1
02	CAPELLEN							0	1	-	-	-	-	1		1
04	LUXEMBOURG-CAMPAGNE							0	2	-	-	-	-	2		2
TOTAL		0	0	0	0	0	0	0	4	0	0	0	0	4	0	4
NET	NETHERLANDS															
02	FRIESLAND							0	-	-	-	-	5	5		5
07	NOORD-HOLLAND							0	-	-	-	-	1	1		1
10	ZUID-HOLLAND							0	-	-	-	-	1	1		1
TOTAL		0	0	0	0	0	0	0	0	0	0	0	7	7	0	7

CZE CZECHOSLOVAKIA RABIES CASES 1. 4.87 - 30. 6.87

LOCATION CODE	NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
00	DISTRICT OF PRAGUE							0						0		0
01	CENTRAL BOHEMIA	-	1	-	-	-	-	1	29	-	1	-	-	30		31
02	SOUTH BOHEMIA	2	8	-	-	-	-	10	57	1	2	-	-	60		70
03	WEST BOHEMIA	-	1	-	-	-	-	1	84	-	-	-	-	84		85
04	NORTH BOHEMIA	3	1	-	-	-	-	4	132	-	3	1	2	138		142
05	EAST BOHEMIA	1	-	-	-	-	-	1	46	-	1	-	-	47		48
06	SOUTH MORAVIA	-	3	-	-	-	-	3	50	1	1	-	-	52		55
07	NORTH MORAVIA							0	25	-	2	-	-	27		27
0	CSR	6	14	-	-	-	-	20	423	2	10	1	2	438		458
10	DISTRICT OF BRATISLAV							0						0		0
11	WEST SLOVAKIA	2	1	-	-	-	-	3	9	-	-	-	-	9		12
12	CENTRAL SLOVAKIA	2	2	-	-	-	-	4	15	-	-	-	1	16		20
13	EAST SLOVAKIA	3	-	-	-	-	-	3	11	-	-	-	-	11		14
1	SSR	7	3	-	-	-	-	10	35	-	-	-	1	36		46
TOTAL		13	17	0	0	0	0	30	458	2	10	1	3	474	0	504
PER CENT		2.6	3.4	0.0	0.0	0.0	0.0	6.0	90.9	0.4	2.0	0.2	0.6	94.0	0.0	100.0

DDR GERMAN DEMOCRATIC REPUBLIC — RABIES CASES — 1. 4.87 - 30. 6.87

LOCATION CODE	NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
01	HAUPTSTADT BERLIN							0	-	-	-	1	-	1		1
02	COTTBUS	1	-	-	-	-	-	1	25	-	-	1	-	26		27
03	DRESDEN							0	10	-	-	-	-	10		10
04	ERFURT	2	3	1	-	1	-	7	51	-	3	1	-	55		62
05	FRANKFURT/ODER	1	3	-	-	-	-	4	20	-	1	1	-	22		26
06	GERA	1	1	-	-	1	-	3	13	4	-	2	-	19		22
07	HALLE	-	4	-	-	-	-	4	21	2	2	-	-	25		29
08	KARL-MARX-STADT	1	1	-	-	2	-	4	4	-	3	-	-	7		11
09	LEIPZIG							0	1	-	-	1	-	2		2
10	MAGDEBURG	1	3	1	1	2	-	8	16	-	1	-	-	17		25
11	NEUBRANDENBURG	3	2	1	-	1	-	7	22	1	2	-	-	25		32
12	POTSDAM	2	2	1	-	-	-	5	3	-	-	-	-	3		8
13	ROSTOCK	9	2	4	-	1	-	16	42	1	2	-	-	45		61
14	SCHWERIN	5	3	1	-	-	-	9	16	2	1	-	-	19		28
15	SUHL	1	-	-	2	1	-	4	23	-	2	1	-	26		30
TOTAL		27	24	9	3	9	0	72	267	10	17	8	0	302	0	374
PER CENT		7.2	6.4	2.4	0.8	2.4	0.0	19.3	71.4	2.7	4.5	2.1	0.0	80.7	0.0	100.0

