

RABIES BULLETIN EUROPE

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1. Introduction

This BULLETIN describes the reported rabies cases in Europe for the **Second Quarter 1991**, subsequently referred to as "*This Quarter*".

In SECTION 2 a summary of the rabies situation in general is given.

SECTION 3 (3.1-3.26) reflects the situation for individual countries.

There are two articles in the miscellaneous section, SECTION 4. Under 4.1 a report summarizes a human rabies case investigation in Texas, 1990. The article under 4.2 gives an account on urban foxes and rabies contingency planning in Britain.

The rabies case data are tabulated for the second quarter

1991 in SECTION 5.

SECTION 6 lists the official contributors to the BULLETIN.

The geographical distribution of rabies cases in Europe for the second quarter 1991 is shown on maps of Europe and Turkey in the ANNEX.

2. Summary of Rabies in Europe

During "*This Quarter*", 3665 rabies cases were reported in Europe. Of these were 2799 cases in wild animals (76.4% of total) and 866 in domestic animals.

Of the cases in wild animals 2329 were foxes, 25 raccoon dogs, 1 wild cat, 77 badgers, 70 stone martens, 14 pine martens, 8 polecats, 1 ferret, 88 roe deer, 3 red deer, 1 fallow deer, 4 wild boars, 3 mouflons, 1 chamois, 1 hedgehog, 1 bat, 1 house mouse and 171 animals other than above or not specified. Of the 866 cases in domestic animals 307 were dogs, 184 cats, 194 cattle, 22 horses, 3 donkeys, 6 pigs, 136 sheep, 4 goats, 2 other domesticated herbivores, 2 domesticated rabbits, 4 other domesticated animals. These data are summarized in Tables 1 and 3.

Table 2 summarizes the quarters 1 and 2 of 1991.

In comparison with the first quarter 1991 (5711 cases) Europe experienced in "*This Quarter*" the expected seasonal decrease in fox-mediated rabies (the expected peak during the first quarter is caused by the roaming and fighting during the mating season). The countries affected were: Austria, Belgium, Czechoslovakia, Germany, France, Hungary, Poland, and Yugoslavia. Luxembourg, Romania and Switzerland had few cases and little changes compared to the first quarter. Though geared by fox- and raccoon dog-mediated rabies there were relatively few cases reported in wild animals (34.6% of total) in the Soviet Union.

Turkey experiencing dog-mediated rabies had a slight

increase of cases.

Rabies-free countries in Europe participating in the surveillance were: Bulgaria, Denmark, Greece, Iceland, Ireland, the mainland of Norway, Portugal, Sweden, and the United Kingdom of Britain and Northern Ireland.

There were no cases reported during "*This Quarter*" from Italy, the Netherlands, the Island of Svalbard of Norway, and the mainland of Spain, but their last indigenously acquired case (in terrestrial animals or bats) was reported less than two years ago.

There was one bat rabies case in Berlin, Germany, during "*This Quarter*".

No human case was reported.

3. Rabies in Individual Countries

3.1 Austria AUT

by Helmut Schnabl

During "*This Quarter*", 580 animal rabies cases were registered of 5697 samples examined. There was a decrease of cases in comparison with the previous quarter (839) by 30.9%.

Of 562 rabid wild animals (96.9% of total) 456 were foxes (78.6%), 50 badgers (8.6%), 24 martens (4.1%), 28 roe deer (4.8%), 3 mouflon and 1 chamois. Of 18 rabid domestic animals (3.1% of total) were 5 cats, 11 sheep and 2 horses.

The distribution of rabies cases by Bundesländer (federal provinces) and Bezirke (districts) was as follows:

Burgenland: 62 cases (10.7% of total) in the Bezirke Eisenstadt-Umgebung, Oberpullendorf, Neusiedl/See, Oberwart.

Niederösterreich: 355 cases (61.2%) in the Bezirke Amstetten, Bruck/Leitha, Gänzersdorf, Gmünd, Hollabrunn, Horn, Lilienfeld, Neunkirchen, Scheibbs, St.Pölten, Tulln, Waidhofen/Thaya, Wiener Neustadt, Zwettl.

Oberösterreich: 28 cases (4.8%) in the Bezirke Braunau, Freistadt, Kirchdorf/Krems, Perg.

Salzburg: 16 cases (2.8%) in

the Bezirke Salzburg-Umgebung, Tamsweg, St.Johann/-Pongau.

Steiermark: 115 cases (19.8%) in the Bezirke Bruck/Mur, Feldbach, Graz/Umgebung, Leibnitz, Liezen, Leoben, Weiz. Tirol: 4 cases in Bezirk Reutte.

No rabies cases were reported from the federal provinces Kärnten, Vorarlberg and Wien.

3.2 Belgium BEL

by J. Tambeur

During "*This Quarter*", 4 rabies cases were confirmed in 2 foxes, 1 bovine and 1 horse in 4 localities of the provinces Liège, Luxembourg and Namur.

There was a decrease of cases by 66.7% compared to the previous quarter and by 83.3% compared to the second quarter 1990.

The situation which improved drastically in 1990 remains very good. A fourth oral vaccination campaign against rabies of foxes covering the entire infected parts of the country (10000 km²) was carried out from 20 April to 20 May 1991. The vaccinia rabies recombinant vaccine and bait used was dropped from small airplanes at low altitude.

3.3 Bulgaria BUL

The country remained rabies-free.

3.4 Czechoslovakia CZE

by Oldrich Matouch

During "*This Quarter*", there were 336 cases of rabies registered on the territory of the CSFR (272 in the Czech Republic and 64 in the Slovak Republic). During the period under observation rabies cases decreased compared to the first quarter by 197, i.e. by 37%.

Of the total number of cases 312 occurred in wild animals representing 92.9% - 293 foxes, 5 badgers, 11 martens, 1 polecat and 2 roe deer and 24 (7.1%) occurred in domestic animals - 4 dogs, 13 cats, 3 pigs, 2 sheep and 2 rabbits.

The highest number of rabies cases was found in the region of North Bohemia (96), the lowest in the region of West Bohemia (4). The most infected districts were Liberec (21), Trebíč and Jindřichuv Hradec (18 each), Litoměřice (16) and Breclav (15).

There was no case of rabies reported in man.

In May 1991 the fifth campaign of oral rabies immu-

nization of foxes took place. This immunization was performed in 13 districts in West Bohemia adjacent to the frontiers with Germany. In an area of 14520 km² 218000 doses of Tübingen bait using the SAD B19 strain were applied. The vaccine was distributed manually by hunters divided into groups of two members each. The repeated applications of the vaccine in this area resulted in a prominent decrease of rabies cases. Three districts (Domazlice, Klatovy and Tachov) are already free from rabies where the vaccine has been applied since 1989.

3.5 Denmark DEN

by Eric Stougaard

The country remained rabies-free.

3.6 Germany, Federal Republic DEU

by Winfried W. Müller
and Klaus Stöhr

A total of 884 rabies cases was reported during "*This Quarter*". These were 346 cases less than during the first quarter (1230) making up for the expected seasonal decrease in the second quarter of a year. The exception were two federal states where cases increased: Mecklenburg-Vorpommern - from 120 to 157- and Saarland - from 12 to 18.

Of the 884 cases were 731 in wild animals (649 foxes,

13 badgers, 27 stone martens, 1 polecat, 35 roe deer, 1 red deer, 1 fallow deer, 3 wild boars, 1 bat) and 153 in domestic animals (53 dogs, 47 cats, 21 cattle, 25 sheep, 1 goat, 5 horses, 1 other domesticated herbivore).

The one insectivorous bat was diagnosed in Berlin.

In general the distribution of cases remained as in the previous quarter. The eastern federal states where oral vaccination of foxes has not been practiced yet took an unfavourable development (Mecklenburg-Vorpommern, Brandenburg).

The anti-rabies oral vaccination campaign of foxes in autumn 1990 of the 5 new eastern federal states has been evaluated and showed good results. 5116 animals (amongst them 2712 foxes, 1404 wild boars and 347 martens) were received in veterinary investigation centers for examination. The acceptance rate of the bait was 79.1% for foxes, 38% for wild boars and 40.3% for martens. The seroconversion rate was 63.7% for foxes.

On 4th April 1991 the spring vaccination campaign of the 5 new federal states was started. In an area of 82195 km² 1475000 Tübingen vaccine baits were placed (18 vaccine baits per km²), mainly by airplane and in a few instances by hand.

3.7 Finland FIN

by Bengt Westerling

The country remained rabies-free. During "*This Quar-*

ter", the brains of 105 animals, including 56 raccoon dogs, 22 foxes and 8 badgers were examined for rabies by immunofluorescence.

3.8 France FRA

by M.F.A. Aubert

512 rabies cases were registered during "*This Quarter*", 203 less than during the same period, last year. The diminution of cases noticed in the first quarter 1991 in comparison with the previous year continues. 401 cases were registered in the fox (78.3% of total), 20 cases in other wild animals and 91 in domestic animals (8 dogs, 17 cats, 19 cattle, 38 small ruminants and 9 equines).

The Départements (departments) recording the greatest number of cases were Haut-Rhin (51 cases) and Voges (49 cases).

