THE URBAN PEST ADVISORY SERVICE OF ZURICH (SWITZERLAND) AND THE SITUATION OF SOME SELECTED PESTS

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Abstract - The Urban Pest Advisory Service with three part-time employees is responsible for the hygienic aspects concerning urban pests in the city of Zurich, Switzerland. The city has a surface of 9,200 hectares and 360,000 inhabitants. The main fields of work are the following: 1. to give advice to the public and the local pest control companies (animal species identification) in cases of pest incidence and infestations, 2. pest control in public areas (mainly rats) and city owned buildings, 3. survey (monitoring) of the pest situation in the city of Zurich and 4. public relations. We developed a computer data base allowing us to monitor pest incidence at specific locations and over time. We give approximately 2,000 consultations yearly concerning pests and their control. Thanks to our data base and a systematic recording of cases, the development of various problematic pest populations (cockroaches, pharao ants, rats etc.) can now be traced over years. We present the frequency of the most-reported pests and the development of the cockroach situation of the last 5 years. *Blattella germanica* (L.), *Supella longipalpa* (F.) and *Blatta orientalis* L. occur in the ratio 17.45 : 3.75 : 1. The significant decrease of cockroaches in the last 5 years is due to the decreasing occurrence of *B. germanica*. The indigenous species *Ectobius lapponicus* (L.) shows no significant change during the last 5 years.
Key words - Cockroaches, *Blattella germanica*, *Ectobius lapponicus*, urban pest data base, monitoring

INTRODUCTION

The Urban Pest Advisory Service (UPAS) is financed by the city of Zurich and not, what might be expected, by the state or national government. As there is no similar institution in Switzerland, inquiries of the whole country about pest problems are sent to us and answered. We advise the people of Zurich about problems concerning pests and other occasionally occurring invaders, like grasshoppers, bats, plant-feeding bugs etc. We are also responsible for the control of pests on public grounds, mainly rats. However, we have no obligation to advise people with horticulture, agronomic or forestry pests.

The UPAS was provisionally founded by the head of the health department in July 1930 for the control of overwintering mosquitoes (*Culex* sp.) in cellars. A chemist and two assistants were employed. Soon after, they were charged with the control of rats, mice and bed bugs. They supervised private pest control operators in the use of highly toxic gases. It soon became clear that only a planned and coordinated pest control and advisory service would lead to long term success. In 1933 the UPAS was definitively integrated into the health department. In the time from 1967 to 1988 the UPAS was rarely mentioned in the annual reports of the health department. During that time the employees had little expert knowledge and no species identifications were performed. Today the UPAS consists of 3 employees, two biologists and an agronomist who share two full-time jobs. The UPAS is integrated into the food inspection office within the health department.

The main tasks of the UPAS consist in: 1) Advising the population of Zurich on pest problems including private pest control operators (animal species identification), physicians and other city institutions. Inspections of locations with pest problems are made to enforce the house owners to have the pests eradicated. Restaurants and food stores are also inspected regularly by the food controllers and if pest problems occur or are suspected, inspections are done together. 2) Pest control in communal buildings like schools, homes for retired people, city hospitals, official buildings, offices and public grounds. Since 1994 rats are no longer controlled in the sewage system, but only on the surface. Critical places like the lake and river shores are monitored regularly. 3) Monitoring the pest and animal situation in Zurich. Additionally we try to prevent the spread of newly imported pests such as the Ghost ant, *Tapinoma*

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melanocephalum (F.). 4) Public relations: This includes presentations and training of those responsible in the public service. Market stands in public areas and interviews for newspapers proved to be quite efficient.

Zurich lies at the outlet of the lake of Zurich and is bordered laterally by moraines. It is the biggest city in Switzerland and today has a population of approximately 360,000 people. The city total surface consists of 9‘200 hectares, including 2,200 hectares of woods and 550 hectares of water surface. There are two main rivers flowing through Zurich, the Limmat and the Sihl. The populated area ranges from 395 to 625 meters above sea level. The city has 915 kilometres of public sewage system and about 1‘800 kilometres of privately owned accesses. Compared to other cities Zurich’s public sewage system is in rather good condition and is flushed at least every three years. In the medieval town centre, houses are closely together which may enhance the spreading of pests.