DEU FEDERAL REPUBLIC OF GERMANY — R A B I E S C A S E S — 1. 4.87 - 30. 6.87

LOCATION CODE	NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
010	SCHLESWIG-HOLSTEIN							0	-	-	-	-	2	2		2
020	HAMBURG							0						0		0
031	BRAUNSCHWEIG	-	1	-	-	-	-	1	9	-	-	1	-	10		11
032	HANNOVER	1	2	1	-	1	-	5	10	-	1	-	1	12		17
033	LUENEBURG							0	1	-	-	-	-	1		1
034	WESER-EMS							0	1	1	-	-	-	2		2
040	BREMEN							0						0		0
051	DUESSELDORF							0						0		0
053	KOELN	-	2	4	-	3	1	10	14	-	-	-	-	14		24
055	MUENSTER							0						0		0
057	DETMOLD	-	-	7	-	1	-	8	50	3	2	3	-	58		66
059	ARNSBERG	1	-	2	-	3	-	6	18	-	1	5	-	24		30
061	DARMSTADT	-	4	2	2	-	-	8	52	2	4	-	-	58		66
062	KASSEL	-	-	1	-	-	-	1	32	2	2	2	-	38		39
071	KOBLENZ	2	2	3	-	3	-	10	50	1	1	4	-	56		66
072	TRIER	-	-	3	1	1	-	5	12	-	2	-	-	14		19
073	RHEINHESSEN-PFALZ	-	-	-	1	-	-	1	10	-	-	-	1	11		12
081	STUTTGART	-	-	1	-	-	-	1	40	2	3	2	-	47		48
082	KARLSRUHE	1	1	1	-	-	-	3	27	1	2	2	-	32		35
083	FREIBURG							0	54	5	2	1	-	62		62
084	TUEBINGEN							0	27	2	2	1	-	32		32
091	OBERBAYERN							0	21	1	2	-	-	24		24
092	NIEDERBAYERN	1	1	-	-	-	-	2	11	-	-	-	-	11		13
093	OBERPFALZ	1	2	1	-	-	-	4	71	1	6	3	-	81		85
094	OBERFRANKEN	-	2	2	-	-	-	4	69	-	4	3	-	76		80
095	MITTELFRANKEN							0	20	1	1	-	-	22		22
096	UNTERFRANKEN	1	1	3	-	-	-	5	67	4	3	3	-	77		82
097	SCHWABEN							0	9	-	-	-	-	9		9
100	SAARLAND							0	8	-	1	-	-	9		9
110	BERLIN (WEST)							0						0		0
TOTAL		8	18	31	4	12	1	74	683	26	39	30	4	782	0	856
PER CENT		0.9	2.1	3.6	0.5	1.4	0.1	8.6	79.8	3.0	4.6	3.5	0.5	91.4	0.0	100.0

FRA FRANCE — RABIES CASES — 1. 4.87 - 30. 6.87

LOCATION CODE	NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
02	AISNE							0	12	-	-	-	-	12		12
08	ARDENNES	-	-	-	-	4	-	4	9	-	-	-	-	9		13
10	AUBE							0	17	-	-	-	-	17		17
21	COTE D'OR	-	1	-	1	3	-	5	21	-	1	-	-	22		27
25	DOUBS	-	3	1	-	1	-	5	56	3	2	-	-	61		66
39	JURA	1	1	-	-	-	-	2	30	3	1	-	-	34		36
51	MARNE	-	1	-	-	-	-	1	11	-	1	-	-	12		13
52	MARNE (HAUTE)	1	2	-	-	-	-	3	10	-	-	-	-	10		13
54	MEURTHE ET MOSELLE	2	2	1	-	2	-	7	41	-	-	-	-	41		48
55	MEUSE	-	1	3	-	3	-	7	12	-	2	-	1	15		22
57	MOSELLE	-	1	1	-	-	-	2	13	-	-	-	-	13		15
58	NIEVRE	-	-	-	-	6	-	6	23	-	2	-	-	25		31
60	OISE	-	1	1	1	-	-	3	5	-	-	-	-	5		8
67	RHIN (BAS)	-	-	3	-	3	-	6	6	1	-	2	-	9		15
68	RHIN (HAUT)							0	13	-	-	2	-	15		15
70	SAONE (HAUTE)	1	1	2	-	1	-	5	34	1	1	-	-	36		41
74	SAVOIE (HAUTE)							0	2	-	-	-	-	2		2
77	SEINE ET MARNE							0	4	-	-	-	-	4		4
80	SOMME							0	2	-	-	-	-	2		2
88	VOSGES	-	1	-	-	7	-	8	22	-	1	1	-	24		32
89	YONNE	-	3	-	-	1	-	4	32	-	1	-	-	33		37
90	TERR.DE BELFORT							0	4	-	-	-	-	4		4
91	ESSONNE	-	1	-	-	-	-	1	2	-	-	-	-	2		3
94	VAL DE MARNE	1	-	-	-	-	-	1	1	-	-	-	-	1		2
TOTAL		6	19	12	2	31	0	70	382	8	12	5	1	408	0	478
PER CENT		1.3	4.0	2.5	0.4	6.5	0.0	14.6	79.9	1.7	2.5	1.0	0.2	85.4	0.0	100.0