It seems that the now most affected départements are the ones not yet included in the programme for oral vaccination.

3.9 Greece GRE

by A. Saravanos

The country remained rabies-free.

3.10 Hungary HUN

by Lazlo Koltai

During "*This Quarter*", 139 rabies cases in animals were diagnosed in Hungary.

Compared to the second quarter 1990 there was a decrease of cases by 9.2%. Of the total 104 cases (74.8%) were in foxes (75.8% during the second quarter 1990).

The provinces (Komitate) mostly affected at this time (with the exception of Vas) were located to the east of the river Danube: Bekes (14), Bacs (12), Csongrad (13), Pest (13).

An application for financial support has been placed by the Chief Veterinary Office of Hungary at PHARE programme (Brussels) to start a first field trial on oral vaccination of foxes against rabies.

3.11 Iceland ICE

The country remained rabies-free.

3.12 Ireland IRE

The country remained rabies-free.

3.13 Italy ITA

by Santino Prosperi
During "This Quarter", no case of rabies was reported.

3.14 Luxembourg LUX

by Joseph Kremer
During "This Quarter", 4 rabies cases were registered, three in the centre and one in the north of Luxembourg

Considering the present situation it can be assumed that in spite of repeated oral vacci-

nation campaigns some rabies foci remained.

Nevertheless, the fact that the epizootic improved country-wide is no doubt connected to the very thoroughly carried out oral vaccination campaign of foxes. This time helicopters were used for the distribution of vaccine baits.

There is hope to eradicate the epizootic in the remaining foci as for September 1991 another vaccination campaign is planned covering the entire country.

3.15 Netherlands NET

by J.H.M. Nieuwenhuijs

The Netherlands remained rabies-free in terrestrial animals.

There was no case of bat rabies noticed.

During "This Quarter", 239 animals (134 adult foxes, 29 young foxes, 14 badgers, 2 cats, 3 dogs, 1 cow, 1 marten, 1 polecat, 1 sheep, 1 squirrel and 52 bats) were investigated for rabies, but none of them were found positive. 22 samples (21 adult foxes and 1 bat) were not suitable for investigation.

Furthermore, 227 young foxes sent in were not investigated because of change in policy. These young foxes were caught together with the parent animals, and they were not examined when the parent animals were rabies negative. As a result of this a considerable decrease in the number of tested animals is to be expected, but complete loss of valuable infor-

mation is avoided.

3.16 Norway NOR

by Gudbrand Bakken

There was no case of rabies reported during "This Quarter" on the island of Svalbard.

The mainland of Norway remained rabies-free.

3.17 Poland POL

A total of 378 rabies cases were reported from Poland during "This Quarter". Of these were 316 (83.6% of total) in wild animals (250 foxes, 25 raccoon dogs, 4 badgers, 11 pine martens, 5 polecats, 17 roe deer, 2 red deer, 1 wild boar and 1 hedgehog) and 62 in domestic animals (30 dogs, 21 cats, 10 cattle, 1 horse).

There was a decrease of 130 cases compared to the first quarter 1991 and an increase of 61 cases compared to the second quarter 1990.

The distribution of cases remained as in the previous quarter, in the western half of the country cases were more concentrated and in the eastern half more scattered. The two most affected provinces (voivodeships) were Gdansk and Koszalin with 39 and 30 cases respectively.

3.18 Portugal POR

The country remained rabies-free.

3.19 Romania ROM

by Horatiu Olaru

During "*This Quarter*", 14 rabies cases were reported from Romania. They occurred in 6 foxes and 2 other wild animals and in 6 domestic animals (2 cats, 1 bovine, 1 horse, 2 others).

The cases were scattered and 13 were located in the western half of the country and one in the north-eastern province of Botosani.

3.20 Spain SPA

by T. Maté Maté

During "*This Quarter*", the mainland and islands of Spain remained **rabies-free** in terrestrial animals.

There was **no case of bat rabies**.

Two dogs have been diagnosed rabid in Melilla (Spanish territory of North Africa).

3.21 European Part of the Soviet Socialist Republics SSR

by G.F. Koromyslov

During "*This Quarter*", 489 rabies cases in animals were reported in the European part of the Soviet Union. 320 of these affected animals were domestic animals -93 dogs, 52 cats, 118 cattle, 53 sheep, 2 horses, 2 other domesticated animals. 169 cases occurred in

wild animals but these were not specified.

Cases were less compared to the first quarter 1991 (1141) as expected. Cases for "*This Quarter*" were less as well when compared to the second quarter of 1990 (726).

Human cases were not reported.

3.22 Sweden SWE

The country remained rabies-free.

3.23 Switzerland SWI

by Hans Matter

During "*This Quarter*", the Swiss Rabies Center received 457 animals for examination. 29 (6.4%) of these were positive for rabies. In the previous quarter 25 cases had been recorded (2.7% of 904), whereas 5 of 368 (1.4%) were positive in the second quarter of 1990.

27 cases were observed in foxes, 1 in a stone marten and 1 in a polecat. One isolated case of a rabid fox was observed in the Canton of Aargau. All other cases were as in previous quarters relatively close to an area in France which is known to be heavily infested. Ten of these cases were observed within a range of 0 to 5 km from the French border, 6 cases within 5.1 to 10 km and another 12 cases at a distance of more than 10 km (maximum distance: 11.4 km). The French area has been vaccinated for the second

time in spring 1991, whereas vaccination campaigns on the Swiss side of the border were performed for the 7th to 15th time (depending on the region).

During vaccination campaigns in the months of April and May 71400 VIRBAC baits had been distributed over an area of approximately 4600 km² covering the whole border zone towards France between Nyon and Basel.

6 bats (1 *Nyctalus leisleri*, 3 *Pipistrellus nathusii*, 1 *Pipistrellus pipistrellus*, 1 *Vespertilio murinus*) examined with immunofluorescence revealed no rabies virus. Switzerland has not experienced any rabies cases in bats yet.

Three human bite exposures to proven rabid foxes were recorded in the second quarter of 1991. The number of people treated for non-bite exposures is not recorded.

3.24 Turkey TUR

During "*This Quarter*", 141 rabies cases were reported from Turkey. 138 cases occurred in domestic animals and 3 in wild animals. The dog is the reservoir and main carrier. 108 dogs were recorded (76.6% of total).

There was an increase of 52 cases compared to the previous quarter.

The provinces Bursa and Canakkale reported 14 cases each, Istanbul 11 cases. All other provinces affected registered less than 10 cases.

3.25 United Kingdom UNK

by P.J. Thomas

The country remained rabies free during "*This Quarter*".

3.26 Yugoslavia YUG

153 cases of rabies were reported from Yugoslavia during "*This Quarter*", nearly as many as during the second quarter 1990 (156). Croatia recorded most cases (83), followed by Slovenia (50) and Bos-

nia and Hercegovina (11). After many years there were for the first time 2 cases (2 sheep) reported in Montenegro. 6 cases were recorded in Voivodina and 1 case in Serbia.

Of the 153 cases were 136 in wild animals (all foxes) and 17 in domestic animals (2 dogs, 7 cats, 6 sheep, 1 equine and 1 bovine).

4. MISCELLANEOUS ARTICLES

4.1 Human Rabies - Texas, 1990

On June 5, 1990, a 22-year-old man died of rabies encephalitis in Hidalgo County, Texas, along the Mexican border. This was the fourth case of human rabies known to be acquired in the United States since 1980 and the first case in Texas since 1985. This report summarizes the case investigation.

On April 13, the man was bitten on the right index finger by a bat while at a tavern in Mercedes, Texas. The patient did not obtain medical care for the bite; he remained well until May 30, when he complained of right hand weakness. On June 1, he complained of right arm numbness and dysesthesias. On June 2, he exhibited several episodes of staring and unre-

sponsiveness lasting 10-15 seconds. He consulted a physician in Mexico, who prescribed an unknown medication. That evening he presented to a hospital emergency room in Texas complaining of right hand pain. Based on a history of a puncture wound with a catfish fin earlier in the week, he was treated with ceftriaxone and tetanus toxoid.

On June 3, when he returned to the emergency room complaining of "spasms", he was hyperventilating and had a white blood cell (WBC) count of 11,100 per mm³. Although he was discharged after reporting some improvement, he subsequently had intermittent episodes of rigidity, breath holding, hallucinations, and

difficulty in swallowing; eventually he refused liquids. That evening he was admitted to the intensive-care unit of another hospital in Texas with a preliminary diagnosis of either encephalitis or tetanus. Manifestations included frequent spasms of the face, mouth, and neck; stuttering speech; hyperventilation; and temperature of 100.1 F (37.8 C). The WBC count was 17,100 per mm³ with a granulocytosis. He was sedated and observed.