MATERIALS AND METHODS

The data collected through our advisory work and pest control operations are registered in a computer data base (Access) especially designed for the UPAS by Müller (1997). The data file contains the exact addresses (street name and number) and dates of occurrence, the species names or animal-groups of the pest(s) (as far as can be determined), the name of the reporting person (optional) and specific remarks on the case. The data base contains a specially designed list of all reported animals (including pests) based on the scientific systematics (phylum, class, order, family, genus, species) according to Sauter (1986), Stresemann *et al.*, (1986) and Weidner (1993). For each systematic group there is a 3 digit code which ends up in a 18 digit code for a species. Often people report pests or animals in the family group like mice, ants or wasps. Unless they send them to us for identification we can only register the group and not the species. People also report noises, smells, stings or other annoyances which might be associated with animals. These are separate groups in our list that can not be found in conventional animal systematics.

If a control operation through the UPAS is necessary the appointment can be recorded in a separate work sheet of the data base linked to the enquiry. After the operation, a report can be included on a sheet linked to the above one. All appointments can be listed and printed separately which helps to organise the work.

The registered data are evaluated in different ways. The sub-programme monthly statistics gives an overview of the number of inquiries, the number of work reports (pest control actions, inspections), work hours and the returns. The sub-programme frequency of animals shows the monthly reported animals. With the sub-programme distribution of animals the monthly local occurrence of animals in the different districts can be surveyed. With the help of a geographical information system, we will be able to plot the pest distribution in Zurich on a map. This will enable us to detect and visualise ”hot spots”.

At present the computer database contains only data from 1996 to 1998. It is difficult to show relevant trends of pest development within such a short period of observation. Therefore, the manually registered data of 1994 and 1995 were added from the archives. The selection of inquiries from Zurich is possible in the computer database but would be too time consuming for the data of 1994/95. Therefore, we present the data consisting of inquiries from the city of Zurich and the rest of Switzerland.

RESULTS

Over the past five years the number of inquiries fluctuate from 1,737 to 2,335 (Figure 1). About 75 % of these are registered by species or animal group and the address of infestation. The remaining 25 % contain too little information (lacking address etc.) to be of further interest. Figure 2 shows the average occurrence of the most often reported pests for the period 1996 - 1998. The sectors with family names

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(e.g. wasps, ants etc.) contain all exactly identified species and animals only determined to the genus or family. In the sector Blattodea, *Ectobius lapponicus* (L.) is excluded. The occurrence of some animals e.g. wasps changes from year to year due to yearly varying climate. Others, like rats, mice, ants, have been quite constant during the past few years. The sector other animals contains a large variety of different species. In 1998 there was a total of 233 identified species and partly identified animal groups. Many of them are not real pests like moles, beetles of the Carabidae, outdoor moths etc. In 1998 123 species or animal groups were reported only once or twice. Of the total of 2,122 reported animals 74% were insects, 15% vertebrates and 3% arachnida.

We compared the frequency of species occurring in Denmark in 1997 (Danish Pest Infestation Laboratory, 1998) with that of the city of Zurich (average 1996-1998) according to the registered inquiries. The occurrence of wasps, ants, Indian meal moths *Plodia interpunctella* (H.) and mice are very similar in both countries. In Zurich, however, there is a much higher frequency of cockroaches, *E. lapponicus* and rats than in Denmark (1%, 0.02% and 2% in Denmark compared to 15%, 10% and 7% in Zurich). The mortar attacking bee *Colletes daviesanus* (S.) occurs in high numbers in Denmark (1997: 4%), whereas in Zurich we have no corresponding reports.

