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40 Years of rat control in Budapest: The importance of sewer treatments for effective rat control in urban areas

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Rats proliferating in urban areas may spread infectious diseases, cause considerable economical damages or through the reaction they provoke, may annoy inhabitants; therefore, their control is indispensable. The question remains: where exactly should control be carried out to obtain appropriate results?

Deratization* of Budapest city

Budapest, the capital city of Hungary, is the only metropolis in the world where in the last 40 years or more, rats have not caused any public health, economic or general discomfort problems. This result has been achieved by Bábolna-Bio following an initial deratization campaign carried out in 1971-72 and the continuous maintenance works performed since then. As a result of these efforts, the initial 32.8 % for rat-infested premises, has decreased significantly and has in recent years, fluctuated between 0.07% and 0.1 %. (3, 5) As a result of the remarkable efficacy of the Budapest rat control programme, the World Health Organization described it, in its brochure about rat control published in autumn 1998, "as the best organized long-term rat control programme in the world".⁽¹¹⁾

In parallel to the successful maintenance operation in Budapest, the occurrence rate of the remaining above ground rat population in buildings and in the underground sewage system has been investigated for over 40 years. (6) This long-term investigation was made possible by the unique fact that, during this time, the whole rat control project has been carried out by the same company. To determine the rat infestation, the following data have been collected by Bábolna Bio: consumption of rodenticide baits, observation of live rats, observation of gnawing traces and droppings, detection of exits of rat burrows and in collaboration with the Budapest public health authority; notices from inhabitants, consumption of non-poisonous assessment bait cubes and observation of foot prints.⁽⁹⁾

In order to register or record the data relating to the habitats of rats, a special code system was devised relating to larger

complex or macro habitats and within these smaller distinct units called micro habitats, which are different from each other. In total, the code system includes 95 different micro habitats. To assess building related and unrelated rat occurrences in both above-ground and underground premises, Bábolna Bio set up three categories according to macro and micro habitats:

- building related rat occurrences – and within this – in the sewage system within buildings
- in public sewage system not belonging to buildings
- building unrelated occurrences in other areas

For the successful organization and follow-up of the maintenance work Bábolna Bio developed special software.⁽⁶⁾ This software allows to store and analyze the obtained data during the maintenance which was used for the purpose of this article, too.

Remaining rat infestations in the sewer

For reasons of simplicity, this article seeks to analyze the data for 2000-2011 only. In the last 12 years the total number of known rat-infested premises in Budapest (with an

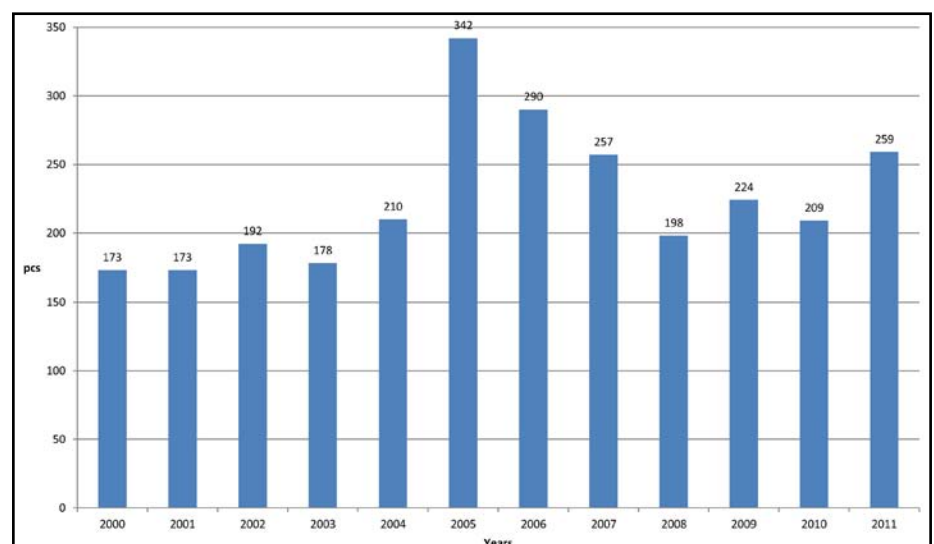
area of 525 km²) varied between 173 and 342 premises per year.⁽⁷⁾ Considering the size of the area and the total number of premises, this can be regarded as minimal.

In buildings and in sewers, the average rat occurrence rates show (Figure 1) that the most frequent rat habitats are 'the buildings except drains (39.7 %)', followed by 'the public sewage system (35.7 %)' and 'drain systems in buildings (16.7 %)' and lastly 'others (7.9 %)'. Adding up the occurrences in the 'public sewage system' and 'drain system in buildings', shows that 52.4 % of rat habitat could be related to drain and sewage systems (Figure 2).

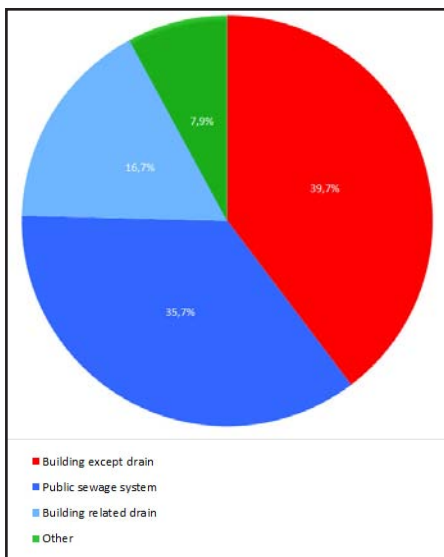
This is not a very surprising result since sewage and drain systems are considered as the ideal foraging routes for rat habitats due to the more stable climate, year-round breeding without seasonal fluctuations, and minimum threat of predation. This means that rats in sewer systems and drains can develop and reproduce year round, without any specific concerns.