On the morning of June 4, the patient was confused, disoriented, and areflexic. Although his neck was supple, muscle tonus was increased in his upper extremities. Analysis of cerebrospinal fluid (CSF) indicated slightly elevated pro-

tein (51 mg/dL; normal: 15-45 mg/dL); slightly elevated glucose; and 3 red blood cells and 1 WBC per dL. An electroencephalogram showed abnormal slow and alpha activity without focal abnormality. Because the patient had uncontrolled oral secretions, he was intubated. His temperature rose to 107 F (41.7 C), and he had marked diaphoresis. Later on June 4, the patient's supervisor from work reported the man's history of a bat bite to hospital authorities. CSF, serum, and skin biopsy (taken from the nape of the neck) samples were forwarded to CDC for rabies testing; all of these samples were negative. The patient became comatose and died on June 5. Post-mortem samples of brain tissue were positive for rabies by the direct immunofluorescence antibody test. Monoclonal antibody typing suggested that the rabies variant was the Mexican free-tailed bat (*Tadarida brasiliensis mexicana*) strain.

Although the period of rabies virus infectivity before onset of clinical symptoms (i.e. preclinical secretion of rabies virus) is probably only a few days, for the purpose of contact investigation for this case, public health authorities considered the 2 weeks before onset of the patient's symptoms to be the period of infectivity. Consequently, postexposure prophylaxis was initiated for 67 of 100 possibly exposed contacts among family, friends, coworkers, and medical personnel.

The patient had worked as a phlebotomist for a blood bank and had donated blood on

May 22 before onset of symptoms. His platelets had been transfused before he became ill, but the remainder of his blood products were destroyed. Although rabies virus was not isolated from the patient's blood and he was probably not infectious when he donated, the platelet recipient received rabies immunoprophylaxis.

MMWR - Editorial Note: The primary types of animal exposures leading to human rabies in the United States have changed since 1950, when most cases were acquired from domestic animals. From 1980 through 1990, 13 cases of human rabies in the United States were reported to CDC; four (30.8%) were acquired domestically.

Bat rabies occurs everywhere in the continental United States: during 1989, each of the 48 contiguous states and the District of Columbia reported infected bats. From 1980 through 1990, the number of reported infected bats peaked in 1984 with 1038. In the southeastern and mid-Atlantic states, rabies is most prevalent in the migratory red bat.

Based on monoclonal antibody analysis and exposure history, three of the four cases of human rabies acquired within the United States from 1980 through 1990 resulted from exposure to bats. In general, postexposure prophylaxis should be initiated for persons exposed to vampire, frugivorous, and insectivorous bats; it may be discontinued if the bat is tested and found negative for rabies.

In 1980 and 1981, 10% of persons who received rabies prophylaxis had been bitten by bats.

Human rabies can be prevented by avoiding contact with rabid animals. Most terrestrial mammals are susceptible to rabies virus infection. Contact should be avoided with all wild and domestic animals exhibiting atypical behavior. Family dogs and cats should be vaccinated against rabies. If human exposures do occur, immediate cleansing of the bite wound with soap and water is recommended. When possible, the biting animal should be captured and submitted for testing for rabies. Medical care should also be sought to assess the need for tetanus vaccination, general wound care, and rabies prophylaxis.

(Taken from: Morbidity and Mortality Weekly Report, 40, No. 8, 1991; U.S. Centers for Disease Control, Atlanta, Georgia 30333)

RBE Editorial Note: The European bat rabies isolates have a different pattern in monoclonal antibody characterization compared to the isolates in Northern America. Knowledge of bat rabies in connection to humans is very scarce in Europe. Nevertheless, exposure of humans to bat rabies in Europe should be handled like any other wildlife exposure as well. Reference is made to the "WHO Guide for Postexposure Treatment" by the WHO Expert Committee on Rabies (Technical Report Series 709, WHO, Geneva, 1984).

4.2 Urban Foxes and Rabies Contingency Planning in Britain

by Stephen Harris

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INTRODUCTION

With no recent experience of rabies in wildlife, and very high numbers of foxes living in many urban areas in southern England, rabies contingency planning for Britain poses a number of problems. However, sound contingency plans are essential, since the threat to Britain is probably higher now than it has been at any time in the last 50 years. The number of animals imported illegally is unknown, but is probably much higher than the actual number of animals detected; if one such animal was rabid, it could set up a focus of infection. Since the majority of people in Britain live in urban areas, it is likely that any illegally imported infected pet would be taken to a large town or city. Hence there is a high chance that an urban area would be the focal point for any rabies epizooty.

To help develop contingency plans to deal with such an event, my colleagues and I have been studying the ecology of urban foxes for a number of years. When we started, virtually nothing was known about urban foxes; which cities had them, which did not (and why not), how many there were, how did urban fox populations behave, and what control pro-

blems would they pose in a rabies event? The aim was to work intensively in Bristol, but also to collect some comparative data from other cities, and then to model these data so that they could be applied to all other British cities. After all, a rabies event could occur in any city, and we need to be in a position to respond effectively wherever the problem arose.

URBAN FOX RESEARCH AT BRISTOL

Much of the early work on urban fox numbers, demography and dispersal has now been published. In particular we were able to produce models that could accurately predict the numbers and distribution of foxes in any British city, and we also produced models to help us understand the dispersal process in foxes. This latter was particularly useful, since dispersal is important in accelerating the spread of rabies, thereby exacerbating the problems of control.

More recently we have been using these field data to develop models that will help us understand how rabies is likely to spread through an urban fox population, and what control problems we are likely to encounter. Of particular relevance here are the very high

densities of urban foxes, up to five family groups (i.e. 17 adults producing 24 cubs each spring) per square kilometre. However, these very high densities are patchily distributed in British cities, and fox densities can vary by over ten fold within a small area. This spatial heterogeneity of the urban fox population exacerbates the control problems, since the rate of rabies spread is more variable in heterogeneous fox populations.

To model the pattern of rabies spread in urban foxes, we developed a spatial stochastic computer simulation model, based on the data collected on urban foxes. This model can be programmed to accurately reflect the numbers and distribution of foxes in any British city, and also any barriers to fox movements. By applying the model to a variety of cities with different fox densities we were able to examine the pattern of rabies spread and the effects of different control strategies. An example is shown for the West Midlands conurbation; as can be seen, without any control measures rabies would rapidly spread out of the city, with very few foxes surviving the rabies event. Of the two control strategies shown, a 64% level of fox control would slow the rate

of spread but be unable to contain the disease; 87% fox control would cause the disease to die out, but occasional cases would persist for over two years after the original introduction.

By running the simulation model for a number of cities with different mean fox densities, we found that in cities with high fox densities low to moderate levels of control were unsuccessful in containing the disease, but that these urban areas had the best chances of eliminating rabies with the highest levels of control. This was in part due to the lower dispersal distances in higher density fox populations.

Since we cannot be sure that we will detect the first rabid animal in Britain, or even be aware of a rabies event for some time, we also investigated the effects of a three month delay in commencing a rabies control campaign in a British city. Such a delay reduced the chance of containing the disease on average by 10-20%, although this was higher in lower density fox populations. Similarly, rabies outbreaks in the dispersal period had an average 10% less chance of being contained. Clearly, controlling a rabies event in an urban fox population will not be easy, and so we looked at a variety of means of enhancing the likely chances of success. One means would be to enlarge the size of the control zone; the current plan is to use a circular zone of radius 19 km centred on what is believed to be the focal point of the infection. Increasing the size of the control zone certainly

increased the chance of successfully containing the disease, although this was density dependent, so that the effect was less in low density fox populations. Again, this was probably a feature of the greater dispersal distances at lower fox densities. Whilst enlarging the control zone may appear to be a theoretical option, in practice it would be difficult. Rabies control in an urban area would be very labour intensive, since the plan is for all baits to be hand-placed and inspected daily to replace those that have been taken, and small increases in the radius of the control zone would greatly increase the number of personnel required.

BAITING STUDIES

Whilst it is easy to plan control programmes on a computer screen, there are a lot of practical problems. To be sure of containing a rabies event in an urban fox population we need to achieve a 90% level of control. Such high levels of control are rarely achieved in any rabies campaign, and in much lower density fox populations (as, for instance, found in much of Europe), somewhere around a 50% level of control is adequate to eliminate the disease. Baiting trials in Bristol, using iophenoxic acid as a biomarker, have shown that a baiting campaign with 32 baits km² would only reach about 30% of the fox population, and this would be totally inadequate to stop rabies spreading. Also, fox surveys in a number of British cities have shown quite conclusively that the highest fox

densities are found in residential areas, yet in this habitat bait uptake is low. Hence we suspect that a series of baiting campaigns will be needed in a rabies event, and so the simulation models were run with successive 40% control campaigns. The low level of bait uptake, and the need for a very high level of control, are two of the reasons why Britain currently favours the use of poison as opposed to a vaccination campaign. From field trials there is some evidence that the same foxes are likely to take the baits on each trial, and we suspect that this may be a feature of fox social organisation. A poison campaign will eliminate this problem, and hopefully reach a greater proportion of the foxes in an area (although whether it will reach 90% is another question). There are also a number of other advantages to using poison baits, although there are several practical problems which have yet to be resolved.