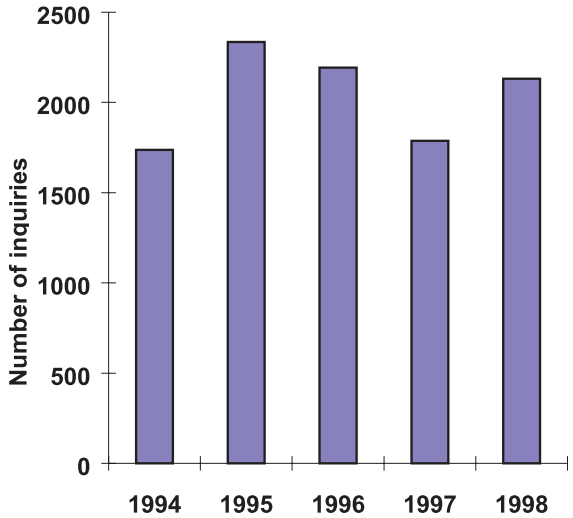

Figure 1. Total number of inquiries from 1994-1998.

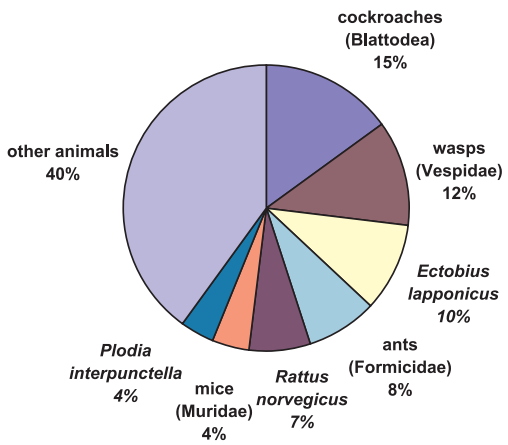

Figure 2. Average occurrence of the most often reported pests 1996-1998. Blattodea excluding *E. lapponicus*.

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During the last five years we observed a remarkable change in frequency of cockroaches (the data from the years before are not yet available). Speaking of cockroaches in the following we mean the tropical species that live in buildings and exclude the native *Ectobius sp*. Figure 3 shows the percentage of cockroaches from total inquiries. When the linear regression was tested using the analysis of variance, the decrease is highly significant ($F_{1,3} = 108$; $p = 0.0019$; $y = -3.6x + 7205$; $r^2 = 0.973$).

Figure 4 shows the number of different cockroaches per year. The American cockroach *Periplaneta americana* (L.) and the Australian cockroach *Periplaneta australasiae* (F.) were rare (0 to 4 registrations per year). The Surinam cockroach *Pycnoscelus surinamensis* (L.) was reported only once in 1997. The Oriental cockroach *Blatta orientalis* L. and brown-banded cockroach *Supella longipalpa* (F.) remained

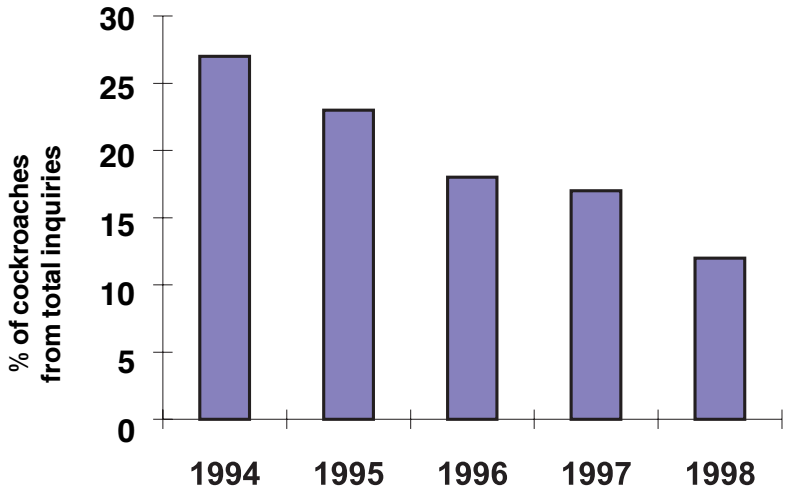

Figure 3. Percentage of cockroaches from total inquiries from 1994-1998.