RABIES CASES 1. 4.87 - 30. 6.87

LOCATION CODE	NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
GBR	**UNITED KINGDOM**															
BI	BIRMINGHAM 1)							0						0	1	1
ROM	**ROMANIA**															
01	ALBA	1	-	-	-	1	-	2						0		2
12	CALARASI							0	1	-	-	-	-	1		1
13	CLUJ	-	-	1	-	-	-	1	1	-	-	-	-	1		2
21	HARGHITA							0	1	-	-	-	-	1		1
23	IALOMITA	-	-	-	-	1	-	1						0		1
24	IASI							0	1	-	-	-	-	1		1
32	SALAJ	-	1	-	-	-	-	1	1	-	-	-	-	1		2
TOTAL		1	1	1	0	2	0	5	5	0	0	0	0	5	0	10
SWI	**SWITZERLAND AND LIECHTENSTEIN**															
06	BERN							0	1	-	-	-	-	1		1
08	GENEVE							0	1	-	-	-	-	1		1
12	NEUCHATEL							0	7	1	-	-	-	8		8
22	VAUD	-	1	-	-	1	-	2	8	-	-	-	-	8		10
23	VALAIS							0	1	-	-	-	-	1		1
26	JURA							0	5	-	-	-	-	5		5
TOTAL		0	1	0	0	1	0	2	23	1	0	0	0	24	0	26
PER CENT		0.0	3.8	0.0	0.0	3.8	0.0	7.7	88.5	3.8	0.0	0.0	0.0	92.3	0.0	100.0
YUG	**YUGOSLAVIA**															
10	SR BOSNA I HERCEGOVIN							0	4	-	-	-	2	6		6
30	SR HRVATSKA	-	1	-	-	-	-	1	25	-	-	-	-	25		26
50	SR SLOVENIJA	1	-	-	-	-	-	1	52	-	-	-	-	52		53
60	SR SRBIJA							0	7	-	-	-	-	7		7
61	SAP VOJVODINA	-	1	-	-	-	-	1	20	-	-	-	-	20		21
TOTAL		1	2	0	0	0	0	3	108	0	0	0	2	110	0	113
PER CENT		0.9	1.8	0.0	0.0	0.0	0.0	2.7	95.6	0.0	0.0	0.0	1.8	97.3	0.0	100.0

1) ACQUIRED IN INDIA.