CURRENT AND FUTURE WORK

Although we have gone a long way to answering the questions we posed at the start of our work, and in understanding the particular problems that would be caused by a rabies event in a high density urban fox population, we still have some way to go to resolve some of the practical aspects of urban rabies control. The models we have developed at Bristol will help here; they have been adopted by the Ministry of Agriculture, Fisheries and Food as a key element of their rabies

control strategy, so that they can accurately assess the chance of success of any control operation before it is instigated. Meanwhile we are continuing to study urban fox social behaviour to refine some of the parameters used in our models. In particular contact rates have hitherto been speculative, and so we have been studying these by simultaneously radio-tracking several foxes to monitor their interactions. We are also continuing to look at the problems of bait uptake, to see how selection of bait sites, methods of presentation, etc. will enhance the rate of uptake. These results will be used to continue to update and refine Britain's rabies contingency plans.

The long term fox studies at Bristol have been funded by the Ministry of Agriculture, Fisheries and Food, the Natural Environment Research Council and the Nature Conservancy Council. I and my colleagues are most grateful to these bodies for their support.

Figure to legend on the right: Results of the Bristol rabies model, showing the pattern of rabies spread in the West Midlands conurbation. The simulation area shown is 49.5x49.5 km (2450km²) and the urban area (589km²) is in the centre of the square. Rabies was introduced in September to the fox family group of the urban area, and the figures show the pattern of rabies spread with (a) no fox control, (b) 64% fox control (in two phases with 40% of the fox population removed each time) and (c) 87% (in four phases of 40% reduction each time). The outer contour represents 1-2 infected foxes, the inner contour 3-4, the hatched areas 4-6, and the solid areas greater than 6 infected foxes per home range.

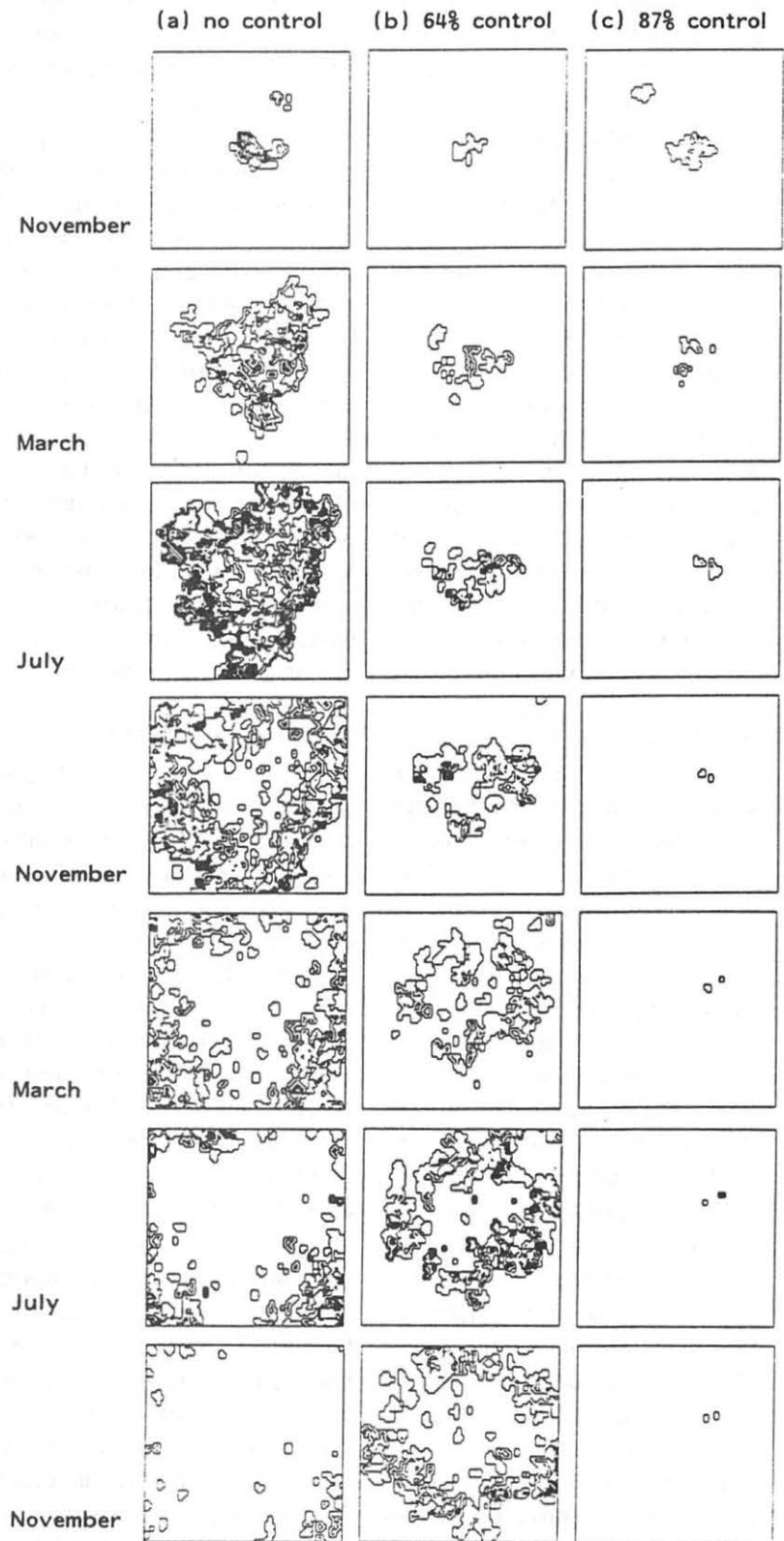


TABLE 1

EUR EUROPE 2/91		RABIES CASES											1. 4. 91 - 30. 6. 91		
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	-	5	-	2	11	-	18	456	50	24	28	4	562		580
BEL BELGIUM	-	1	-	1	-	-	2	2	-	-	-	-	2		4
BUL BULGARIA *							0						0		0
CZE CZECHOSLOVAKIA	4	13	-	-	2	5	24	293	5	12	2	-	312		336
DEN DENMARK *							0						0		0
DEU FED. REP. OF GERMANY	53	47	21	5	26	1	153	649	13	28	37	4	731		884
FIN FINLAND *							0						0		0
FRA FRANCE	8	17	19	8	38	1	91	401	5	10	5	-	421		512
GRE GREECE *							0						0		0
HUN HUNGARY	7	13	7	-	2	3	32	104	-	1	1	1	107		139
ICE ICELAND *							0						0		0
IRE IRELAND *							0						0		0
ITA ITALY *							0						0		0
LUX LUXEMBOURG	-	-	1	-	-	-	1	3	-	-	-	-	3		4
NET NETHERLANDS *							0						0		0
NOR NORWAY *							0						0		0
POL POLAND	30	21	10	1	-	-	62	250	4	16	19	27	316		378
POR PORTUGAL *							0						0		0
ROM ROMANIA	-	2	1	1	-	2	6	6	-	-	-	2	8		14
SPA SPAIN	2	-	-	-	-	-	2						2		2
SSR SOVIET SOCIALIST REP	93	52	118	2	53	2	320	-	-	-	-	169	169		489
SWE SWEDEN *							0						0		0
SWI SWITZERLAND + LIECHT							0	27	-	2	-	-	29		29
TUR TURKEY	108	6	16	1	2	5	138	2	-	-	-	1	3		141
UNK UNITED KINGDOM *							0						0		0
YUG YUGOSLAVIA	2	7	1	1	6	-	17	136	-	-	-	-	136		153
TOTAL	307	184	194	22	140	19	866	2329	77	93	92	208	2799	0	3665
PER CENT	8.4	5.0	5.3	0.6	3.8	0.5	23.6	63.5	2.1	2.5	2.5	5.7	76.4	0.0	100.0

* NO CASES.

2nd Quarter: April - June 1991

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TABLE 2

EUR EUROPE		1-2/91							RABIES CASES						1. 1.91 - 30. 6.91	
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	3	16	2	2	12	-	35	1164	90	59	66	5	1384		1419
BEL	BELGIUM	-	1	1	2	-	-	4	12	-	-	-	-	12		16
BUL	BULGARIA	*						0						0		0
CZE	CZECHOSLOVAKIA	10	21	-	-	2	5	38	793	7	25	6	-	831		869
DEN	DENMARK	*						0						0		0
DEU	FED. REP. OF GERMANY	107	108	39	11	40	3	308	1637	26	61	76	6	1806		2114
FIN	FINLAND	*						0						0		0
FRA	FRANCE	1)	21	33	44	15	78	192	940	11	17	7	-	975	1	1168
GRE	GREECE	*						0						0		0
HUN	HUNGARY	34	32	15	2	5	4	92	366	-	1	4	1	372		464
ICE	ICELAND	*						0						0		0
IRE	IRELAND	*						0						0		0
ITA	ITALY	*						0						0		0
LUX	LUXEMBOURG	-	-	2	-	-	-	2	4	-	-	-	-	4		6
NET	NETHERLANDS	*						0						0		0
NOR	NORWAY	*						0						0		0
POL	POLAND	74	48	22	1	-	-	145	589	5	27	50	70	741		886
POR	PORTUGAL	*						0						0		0
ROM	ROMANIA	2	3	1	2	-	2	10	11	-	2	-	2	15		25
SPA	SPAIN	2	-	-	-	-	-	2						0		2
SSR	SOVIET SOCIALIST REP	226	144	391	12	443	8	1224	180	-	-	-	226	406		1630
SWE	SWEDEN	*						0						0		0
SWI	SWITZERLAND + LIECHT							0	52	-	2	-	-	54		54
TUR	TURKEY	184	8	25	1	3	6	227	2	-	-	-	1	3		230
UNK	UNITED KINGDOM	*						0						0		0
YUG	YUGOSLAVIA	9	15	2	1	12	1	40	448	1	3	1	-	453		493
TOTAL		672	429	544	49	595	30	2319	6198	140	197	210	311	7056	1	9376
PER CENT		7.2	4.6	5.8	0.5	6.3	0.3	24.7	66.1	1.5	2.1	2.2	3.3	75.3	0.0	100.0