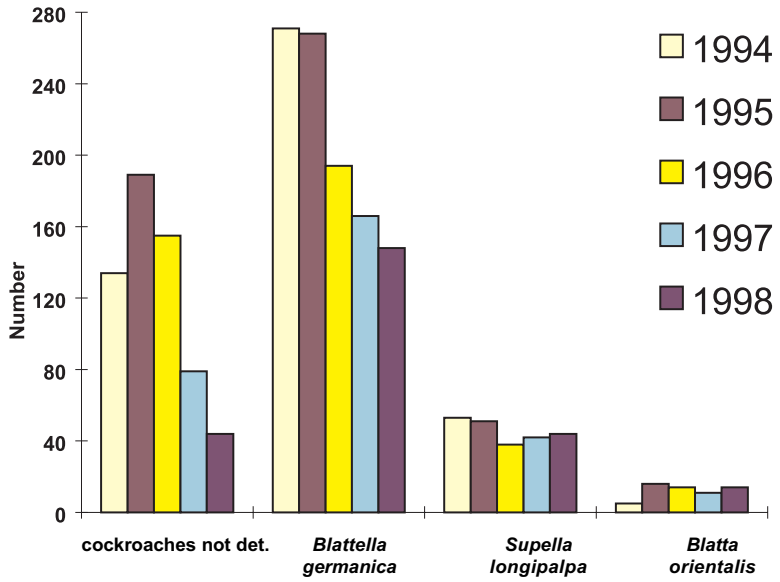

Figure 4. Number of different cockroach species from 1994-1998. Not. det. = not determined to species.

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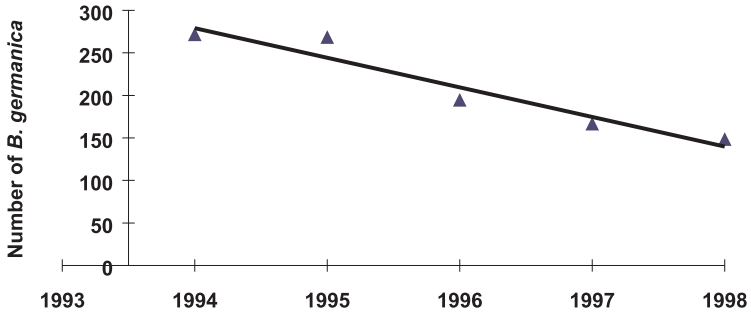

Figure 5.
Number of *B. germanica* with linear regression from 1994-1998.

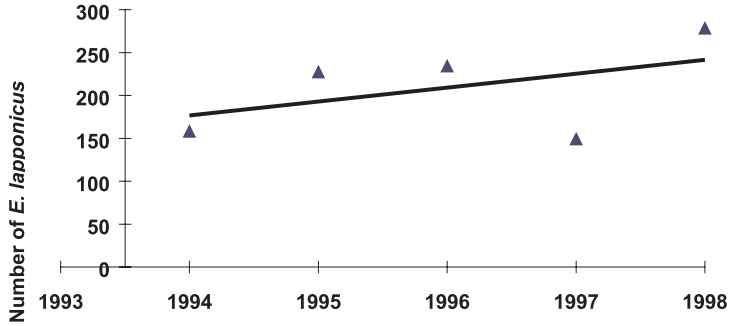

Figure 6.
Number of *E. lapponicus* with linear regression from 1994-1998.

constant. The average ratio of the German cockroach *Blattella germanica* (L.)*: S. longipalpa: B. orientalis* is 17.45 : 3.75 : 1 for the years 1994-1998. Figure 5 shows the highly significant decrease of *B. germanica* ($F_{1,3}$ = 36.014; p = 0.0093; y = -34.8x + 69670.2; r^2 = 0.923). Figure 6: the increase of *E. lapponicus* in the last five years is not significant ($F_{1,3}$ = 0.614; p = 0.4906; y = 0.6x - 1187; r^2 = 0.17).