HUN HUNGARY

RABIES CASES

1. 4.87 - 30. 6.87

LOCATION CODE	NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
01	BUDAPEST	1	-	-	-	-	-	1	9	-	-	-	-	9		10
02	BARANYA	1	2	-	-	-	-	3	11	-	-	-	-	11		14
03	BACS-KISKUN	-	-	6	-	1	-	7	21	-	-	-	-	21		28
04	BEKES	1	-	1	-	-	-	2	8	-	-	-	-	8		10
05	BORSOD-ABAUJ-ZEMPLEN	2	-	-	-	-	-	2	20	-	-	-	-	20		22
06	CSONGRAD							0	9	-	-	-	-	9		9
07	FEJER	2	1	1	-	1	-	5	17	-	-	-	-	17		22
08	GYOER-SOPRON							0	2	-	-	-	-	2		2
09	HAJDU-BIHAR							0	6	-	-	-	-	6		6
10	HEVES	3	1	3	-	-	-	7	5	-	-	-	-	5		12
11	KOMAROM	-	1	-	-	-	-	1	5	-	-	-	-	5		6
12	NOGRAD	-	1	-	-	-	-	1	8	-	-	1	-	9		10
13	PEST	-	2	-	-	-	1	3	30	-	1	3	-	34		37
14	SOMOGY	-	2	2	-	-	-	4	20	1	-	1	-	22		26
15	SZABOLCS-SZATMAR	-	1	4	-	-	-	5	10	-	-	-	-	10		15
16	SZOLNOK	-	1	-	-	-	-	1	6	-	-	-	-	6		7
17	TOLNA	-	1	-	-	-	-	1	12	-	-	1	-	13		14
18	VAS							0	7	-	-	-	-	7		7
19	VESZPREM							0	9	-	-	-	-	9		9
20	ZALA							0	10	-	-	-	-	10		10
TOTAL		10	13	17	0	2	1	43	225	1	1	6	0	233	0	276
PER CENT		3.6	4.7	6.2	0.0	0.7	0.4	15.6	81.5	0.4	0.4	2.2	0.0	84.4	0.0	100.0

POL POLAND

RABIES CASES

1. 4.87 - 30. 6.87

LOCATION CODE	NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
01	WARSZAWA	2	2	-	-	-	-	4	2	-	2	-	-	4		8
05	BIALYSTOK							0	1	-	-	-	-	1		1
07	BIELSKO-BIALA							0	1	-	-	-	-	1		1
09	BYDGOSZCZ	2	-	1	-	-	-	3	10	-	1	-	3	14		17
13	CIECHANOW	2	-	1	-	-	-	3	15	1	-	-	-	16		19
15	CZESTOCHOWA							0	1	-	-	-	-	1		1
17	ELBLAG	-	1	-	-	-	-	1						0		1
19	GDANSK	2	2	1	-	1	-	6	23	1	3	1	6	34		40
21	GORZOW	1	-	1	-	-	-	2	7	-	-	-	-	7		9
23	JELENIA GORA	1	-	-	-	-	-	1	19	-	-	-	-	19		20
25	KALISZ							0	3	-	2	-	-	5		5
27	KATOWICE	-	-	-	-	1	-	1	1	-	-	-	-	1		2
29	KIELCE							0	7	-	-	1	-	8		8
33	KOSZALIN	-	-	1	-	-	-	1	8	1	1	-	-	10		11
39	LEGNICA							0	6	-	-	-	-	6		6
41	LESZNO							0	10	-	1	-	-	11		11
45	LOMZA							0	2	-	-	-	-	2		2
49	NOWY SACZ							0	1	-	-	-	-	1		1
51	OLSZTYN	1	-	2	-	-	-	3	5	-	1	-	4	10		13
53	OPOLE							0	11	1	-	-	-	12		12
55	OSTROLEKA							0	-	1	-	-	-	1		1
57	PILA	1	1	-	-	-	-	2	13	1	-	-	-	14		16
61	PLOCK							0	-	1	-	-	-	1		1
63	POZNAN	-	1	-	-	-	-	1	26	1	2	3	-	32		33
65	PRZEMYSL	-	1	-	-	-	-	1	2	-	-	-	-	2		3
67	RADOM	-	2	-	-	-	-	2	3	-	-	-	-	3		5
77	SLUPSK	3	-	-	-	-	-	3	13	-	1	2	2	18		21
79	SUWALKI	-	-	1	-	-	-	1	5	1	1	-	2	9		10
81	SZCZECIN	1	1	-	-	1	-	3	6	-	1	4	-	11		14
83	TARNOBRZEG							0	3	-	1	-	-	4		4
87	TORUN	-	1	-	-	-	-	1	1	1	1	-	1	4		5
89	WALBRZYCH	-	1	1	-	1	-	3	15	-	-	-	-	15		18
93	WROCLAW							0	7	-	-	-	-	7		7
97	ZIELONA GORA	-	-	1	-	-	-	1	18	-	-	-	-	18		19
TOTAL		16	13	10	0	4	0	43	245	10	18	11	18	302	0	345
PER CENT		4.6	3.8	2.9	0.0	1.2	0.0	12.5	71.0	2.9	5.2	3.2	5.2	87.5	0.0	100.0