* NO CASES 1) IMPORTED FROM MEXICO

TABLE 3

EUR		EUROPE		2/91		RABIES CASES 'OTHER ANIMAL SPECIES'										1. 4.91 - 30. 6.91	
LOCATION		OTHER DOMESTIC ANIMALS					OTHER WILD ANIMALS									TOTAL	
CODE	NAME	DONKEY	PIG	OTH. DOM HERBIVO	DOMEST RABBIT	OTHERS	RACCOON DOG	WILD CAT	WILD BOAR	MOUFLON	CHAMOIS	HEDGEHOG	INSECT BAT	HOUSE MOUSE	OTHERS		
AUT	AUSTRIA	-	-	-	-	-	-	-	-	3	1	-	-	-	-	4	
CZE	CZECHOSLOVAKIA	-	3	-	2	-	-	-	-	-	-	-	-	-	-	5	
DEU	FED. REP. OF GERMAN	-	-	1	-	-	-	-	3	-	-	-	1	-	-	5	
FRA	FRANCE	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
HUN	HUNGARY	-	3	-	-	-	-	1	-	-	-	-	-	-	-	4	
POL	POLAND	-	-	-	-	-	25	-	1	-	-	1	-	-	-	27	
ROM	ROMANIA	-	-	-	-	2	-	-	-	-	-	-	-	-	2	4	
TUR	TURKEY	2	-	3	-	-	-	-	-	-	-	-	-	1	-	6	
TOTAL		3	6	4	2	2	25	1	4	3	1	1	1	1	2	56	
PER CENT		5.4	10.7	7.1	3.6	3.6	44.6	1.8	7.1	5.4	1.8	1.8	1.8	1.8	3.6	100.0	

AUT AUSTRIA		RABIES CASES											1. 4.91 - 30. 6.91			
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	14	-	-	-	1	15		15
104	GUESSING							0	2	-	-	-	-	2		2
105	JENNERSDORF							0	1	-	-	-	-	1		1
107	NEUSIEDL AM SEE							0	32	1	-	-	-	33		33
108	OBERPULLENDORF							0	4	-	-	-	-	4		4
109	OBERWART							0	6	1	-	-	-	7		7
305	AMSTETTEN							0	15	1	-	-	-	16		16
307	BRUCK AN DER LEITHA							0	5	-	-	-	-	5		5
308	GAENSERNDORF	-	1	-	-	-	-	1	6	-	-	-	-	6		7
309	GMUEND							0	2	-	-	-	-	2		2
310	HOLLABRUNN	-	1	-	-	-	-	1	11	1	2	1	-	15		16
311	HORN							0	3	-	1	-	-	4		4
312	KORNEUBURG							0	6	-	-	-	-	6		6
313	KREMS AN DER DONAU-L							0	1	-	1	-	-	2		2
314	LILIENTELD	-	-	-	-	4	-	4	39	16	-	4	2	61		65
315	MELK							0	1	1	1	-	-	3		3
316	MISTELBACH							0	2	-	-	-	-	2		2
318	NEUNKIRCHEN	-	1	-	-	2	-	3	68	3	6	12	1	90		93
319	SANKT POELTEN-LAND	-	-	-	-	3	-	3	40	6	-	5	-	51		54
320	SCHEIBBS							0	19	4	1	-	-	24		24
321	TULLN							0	8	-	-	1	-	9		9
322	WAIDHOFEN AN DER THA							0	2	-	1	-	-	3		3
323	WIENER NEUSTADT-LAND							2	35	-	1	-	-	36		38
325	ZWETTL	-	1	-	1	1	-	1	2	-	3	-	-	5		6
404	BRAUNAU AM INN							0	1	1	-	-	-	2		2
406	FREISTADT							0	13	7	2	1	-	23		23
409	KIRCHDORF AN DER KRE							0	2	-	-	-	-	2		2
411	PERG							0	1	-	-	-	-	1		1
502	HALLEIN							0	1	-	-	-	-	1		1
503	SALZBURG-LAND							0	3	-	1	-	-	4		4
504	SANKT JOHANN IM PONG							0	2	-	-	-	-	2		2
505	TAMSWEG							0	9	-	-	-	-	9		9
602	BRUCK AN DER MUR							0	2	1	-	-	-	3		3
604	FELDBACH							0	4	-	-	-	-	4		4
605	FUERSTENFELD							0	1	-	-	-	-	1		1
606	GRAZ-LAND							0	17	-	-	1	-	18		18
607	HARTBERG							0	2	-	-	-	-	2		2
610	LEIBNITZ							0	2	-	-	-	-	2		2
611	LEOBEN							0	-	1	-	-	-	1		1
612	LIEZEN	-	1	-	-	2	-	3	66	6	3	3	-	78		81
613	MUERZZUSCHLAG							0	1	-	1	-	-	2		2
615	RADKERSBURG							0	1	-	-	-	-	1		1
708	REUTTE							0	4	-	-	-	-	4		4
TOTAL		0	5	0	2	11	0	18	456	50	24	28	4	562	0	580
PER CENT		0.0	0.9	0.0	0.3	1.9	0.0	3.1	78.6	8.6	4.1	4.8	0.7	96.9	0.0	100.0

R A B I E S C A S E S															1. 4.91 - 30. 6.91	
LOCATION CODE NAME		D O M E S T I C A N I M A L S						W I L D A N I M A L S						HUMAN CASES	TOTAL	
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS			TOTAL
BEL B E L G I U M																
LG LIEGE		-	-	-	1	-	-	1						0		1
LX LUXEMBOURG		-	1	-	-	-	-	1						0		1
NA NAMUR								0	2	-	-	-	-	2		2
TOTAL		0	1	0	1	0	0	2	2	0	0	0	0	2	0	4
PER CENT		0.0	25.0	0.0	25.0	0.0	0.0	50.0	50.0	0.0	0.0	0.0	0.0	50.0	0.0	100.0
LUX L U X E M B O U R G																
04 LUXEMBOURG-CAMPAGNE								0	1	-	-	-	-	1		1
07 DIEKIRCH								0	1	-	-	-	-	1		1
09 WILTZ		-	-	1	-	-	-	1						0		1
12 GREVENMACHER								0	1	-	-	-	-	1		1
TOTAL		0	0	1	0	0	0	1	3	0	0	0	0	3	0	4
PER CENT		0.0	0.0	25.0	0.0	0.0	0.0	25.0	75.0	0.0	0.0	0.0	0.0	75.0	0.0	100.0

CZE		CZECHOSLOVAKIA						RABIES CASES						1. 4.91 - 30. 6.91		
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
00	DISTRICT OF PRAGUE	-	1	-	-	-	-	1	-	-	-	-	-	0	1	
01	CENTRAL BOHEMIA	-	2	-	-	-	-	2	32	-	3	-	-	35	37	
02	SOUTH BOHEMIA	-	2	-	-	-	-	2	39	-	2	-	-	41	43	
03	WEST BOHEMIA	-	-	-	-	-	3	3	1	-	-	-	-	1	4	
04	NORTH BOHEMIA	-	2	-	-	1	-	3	89	1	2	1	-	93	96	
05	EAST BOHEMIA	-	-	-	-	-	-	0	16	-	2	-	-	18	18	
06	SOUTH MORAVIA	2	-	-	-	-	2	4	47	3	2	-	-	52	56	
07	NORTH MORAVIA	-	2	-	-	-	-	2	15	-	-	-	-	15	17	
0	CZECH REPUBLIC	2	9	-	-	1	5	17	239	4	11	1	-	255	272	
10	DISTRICT OF BRATISLAV	1	-	-	-	-	-	1	-	1	-	-	-	1	2	
11	WEST SLOVAKIA	-	1	-	-	-	-	1	19	-	-	-	-	19	20	
12	CENTRAL SLOVAKIA	1	2	-	-	1	-	4	16	-	1	1	-	18	22	
13	EAST SLOVAKIA	-	1	-	-	-	-	1	19	-	-	-	-	19	20	
1	SLOVAK REPUBLIC	2	4	-	-	1	-	7	54	1	1	1	-	57	64	
TOTAL		4	13	0	0	2	5	24	293	5	12	2	0	312	0	336
PER CENT		1.2	3.9	0.0	0.0	0.6	1.5	7.1	87.2	1.5	3.6	0.6	0.0	92.9	0.0	100.0

