

Behind 'closed' doors!

How to prevent rodent access

When mice and rats occur inside our buildings, the assumption made by most is that the rodents came in through some 'open door'. But, what is 'open'? Based on their behaviour alone, rodents do not generally enter through doors that have been left open. Rather, they get in through closed doors via 'threshold gaps' including gaps created by the gnawing of the rodents themselves).

This article examines the relationship between urban rodents and the everyday doors of our residential and commercial buildings. For example, what attracts rodents to doors? How are rodents specially equipped for gaining entry beneath and between doors? Which door models are most vulnerable? And how can pest professionals offer the best rodent-proofing services, materials and/or education to clients and communities to protect homes, food and community health?

Exploration of gaps and holes

Mice and rats are compulsive explorers. They are always on the go. They may be driven by hunger, thirst or the need for better or alternative shelters. But, sometimes, like humans, they explore just for the sake of exploring.

Some buildings can be under constant rodent pressure from exploring rodents, especially if natural harbourages such as open fields, woods, waterways and the like are nearby. And consider that from beneath gappy door thresholds, buildings leak warm air currents and all types of food odours. And once the first rodent has squeezed beneath a threshold gap, it may leave rodent scent for future exploring rodents to follow in the same path. So rodent entry begets rodent entry.

Human buildings are ideal substitutes for the natural shelters of rodents in the wild. Consider how a building can resemble a hollow log to a mouse or rat. Or how a delivery door offers shelter into 'the log' that has been absorbing the warm rays of the sun all day long and is leaking that stored heat all night. Or how various cable and electrical lines are much the same as the climbing vines of a tree leading to a tree crotch containing the smell of acorns or other seeds.

As part of these natural explorations and those along building foundations, rodents are constantly and incessantly showing their elongated, pointed muzzles into various

holes, nooks, crannies and crevices. Once their muzzle is inserted, they can feel and smell whether or not further exploration is likely to be rewarding. Some of their specialised facial whiskers help them determine if they can fit into a hole, or if they need to expand the opening by gnawing with their powerful incisors.

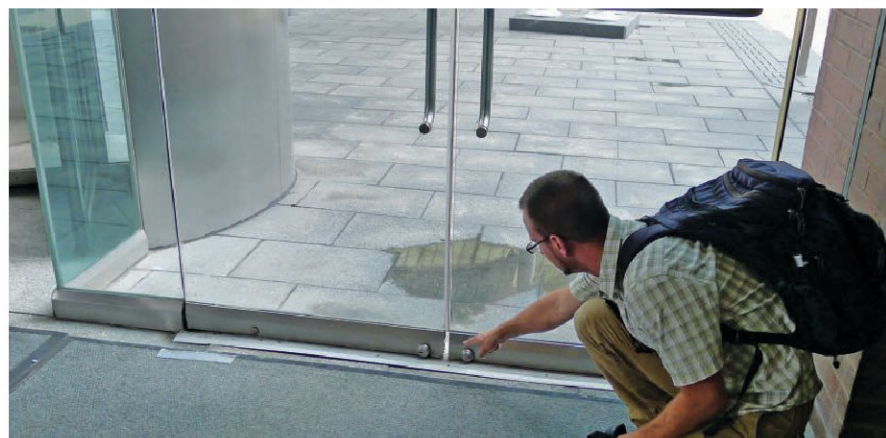
What's more, mice and rats are exceptional gymnasts. They climb, jump, leap, squeeze, contort, run, hang, crawl and swing while they travel along trees, branches, vines and rock crevices.

In most cases, if a mouse or rat can fit its head beneath a crevice or into a hole, its backbone and the rest of the body is flexible enough to follow. (However, it's a myth that rodents can 'flatten out' their bodies due to soft cartilage or special joints.)

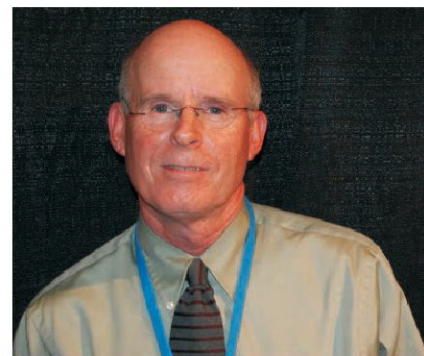
Finally, it's important for the discussion that follows to note that exploring rodents do as most mammals do. That is, they select the paths of least resistance. A threshold gap beneath a door of a building is the same as a hole in a hollow log at just the right spot. Not much further work is needed to exploit the resource.

Hundreds of doors

There are hundreds of models of doors and as many variations on the models depending upon the applications needed.



The 'astragal space' between these double doors is an easy entry point for rodents



Global rodent expert, Dr Bobby Corrigan of RMC Pest Management Consulting highlights how badly fitting doors are essentially an open invitation to rodents to enter

"We should have little trouble with vermin if builders would hear and understand the 'language' of vermin and do a better job in eliminating their entrances and hiding places."