However, all too often, strategies for rat control are based on complaints by residents and treatment is adapted only for above-ground premises. (10) If there are defects in the sewers and drains, regular movement of rats between 'sewers and drains' and above-ground areas without being noticed, is highly possible. In other words, previously treated above-

Figure 1: Number of rat-infested premises in Budapest per year



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Average rat occurrence in above-ground and drain and sewage system habitats between 2000 and 2011

ground areas may suffer re-infestation originating from the sewage and drainage systems, which serve as reservoirs for the rat population.

What should be used to control rats in the sewer?

Bábolna Bio finished the initial programme of deratization of Budapest ⁽¹⁾ in December 1972 ^(3, 12). Following completion of the programme, it was concluded that benefits from the work and money invested could only be realized if the initial rat control activity was followed immediately by a maintenance programme aimed at maintaining the rat-free conditions.

The Bábolna deratization approach was based on the principle that control in the above-ground premises and in the underground sewer should be performed simultaneously. ⁽⁴⁾ It was obvious that for long-term maintenance, the control of rats occurring in the highly humid sewer system has to be addressed with an appropriate rodenticide. In the early 70s, rat control in the sewer system was carried out either with loose or grain bait, since other formulation types were not available at the time.

To achieve effective control, there was a need for a rodenticide, which not only remained effective in sewers; but could withstand the high humidity and the

fungal environment over a long period of time; and would allow easy observation of consumption by rats. The rodenticide used should also be easily applied both via manholes and in gullies. An additional objective was to be able to reduce the quantity of the rodenticide used by increasing the residual efficacy of the bait.

To achieve the objectives outlined above, Bábolna Bio's predecessor, the Disinfection Station of Bábolna developed a disc shaped wax block, which contained 26.3 % paraffin. The sewer wax block had a built in hanger hook for safe fixing, and was covered with multilayer paraffin in order to withstand the adverse conditions of the sewers. (Photo 1)

The efficacy of the new formulation developed in 1974, was tested both in laboratory and under field conditions. The field experiment was carried out in 1974 in the sewers of downtown Győr, situated 120 km from Budapest. The active was coumatetralyl, a first generation anticoagulant active ingredient. The effect was a reduction in the initial 56 % rat infestation in the sewers to 2.5 % in just 7 weeks. A detailed publication of the field experiment performed in Győr was published in the Nov-Dec 1976 issue of International Pest Control. ⁽²⁾ (Photo 2)

Having produced favorable results in both laboratory and field trials, the industrial (large scale) production of disc shaped wax blocks used for the treatment

of the sewer system, began for the first time in the world. Although paraffin may decrease the acceptance of rodenticides containing such material by rats, compared to loose bait, it is still considered a reasonable compromise compared to the effective elimination of the rats in the sewer system.

During the past 36 years, the sewer wax block has been improved and is now mainly produced with bromadiolone, a second generation anticoagulant active ingredient. The first European approval of a bromadiolone wax block was issued by the Swedish KEMI on 16th October 2012. The sewer wax bait marketed in the shape of both disc and block (75, 100 and 200 grams) is especially popular in Hungary and Germany, but also in Iceland. In addition, the product is readily used in Slovakia, Czech Republic, Romania and Slovenia. Beside bromadiolone, the sewer block can also be produced with brodifacoum and difenacoum as active ingredients.

Conclusion

It was also reported that when treatment of the sewer system infestation was carried out at the same time as the surface treatment, this reduced the rat population to a small fraction of its original size, and the recovery of the rat population was significantly slower. ⁽⁹⁾. Therefore, combining control operations in both

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above-ground area and sewer and drain systems can be considered as essential in order to avoid re-infestation and achieve good results. A second precondition of effective rat control in the cities of Central Europe is the use of a special, wax containing rodenticide bait with long residual effect in drain and sewage systems.

Furthermore, through the deratization campaign and maintenance works carried out in Budapest, it was also proved that the best control operations were achieved if operations were carried out in cooperation with local governments, and especially if performed by a single specialized company.

It has been reported, that a reduction in investment for rat control procedures by the UK water industry has resulted in an increase in rat problems, and particularly surface sightings of rats emerging from sewers. ⁽¹⁾ Problems caused by rats should not be viewed as only belonging to affected premises and individuals, but they should be seen as a community problem that needs to be addressed at a community level. Therefore, in order to obtain appropriate results in urban environments, or rather to achieve a rat-free city, the above-ground area and sewage and drainage systems must be treated simultaneously. The application of a well-prepared control strategy in cooperation with the local community is also essential.

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* Editors Note: For those not familiar with the term, in some European markets, the Pest Control or Public Health market is more often referred to as DDD services which include disinfection, desinsection and deratization.

A detailed publication of the field experiment performed in Győr was published in the Nov-Dec 1976 issue of International Pest Control.



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