FRA FRANCE

RABIES CASES

1. 4.91 - 30. 6.91

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	-	-	4	-	-	-	4	11	-	-	-	-	11		15
08 ARDENNES	1	-	-	-	-	-	1	15	-	-	-	-	15		16
10 AUBE	-	-	-	-	1	-	1	26	-	1	-	-	27		28
21 COTE D'OR	-	-	-	-	2	-	2	13	-	1	-	-	14		16
25 DOUBS	-	3	-	2	2	-	7	14	1	2	-	-	17		24
27 EURE	-	-	2	-	2	-	4	20	-	-	1	-	21		25
39 JURA	-	-	1	2	-	-	3	11	-	1	1	-	13		16
51 MARNE	-	-	-	1	-	-	1	15	-	-	-	-	15		16
52 MARNE (HAUTE)	2	1	2	-	9	1	15	8	-	-	-	-	8		23
54 MEURTHE ET MOSELLE	-	-	4	-	-	-	4	28	1	-	-	-	29		33
55 MEUSE	-	2	2	1	-	-	5	17	-	-	-	-	17		22
57 MOSELLE	-	1	1	-	3	-	5	36	-	-	-	-	36		41
59 NORD	-	-	-	-	-	-	0	2	-	-	-	-	2		2
60 OISE	-	1	-	-	-	-	1	5	-	-	-	-	5		6
67 RHIN (BAS)	-	-	-	-	1	-	1	7	-	-	-	-	7		8
68 RHIN (HAUT)	-	2	-	-	-	-	2	46	1	-	2	-	49		51
70 SAONE (HAUTE)	1	2	-	1	6	-	10	25	-	-	-	-	25		35
76 SEINE MARITIME	1	1	-	-	1	-	3	29	1	-	-	-	30		33
77 SEINE ET MARNE	-	1	-	-	-	-	1	-	-	-	-	-	0		1
80 SOMME	1	-	1	1	2	-	5	20	1	1	-	-	22		27
88 VOSGES	2	3	-	-	9	-	14	30	-	4	1	-	35		49
89 YONNE	-	-	-	-	-	-	0	12	-	-	-	-	12		12
90 TERR. DE BELFORT	-	-	-	-	-	-	0	1	-	-	-	-	1		1
95 VAL D'OISE	-	-	2	-	-	-	2	10	-	-	-	-	10		12
TOTAL	8	17	19	8	38	1	91	401	5	10	5	0	421	0	512
PER CENT	1.6	3.3	3.7	1.6	7.4	0.2	17.8	78.3	1.0	2.0	1.0	0.0	82.2	0.0	100.0

2nd Quarter: April - June 1991

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DEU		FEDERAL REPUBLIC OF GERMANY						R A B I E S C A S E S						1. 4.91 - 30. 6.91	
LOCATION		D O M E S T I C A N I M A L S						W I L D A N I M A L S						HUMAN CASES	TOTAL
CODE	NAME	DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS		
010	SCHLESWIG-HOLSTEIN							0						0	0
020	HAMBURG							0						0	0
031	BRAUNSCHWEIG							0	31	2	1	-	-	34	34
032	HANNOVER	-	-	1	-	-	-	1	11	-	1	-	-	12	13
033	LUENEBURG	-	1	-	1	2	-	4	10	-	-	-	-	10	14
034	WESER-EMS							0						0	0
040	BREMEN							0	2	-	-	-	-	2	2
051	DUESSELDORF							0						0	0
053	KOELN							0						0	0
055	MUENSTER							0						0	0
057	DETMOLD	-	-	1	-	-	-	1						0	1
059	ARNSBERG							0						0	0
064	DARMSTADT							0	26	-	-	3	-	29	29
065	GIESSEN	-	-	-	1	-	-	1	5	-	-	-	-	5	6
066	KASSEL	1	-	-	-	2	-	3	3	-	1	-	-	4	7
071	KOBLENZ	-	1	-	-	-	-	1	3	-	-	-	-	3	4
072	TRIER							0	3	-	1	1	-	5	5
073	RHEINHESSEN-PFALZ	1	-	-	-	-	-	1	6	-	-	-	-	6	7
081	STUTT GART	-	1	-	-	-	-	1	19	-	1	-	-	20	21
082	KARLSRUHE	-	-	1	-	-	-	1	5	-	-	1	-	6	7
083	FREIBURG							0	1	-	-	-	-	1	1
084	TUEBINGEN	-	3	1	-	-	-	4	16	2	-	-	-	18	22
091	OBERBAYERN							0	16	-	-	-	-	16	16
092	NIEDERBAYERN							0	7	-	-	-	-	7	7
093	OBERPFALZ							0	3	-	-	-	-	3	3

DEU CONTINUED																
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
094 OBERFRANKEN							0	10	-	-	-	-	10		10	
095 MITTELFRAKEN							0						0		0	
096 UNTERFRANKEN							0	2	-	-	-	-	2		2	
097 SCHWABEN		-	1	1	1	-	3	40	3	-	-	-	43		46	
100 SAARLAND		-	-	1	-	-	1	16	-	-	1	-	17		18	
110 BERLIN		2	5	-	-	-	7	14	-	1	16	3	34		41	
121 ROSTOCK		6	2	1	-	2	11	30	-	2	1	-	33		44	
122 SCHWERIN		2	3	4	-	-	9	24	-	6	1	-	31		40	
123 NEUBRANDENBURG		8	6	3	1	1	19	52	-	1	-	1	54		73	
131 POTSDAM		6	1	-	-	1	8	29	-	2	1	-	32		40	
132 FRANKFURT		6	5	-	-	-	11	51	-	4	2	-	57		68	
133 COTTBUS		-	2	-	-	-	2	21	1	-	-	-	22		24	
141 MAGDEBURG		11	4	2	-	-	17	37	1	1	1	-	40		57	
142 HALLE		4	2	1	-	1	8	44	-	2	3	-	49		57	
151 ERFURT		4	1	-	-	-	5	13	-	1	-	-	14		19	
152 GERA		-	3	-	-	2	5	26	1	1	-	-	28		33	
153 SUHL		-	1	1	-	1	3	6	-	-	-	-	6		9	
161 DRESDEN		2	1	3	-	12	19	50	3	1	3	-	57		76	
162 LEIPZIG		-	1	-	1	-	2	9	-	-	1	-	10		12	
163 CHEMNITZ		-	3	-	-	2	5	8	-	1	2	-	11		16	
TOTAL		53	47	21	5	26	153	649	13	28	37	4	731	0	884	
PER CENT		6.0	5.3	2.4	0.6	2.9	0.1	17.3	73.4	1.5	3.2	4.2	0.5	82.7	0.0	100.0

HUN HUNGARY		RABIES CASES												1. 4.91 - 30. 6.91		
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							0	1	-	-	-	-	1		1
02	BARANYA	1	-	-	-	-	-	1	7	-	-	1	-	8		9
03	BACS-KISKUN	1	1	1	-	-	-	3	9	-	-	-	-	9		12
04	BEKES	1	1	1	-	-	1	4	10	-	-	-	-	10		14
05	BORSOD-ABAUJ-ZEMPLEN	1	-	1	-	-	-	2	5	-	-	-	-	5		7
06	CSONGRAD	-	-	1	-	1	1	3	10	-	-	-	-	10		13
07	FEJER	-	1	-	-	-	-	1	6	-	-	-	-	6		7
08	GYOER-SOPRON	-	-	-	-	-	-	0	1	-	-	-	-	1		1
09	HAJDU-BIHAR	-	1	-	-	-	-	1	1	-	1	-	-	2		3
10	HEVES	-	1	-	-	1	-	2	2	-	-	-	-	2		4
11	KOMAROM	-	-	-	-	-	1	1	8	-	-	-	-	8		9
12	NOGRAD	-	1	-	-	-	-	1	1	-	-	-	-	1		2
13	PEST	-	2	-	-	-	-	2	11	-	-	-	-	11		13
14	SOMOGY	-	1	-	-	-	-	1	4	-	-	-	-	4		5
15	SZABOLCS-SZATMAR	-	1	1	-	-	-	2	2	-	-	-	-	2		4
16	SZOLNOK	3	3	1	-	-	-	7	1	-	-	-	1	2		9
17	TOLNA	-	-	-	-	-	-	0	2	-	-	-	-	2		2
18	VAS	-	-	-	-	-	-	0	10	-	-	-	-	10		10
19	VESZPREM	-	-	1	-	-	-	1	8	-	-	-	-	8		9
20	ZALA	-	-	-	-	-	-	0	5	-	-	-	-	5		5
TOTAL		7	13	7	0	2	3	32	104	0	1	1	1	107	0	139
PER CENT		5.0	9.4	5.0	0.0	1.4	2.2	23.0	74.8	0.0	0.7	0.7	0.7	77.0	0.0	100.0