TUR TURKEY

RABIES CASES

1. 4.87 - 30. 6.87

LOCATION CODE	NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
001	ADANA	6	1	2	-	-	-	9	-	-	-	-	1	1		10
003	AFYON	6	-	2	-	-	-	8						0		8
005	AMASYA	1	-	-	-	-	-	1						0		1
007	ANTALYA	-	-	1	-	-	1	2						0		2
009	AYDIN	4	-	2	-	-	-	6						0		6
010	BALIKESIR	7	-	1	-	-	-	8						0		8
012	BINGOEL	1	-	-	-	-	-	1						0		1
014	BOLU	4	-	1	-	-	-	5						0		5
016	BURSA	9	-	-	-	-	-	9						0		9
017	CANAKKALE	1	-	-	-	-	-	1						0		1
019	CORUM	2	-	-	-	-	-	2						0		2
020	DENIZLI	1	-	-	-	-	-	1						0		1
022	EDIRNE	1	-	-	-	-	-	1						0		1
023	ELAZIG	1	1	-	-	-	-	2						0		2
026	ESKISEHIR	1	-	-	-	-	-	1						0		1
027	GAZIANTEP	3	-	-	-	-	-	3						0		3
028	GIRESUN	1	-	-	-	-	-	1						0		1
031	HATAY	-	1	1	-	-	-	2						0		2
032	ISPARTA	3	-	1	-	-	-	4						0		4
033	ICEL	1	1	1	-	-	1	4						0		4
034	ISTANBUL	11	-	1	-	-	-	12						0		12
035	IZMIR	19	9	1	-	-	-	29	-	-	-	-	5	5		34
036	KARS	1	-	-	-	-	-	1						0		1
037	KASTAMONU	5	-	1	-	-	-	6						0		6
038	KAYSERI	2	-	-	-	-	-	2						0		2
041	KOCAELI	7	-	2	-	-	-	9						0		9
042	KONYA	3	-	-	-	-	-	3						0		3
043	KUETAHYA	12	-	1	-	1	-	14						0		14
045	MANISA	6	1	-	-	3	-	10						0		10
046	KAHRAMAN MARAS	-	-	1	-	-	-	1						0		1
047	MARDIN	1	-	-	-	-	1	2						0		2
050	NEVSEHIR	1	-	-	-	-	-	1						0		1
051	NIGDE	-	1	-	1	-	-	2						0		2
052	ORDU	10	-	1	-	-	-	11	-	-	-	-	1	1		12
054	SAKARYA	9	-	-	-	-	-	9						0		9
055	SAMSUN	9	1	10	-	-	-	20	-	-	-	-	2	2		22
057	SINOP	7	1	2	-	1	-	11						0		11
058	SIVAS	2	-	-	-	-	-	2						0		2
061	TRABZON	1	-	-	-	-	-	1	-	-	-	-	1	1		2
062	TUNCELI	1	-	-	-	-	-	1						0		1
063	URFA	2	-	1	-	-	-	3						0		3
064	USAK	3	-	-	-	1	-	4						0		4
066	YOZGAT	1	-	1	-	-	-	2						0		2
067	ZONGULDAK	3	-	2	-	-	-	5						0		5
TOTAL		169	17	36	1	6	3	232	0	0	0	0	10	10	0	242
PER CENT		69.8	7.0	14.9	0.4	2.5	1.2	95.9	0.0	0.0	0.0	0.0	4.1	4.1	0.0	100.0