Hugo Hartnack, 1939

However, the most common doors fit into only a few types. For the purposes of this article we will focus on three broad types:

- 1 Single-swing doors (e.g. main entry doors of homes, small restaurants, apartments);
- 2 Double-swing doors (two doors that meet in the middle e.g. glass doors of shopping centres, high-end offices etc.);
- 3 Overhead roll-down doors (e.g. garages, warehouses, supermarket delivery doors etc.).

Door terms

Door terminology can be confusing. Some terms are used interchangeably ▶▶▶

while others seem to have specific uses within a particular text, code book or manufacturer.

For example, the terms 'door sill' and 'threshold' are regularly interchangeable. So too are brushes, bristles, sweeps, strips and seals. Some door 'sweeps' have no brushes; some brushes sweep across the floor. Some 'strips' claim to keep out cold air currents as well as being a rodent seal. Semantics aside, a few terms are important to clarify:

Threshold:

The floor area at the entrance to a room or building when passing through a door. A threshold can have construction elements (plates) made of wood, metal or stone possibly covering a joint that occurs beneath a door bottom.

Door sill:

A shelf or slab of stone, wood or metal at the lowest portion of a door assemblage; and/or used to describe the extended plate or shelf for those doors that are higher than the exterior space to which the door leads (similar in design and concept to a window sill). Often associated with a 'step-up' style of door entry.

Astragal:

A moulding, attached to one of a pair of swinging double doors, against which the other door strikes.

Astragal gap/space:



A typical single-swing door. The sign says one thing; the gap, bottom right, another



The grey vinyl strip on the base of this door is a weather strip. Note how the rodents were able to easily gnaw through it (also note the tooth marks in the vinyl)

Loosely refers to the gap that occurs at the threshold area between double doors where the two doors meet.

Saddle:

Usually an elevated convex plate of metal or wood installed along the threshold area of a door base. Saddles are often used to cover crevices or to provide a levelling element for uneven floors. When used, saddles will often be called 'the threshold'.

Inspecting doors

It is not difficult for anyone to inspect a door to determine if a threshold gap will allow rodent entry. But it cannot be done while standing up. The house mouse requires a crevice opening of only 6mm high. If it is attempting to get through a hole, it requires a width of 9.5mm. The larger rat (including a young rat) requires crevices of at least 12mm in height and holes of 18mm wide.

Certainly, a ruler (or other measuring device) can assist in determining if a rodent can gain entry (e.g., if you can roll a standard HB pencil beneath a door, that is sufficient for a mouse; a 5p coin for a mouse hole; a 2p coin for a rat hole).

One of the fastest ways to determine a door's rodent vulnerability is to simply stand on the inside of a closed door with the lights out and look outward to check for any exterior light leaks. As a general rule, any light noticed at any part of the threshold and/or door corners is sufficient to require a ruler measurement, if not immediate repairs.

A final but important note on door inspections is to keep in mind that if the door materials at the thresholds and jamb corners contain 'soft' materials, such as wood, vinyl strips or plastic bristles, rodents need an edge of just one or two millimetres. Such tiny openings serve an exploring rodent as 'gnaw-starts' for its incisors to enlarge the hole size to permit entry.

Rodent proofing

Needless to say, the best rodent-proofed

door is one in which the thresholds and jambs are built correctly (i.e. tight) from the start and maintained over time. When this is done, supplementary rodent-proofing is usually unnecessary. Unfortunately, a large percentage of everyday doors remain open to mice (and many to rats as well).

The good news is that rodent-proofing is typically not overly difficult, complicated or expensive. Nor does most proofing require massive construction or elaborate tools.

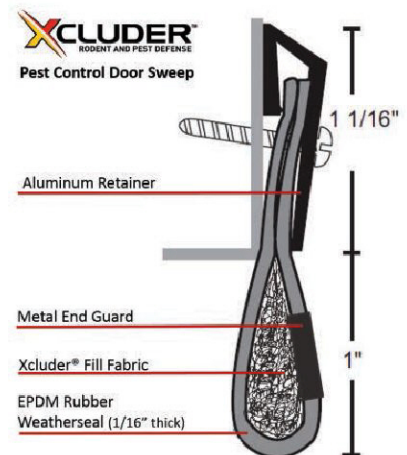
Rodent-proofing products

There is a wide variety of weather-proofing materials, but for quality pest-proofing materials, the choices are fewer. And, as mentioned earlier, the terminology of both 'weather stripping' or 'pest proofing' is a confusing mix of seals, strips, brushes, bristles, barriers and others. We look at two of the most common types of 'door sweeps':

- Rubber-encased steel fabric sweep (RESF).
- High-density brushes (HDB).

Rubber-encased steel fabric sweep

The rubber-encased steel fabric sweep (RESF) is designed with a high-weatherability rubber EPDM encasement containing a stainless steel fabric (mesh). The steel fabric is compressed and specially laminated to the interior surface of the rubber. RESF sweeps can rodent-proof threshold gaps upwards of 18mm in height. A RESF sweep presents a formidable challenge to rodents probing around door thresholds both in time and in risk of bodily injury. Essentially, a rodent encounters a nine-layered barricade made of rubber encasements, screens, adhesives and a 18mm steel fabric mesh.