POL POLAND

RABIES CASES

1. 4.91 - 30. 6.91

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							0	5	-	-	-	-	5		5
03	BIALA PODLASKA							0	2	-	-	-	-	2		2
05	BIALYSTOK							0	3	-	-	-	-	3		3
07	BIELSKO-BIALA	-	1	-	-	-	-	1	1	1	-	-	-	2		3
09	BYDGOSZCZ	2	1	2	-	-	-	5	10	-	-	-	1	11		16
15	CZESTOCHOWA							0	1	-	-	-	-	1		1
17	ELBLAG	-	1	-	-	-	-	1	1	-	-	-	-	1		2
19	GDANSK							0	32	-	1	2	4	39		39
21	GORZOW	-	-	1	-	-	-	1	15	-	-	1	2	18		19
23	JELENIA GORA	1	-	-	-	-	-	1	11	-	-	-	-	11		12
25	KALISZ	1	-	-	-	-	-	1	4	-	-	1	-	5		6
27	KATOWICE	2	-	-	-	-	-	2	3	-	3	-	-	6		8
29	KIELCE	-	1	-	-	-	-	1	3	-	-	-	-	3		4
31	KONIN							0	1	-	-	-	-	1		1
33	KOSZALIN	4	-	1	-	-	-	5	17	-	2	2	4	25		30
35	KRAKOW	-	1	-	-	-	-	1		-	-	-	-	0		1
39	LEGNICA	-	1	-	-	-	-	1	10	-	-	-	-	10		11
41	LESZNO							0	3	-	-	1	-	4		4
49	NOWY SACZ							0	5	-	-	1	-	6		6
51	OLSZTYN	-	1	4	1	-	-	6	5	-	-	2	3	10		16
53	OPOLE	2	-	-	-	-	-	2	9	-	2	-	-	11		13
55	OSTROLEKA	-	-	1	-	-	-	1	1	-	-	-	-	1		2
57	PILA	1	2	-	-	-	-	3	9	2	1	-	3	15		18
59	PIOTRKOW TRYB	1	3	-	-	-	-	4	2	1	2	-	-	5		9
61	PLOCK							0	-	-	1	-	-	1		1
63	POZNAN	5	1	-	-	-	-	6	11	-	1	4	1	17		23
65	PRZEMYSL							0	-	-	-	-	1	1		1
67	RADOM	-	1	-	-	-	-	1	3	-	-	-	-	3		4
69	RZESZOW	-	1	-	-	-	-	1	2	-	-	1	-	3		4
71	SIEDLCE	-	3	-	-	-	-	3	1	-	-	-	-	1		4
73	SIERADZ							0	2	-	-	-	-	2		2
75	SKIERNIEWICE							0	1	-	-	-	-	1		1
77	SLUPSK	7	-	-	-	-	-	7	16	-	-	1	2	19		26
79	SUWALKI	1	1	-	-	-	-	2	1	-	-	-	3	4		6
81	SZCZECIN							0	15	-	1	-	1	17		17
83	TARNOBRZEG							0	2	-	-	-	-	2		2
85	TARNOW	1	-	-	-	-	-	1	7	-	-	-	-	7		8
87	TORUN	1	1	-	-	-	-	2	3	-	-	1	2	6		8
89	WALBRZYCH	1	-	1	-	-	-	2	10	-	-	2	-	12		14
91	WLOCLAWEK							0	8	-	1	-	-	9		9
93	WROCLAW	-	1	-	-	-	-	1	8	-	-	-	-	8		9
95	ZAMOSC							0	3	-	-	-	-	3		3
97	ZIELONA GORA							0	4	-	1	-	-	5		5
TOTAL		30	21	10	1	0	0	62	250	4	16	19	27	316	0	378
PER CENT		7.9	5.6	2.6	0.3	0.0	0.0	16.4	66.1	1.1	4.2	5.0	7.1	83.6	0.0	100.0

2nd Quarter: April - June 1991

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R A B I E S C A S E S															1. 4.91 - 30. 6.91	
LOCATION CODE NAME		D O M E S T I C A N I M A L S						W I L D A N I M A L S						HUMAN CASES	TOTAL	
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS			TOTAL
ROM R O M A N I A																
01	ALBA						0	1	-	-	-	-	1		1	
06	BISTRITA-NASAUD	-	1	-	-	-	1						0		1	
07	BOTOSANI						0	1	-	-	-	-	1		1	
11	CARAS-SEVERIN						0	-	-	-	-	1	1		1	
13	CLUJ						0	2	-	-	-	-	2		2	
17	DOLJ	-	-	-	-	-	2						0		2	
20	GORJ	-	-	1	-	-	1						0		1	
25	MARAMURES	-	1	-	-	-	1						0		1	
27	MURES						0	1	-	-	-	-	1		1	
32	SALAJ	-	-	-	1	-	1	1	-	-	-	1	2		3	
TOTAL		0	2	1	1	0	6	6	0	0	0	2	8	0	14	
PER CENT		0.0	14.3	7.1	7.1	0.0	42.9	42.9	0.0	0.0	0.0	14.3	57.1	0.0	100.0	
SPA S P A I N																
52	MELILLA (NORTH AFRICA)	2	-	-	-	-	2						0		2	
SWI S W I T Z E R L A N D A N D L I E C H T E N S T E I N																
01	AARGAU						0	1	-	-	-	-	1		1	
06	BERN						0	16	-	2	-	-	18		18	
12	NEUCHATEL						0	7	-	-	-	-	7		7	
26	JURA						0	3	-	-	-	-	3		3	
TOTAL		0	0	0	0	0	0	27	0	2	0	0	29	0	29	
PER CENT		0.0	0.0	0.0	0.0	0.0	0.0	93.1	0.0	6.9	0.0	0.0	100.0	0.0	100.0	
YUG Y U G O S L A V I A																
10	SR BOSNA I HERCEGOVIN	-	1	1	-	3	5	6	-	-	-	-	6		11	
20	SR CRNA GORA	-	-	-	-	2	2						0		2	
30	SR HRVATSKA	1	-	-	-	1	2	81	-	-	-	-	81		83	
50	SR SLOVENIJA	-	6	-	-	-	6	44	-	-	-	-	44		50	
60	SR SRBIJA	1	-	-	-	-	1						0		1	
61	SAP VOJVODINA	-	-	-	1	-	1	5	-	-	-	-	5		6	
TOTAL		2	7	1	1	6	17	136	0	0	0	0	136	0	153	
PER CENT		1.3	4.6	0.7	0.7	3.9	11.1	88.9	0.0	0.0	0.0	0.0	88.9	0.0	100.0	

SSR		UNION OF SOVIET SOCIALIST REP.						R A B I E S C A S E S						1. 4.91 - 30. 6.91		
LOCATION		D O M E S T I C A N I M A L S						W I L D A N I M A L S						HUMAN CASES	TOTAL	
CODE	NAME	DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS			TOTAL
01	RSFSR	40	4	76	1	52	1	174	-	-	-	-	31	31	205	
02	MOLDAVIAN SSR	-	-	2	-	-	-	2	-	-	-	-	0	0	2	
03	UKRAINIAN SSR	23	29	27	-	-	1	80	-	-	-	-	36	36	116	
04	BYELORUSSIAN SSR	2	2	2	1	-	-	7	-	-	-	-	13	13	20	
05	LITHUANIAN SSR	3	1	7	-	-	-	11	-	-	-	-	1	1	12	
06	LATVIAN SSR	12	8	4	-	1	-	25	-	-	-	-	41	41	66	
07	ESTONIAN SSR	13	8	-	-	-	-	21	-	-	-	-	47	47	68	
TOTAL		93	52	118	2	53	2	320	0	0	0	0	169	169	0	489
PER CENT		19.0	10.6	24.1	0.4	10.8	0.4	65.4	0.0	0.0	0.0	0.0	34.6	34.6	0.0	100.0