DISCUSSION

The fluctuation shown in Figure 1 may be partly caused by climatic factors. An other factor may be how well-known our service is within the public of Zurich. The more we do to become known, the more inquiries we will receive. The total number of inquiries of the Danish Pest Infestation Laboratory is about six times higher (1997: 12,150 inquiries) than ours, but it is interesting to compare the average occurrence of the most frequent pests (Figure 2). The differences are partly due to the different sampling methods of the two institutions. 75% of our reports are from the city of Zurich, while the Danish reports are based country wide. Cockroaches and rats develop especially well in densely populated areas with a big sewage system and are more or less isolated in the countryside. The high frequency of *E. lapponicus* is probably due to different climatic conditions between Switzerland and Denmark. In Denmark *C. daviesanus* burrows in the mortar joints between bricks of house walls and joints of chimneys in houses built before World War 2 and may cause damage (per Sejerø Nielsen, pers. information) whereas to us (with far less brick houses) this problem is not known in Zurich and surroundings.

The decrease of not determined cockroaches in Figure 4 is due to the fact that we persuade people to send or bring us their insects. The decrease of the percentage of cockroaches (Figure 3) can be attributed to the decrease of *B. germanica* (Figure 5). There are different possibilities to explain this fact. Perhaps the population of Zurich has a good knowledge of this pest. People are well informed about what can be done and therefore the propagation can be prevented by quick treatments from pest control operators. Another explanation might be newer and effective control techniques (e.g. gel bait application) and insecticides used by the pest control operators. Furthermore, a new law on food and hygiene has been enacted which requires that restaurants must have a concept of self-control. Therefore, many restaurants and food processing stores have contracts with pest control operators who monitor and

control all pests regularly. If the cockroach populations are small, the chance of a further spread is reduced. We don't know whether this trend has been recorded in other cities too. If so, it might be that our living conditions are changing. For *B. orientalis* these changes (central heating, new buildings) caused a decrease in Great Britain in this century (Cornwell, 1968). However, our data registered over five years are a too short period to show such changes. In addition *B. germanica* tolerates a wide range of temperature and humidity (Metzger, 1995). Since we have not heard of a decline of *B. germanica* at other places, it is possible that the sample of our data base is not representative enough. Further, the public we reach with our advertisements in the newspaper, market stands on public places, articles in newspapers etc. may not be representative of the general population of Zurich. To test this hypothesis it would be necessary to take houses at random in Zurich and count the frequency of *B. germanica*.

Figure 6 shows the non-significant increase of *E. lapponicus*. The increase may be significant if the years before are taken into consideration. Our former colleague told us that in the early nineties *E. lapponicus* was hardly found in houses by pest control operators in Switzerland (Karl Dorn, pers. information). *Ectobius* sp. is only mentioned in specialist literature (Weidner, 1993; Stresemann, 1986; Mallis, 1997). The reason might be that it is not considered to be a pest although it is now often confounded with *B. germanica* by amateurs. It is astonishing that pest control magazines in German language (Der praktische Schädlingsbekämpfer, Pest Control News) do not mention *Ectobius* sp. considering the amount of inquiries we receive in Zurich: in July 1998 25% of all inquiries concerned *E. lapponicus*.

In the future it will be possible to carry out further interesting evaluations. The geographical localisation of pests will give us more information about the population dynamics and will help to react quickly in the affected areas. Our data base also contains interesting data which can be used for environmental purposes. Every year we register data of a wide range of animals. This is especially interesting because the fauna in big cities is not as well-known as in other biotops (Klausnitzer, 1993).

The results presented here are only a small part of the information that can be extracted from our data base. We intend to collect and publish more data in the future. This enables us to consider and discuss the pest or animal situation of the city of Zurich with specialists of other urban areas allowing comparisons with the pest and animal situation of other cities and countries.

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