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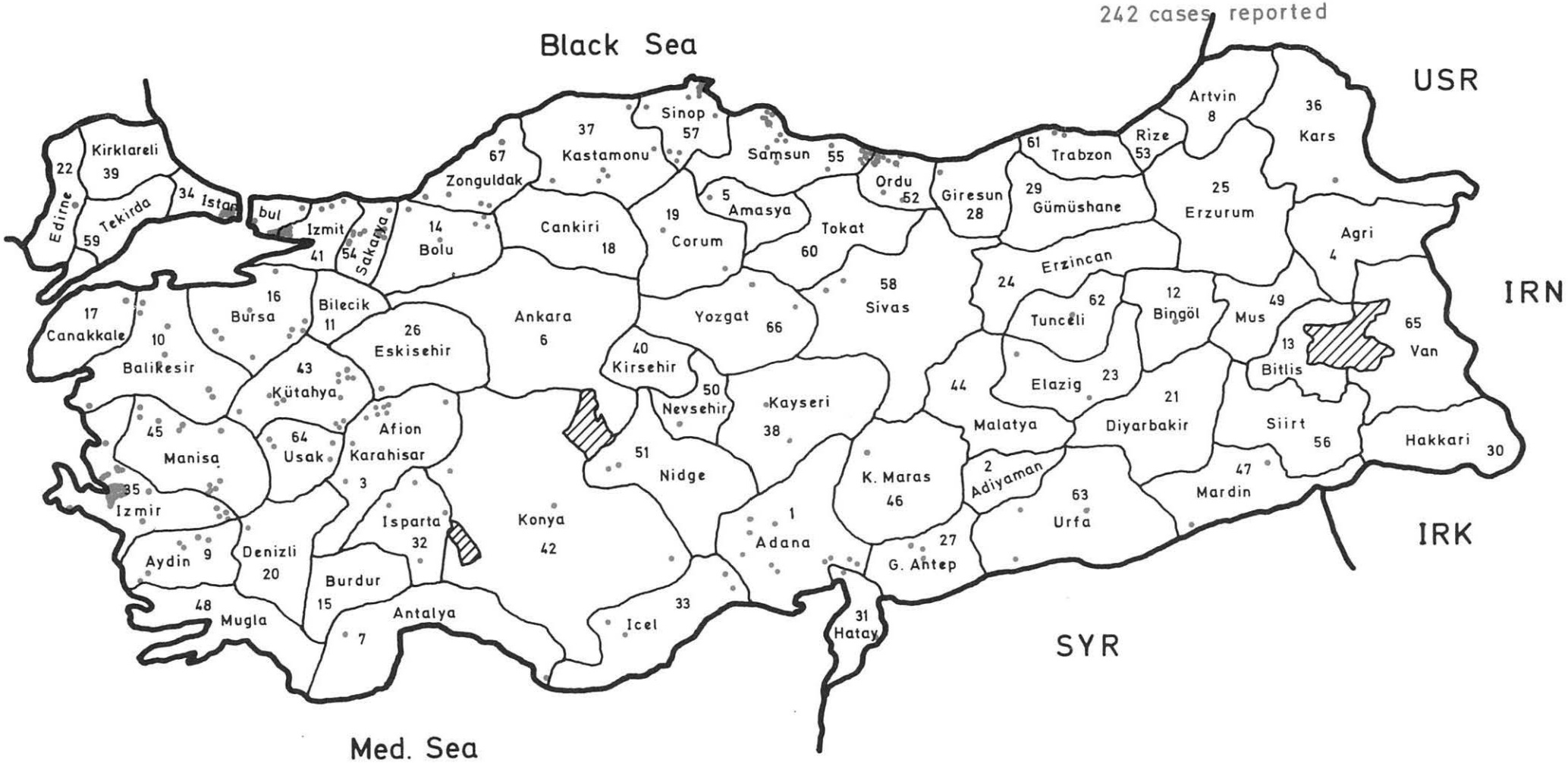
WHO Coll. Centre
Tuebingen / DEU

Rabies Cases Turkey
2nd Quarter 1987
242 cases reported



WHO Coll. Centre
Tuebingen / DEU

Rabies Cases Europe
2nd Quarter 1987

3863 cases reported

• = bat rabies

ISL
(rabies free)

NOR
(rabies free)

FIN
(0)

SWE
(rabies free)

DEN
(11)

IRE
(rabies free)

GBR
(1 human case - acquired in India)

NET
(7)

BEL (46)

DEU
(856)

DDR
(374)

POL
(345)

USR
(no data)

CZE
(504)

AUT
(570)

HUN
(276)

FRA
(478)

SWI
(26)

ITA
(0)

YUG
(113)

ROM
(10)

BUL
(rabies free)

POR
(rabies free)

SPA
(rabies free)

ALB
(no data)

GRE
(0)

TUR
(242)

0 50 100 km