2nd Quarter: April - June 1991

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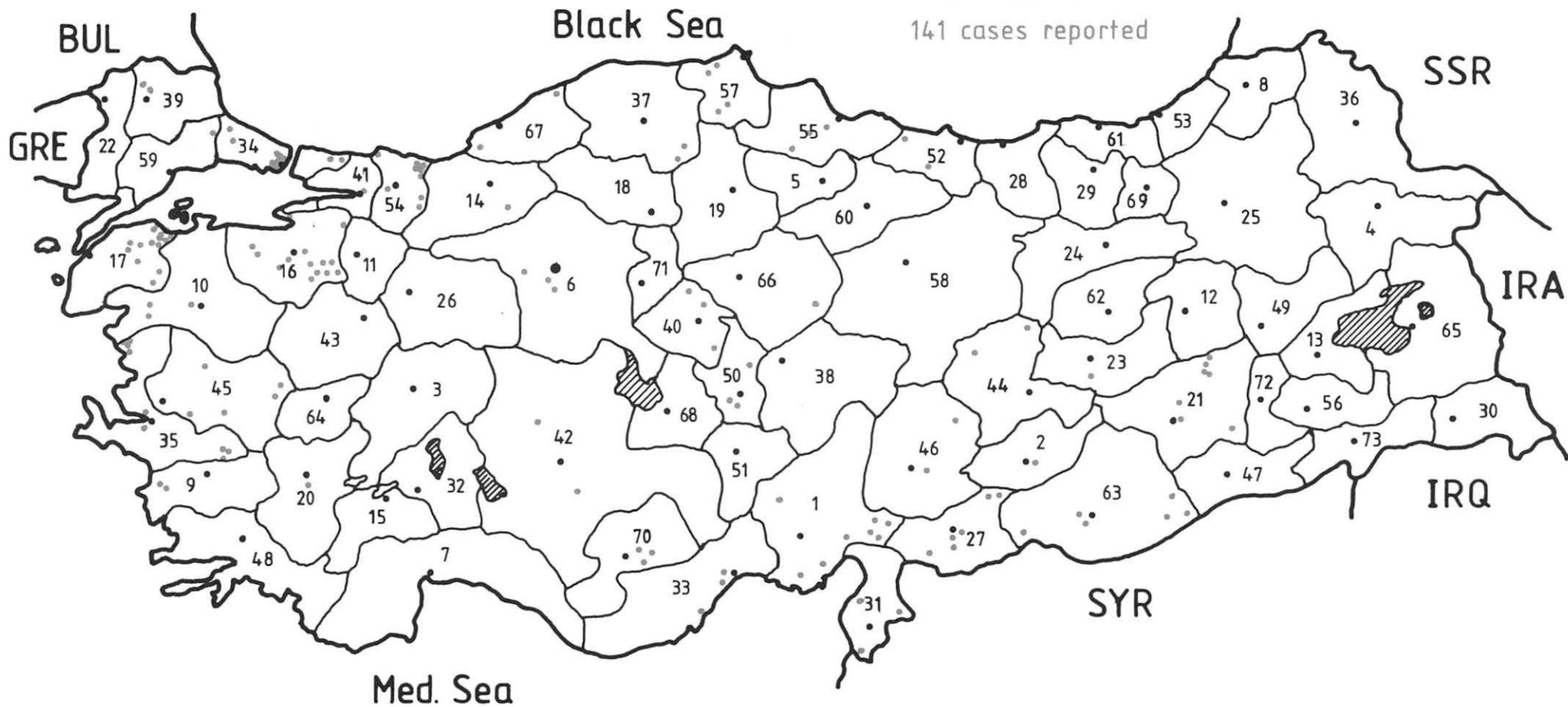
TUR		TURKEY											RABIES CASES					1. 4.91 - 30. 6.91	
LOCATION		DOMESTIC ANIMALS						WILD ANIMALS						HUMAN CASES	TOTAL				
CODE	NAME	DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS			TOTAL			
01	ADANA	4	2	-	-	-	2	8						0		8			
02	ADYAMAN	-	-	1	-	-	-	1						0		1			
06	ANKARA	1	2	-	-	-	-	3						0		3			
09	AYDIN	1	-	-	-	-	1	2						0		2			
10	BALIKESIR	3	-	-	-	-	-	3						0		3			
14	BOLU	-	-	1	-	-	-	1						0		1			
16	BURSA	13	-	-	-	1	-	14						0		14			
17	CANAKKALE	13	-	-	-	1	-	14						0		14			
20	DENIZLI	1	-	-	-	-	-	1						0		1			
21	DIYARBAKIR	2	-	4	-	-	1	7						0		7			
23	ELAZIG	1	-	-	-	-	-	1						0		1			
27	GAZIANTEP	5	-	1	-	-	-	6						0		6			
31	HATAY	2	-	-	1	-	-	3						0		3			
33	ICEL	1	1	-	-	-	1	3						0		3			
34	ISTANBUL	9	1	1	-	-	-	11						0		11			
35	IZMIR	9	-	-	-	-	-	9						0		9			
37	KASTAMONU	1	-	-	-	-	-	1	1	-	-	-	-	1		2			
39	KIRKLARELI	2	-	-	-	-	-	2						0		2			
40	KIRSEHIR	3	-	-	-	-	-	3						0		3			
41	KOCAELI	1	-	-	-	-	-	1						0		1			
42	KONYA	2	-	-	-	-	-	2						0		2			
44	MALATYA	2	-	-	-	-	-	2						0		2			
45	MANISA	5	-	-	-	-	-	5						0		5			
46	KAHRAMANMARAS	2	-	-	-	-	-	2						0		2			
50	NEVSEHIR	2	-	-	-	-	-	2						0		2			
52	ORDU	1	-	1	-	-	-	2						1		3			
54	SAKARYA	7	-	2	-	-	-	9						0		9			
55	SAMSUN	3	-	-	-	-	-	3						0		3			
57	SINOP	2	-	2	-	-	-	4						0		4			
59	TEKIRDAG	1	-	-	-	-	-	1						0		1			
63	SANLIURFA	4	-	2	-	-	-	6						0		6			
66	YOZGAT	1	-	-	-	-	-	1						0		1			
67	ZONGULDAK	1	-	1	-	-	-	2						0		2			
68	AKSARAY	1	-	-	-	-	-	1						0		1			
70	KARAMAN	2	-	-	-	-	-	2	1	-	-	-	-	1		3			
TOTAL		108	6	16	1	2	5	138	2	0	0	0	1	3	0	141			
PER CENT		76.6	4.3	11.3	0.7	1.4	3.5	97.9	1.4	0.0	0.0	0.0	0.7	2.1	0.0	100.0			

6. List of Contributors

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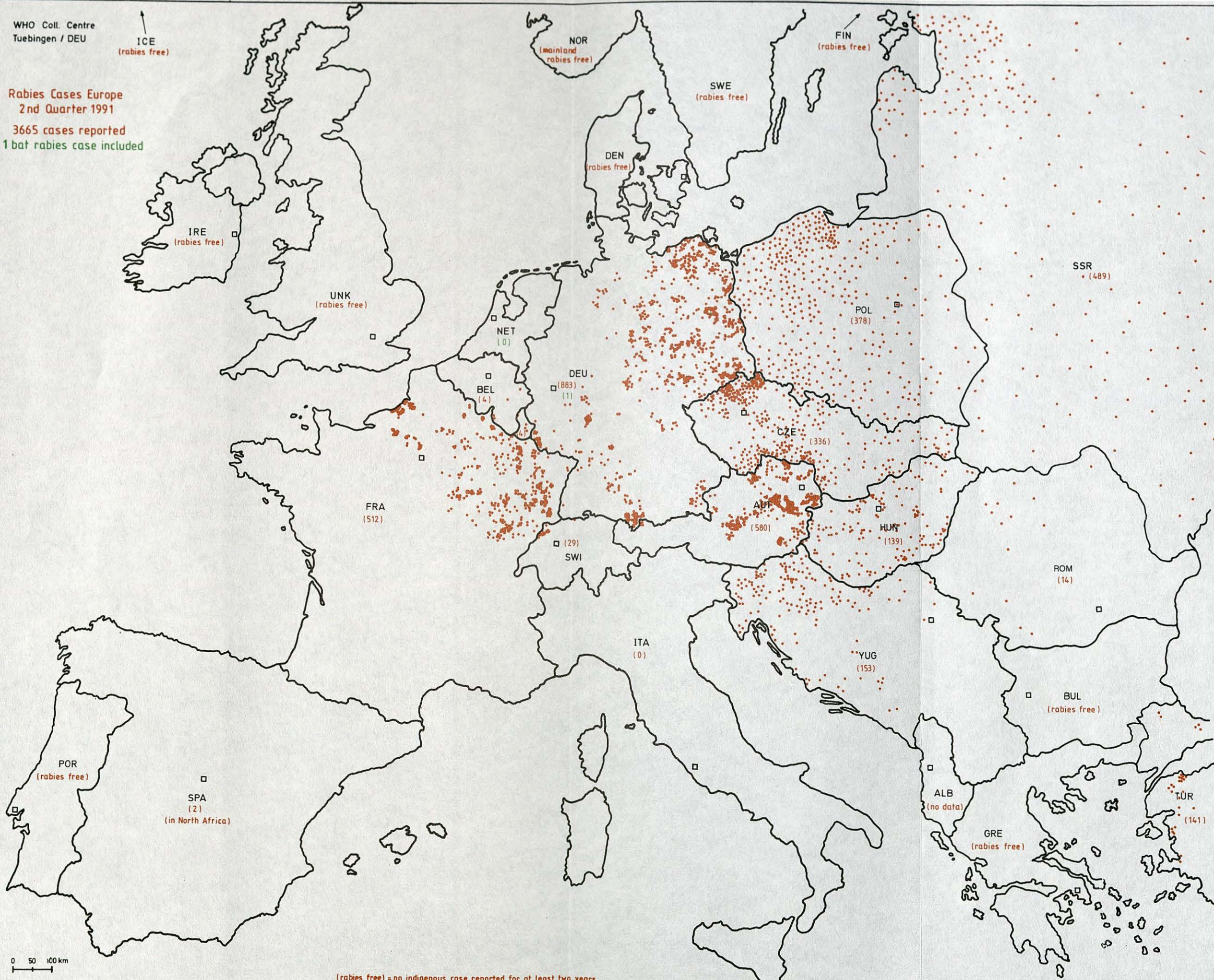
WHO Coll. Centre
Tuebingen / DEU

Rabies Cases Turkey
2nd Quarter 1991
141 cases reported



ICE
(rabies free)

Rabies Cases Europe
2nd Quarter 1991
3665 cases reported
1 bat rabies case included



0 50 100 km

(rabies free) = no indigenous case reported for at least two years