The Xcluder is a Rubber-Encased Steel Fabric door sweep. It's not yet available in the UK, but several UK distributors sell products from this manufacturer so, if you're interested, ask them

For city mice and rats, an RESF sweep is a lot to get through. This is important because, rodents that are prey species know that the longer they remain away from cover, the greater the danger.

The RESF sweep also poses significant bodily harm to a rodent. Should a rodent successfully penetrate the first two barricades, it must now negotiate hundreds of sharp steel fibres poking from all directions at its eyes, nose, mouth, whiskers, paws and the rest of its body.

High-density strip brushes

High-density brushes (HDBs) are made from thousands of high-flexibility nylon bristles, densely packed to form a bristle-style barrier at thresholds and other door areas.

The brushes are flexible in both a back-and-forth motion as well as being compressible along the vertical plane. In this way they conform to both even and uneven surfaces, including those with relatively large threshold gaps. High-density brush models can also be used to create barriers to the astragal spaces that commonly exist between many double-swing doors.

With high-density brushes, determined rats (rarely mice) can whittle away at each bristle to gain entry. Whilst there is no pain impediment among the many bristles, the rodent must extend its exposure time.

Examples of RESF and HDB pest-proofing can be found by Googling 'door sweeps'. The Xcluder product looks interesting but, at present, it does not seem to be available in the UK. If you're interested speak to your distributor who may be able to access these.

In summary

Without a doubt, the threshold gaps of doors are a primary entry point of rodents into buildings in cities and towns the world



A mouse's eye view of the space between two double doors. Mice enter between these two very strong steel doors at will via the chewed out rubber gasket

over. And rodent entry begets rodent entry. It makes little sense for property owners to repeatedly spend money on interior rodent service if exterior doors are closed to humans but open to rodents.

Pest exclusion is not only the most basic approach that should be taken, it is also the most prudent and, thus, the most sensible.

But property owners need to be educated by pest professionals who are trained about the incredible capabilities of mice and rats around doors. It's not enough to say: "You must fix your doors." To which the client could respond: "Well you're the pest expert, tell me specifically what should be done and what should be used."

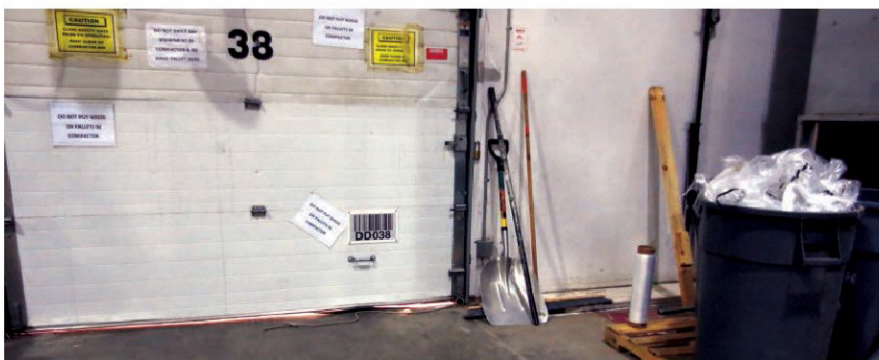
Rodent proofing doors requires inspection, situation analysis, selection of the correct materials and attention to detail during the installations. To a large degree, clients pay us, the pest professionals, because we are trained to see what they overlook. And certainly they overlook the threshold gaps of doors they enter and exit day-in and day-out.

But what happens in the quiet of the night when those doors are finally closed and locked? Rodents are using the same doors. No keys required!

On the job advice

When pest-proofing doors:

- Use quality materials specifically made to rodent proof structures. Weather proofing is not rodent proofing;
- Install/repair with precision. Leaving small crevices can encourage rodents to squeeze harder or to start gnawing to enlarge the crevice to enable entry;
- Monitor rodent-proofed doors for maintenance needs quarterly for residences and at least monthly for heavy-use commercial facilities;
- When selecting rodent-proof sweeps or brushes, analyse each situation:
 - Where exterior rodent pressure is light, or where there is plenty of human activity on a 24/7 basis (i.e. too much threatening noise during rodent explorations), high-density brushes or rubber-encased steel fabric sweeps can be used;
 - Where rodent pressure is ongoing, or for sensitive facilities where maximum protection is necessary, RESF sweeps offer a high level of deterrent to exploring mice and rats;
 - For irregular thresholds (in low rodent pressure areas) and for relatively high threshold gaps, HDBs are the appropriate barriers;
 - For irregular thresholds in areas of high rodent pressure, the threshold should be repaired via saddles or some other means followed by the use of a RESF sweep;
 - For astragal gaps large enough for mice, astragal space high-density brushes can be installed;
 - For astragal gaps large enough for rats, door repairs or door supplements should be considered.



A typical overhead warehouse door. Note the poor door sealing at the base and the overlooked rope-pull causing a gap. Essentially, any exterior light seen from the inside is usually likely to permit rodent entry

This article first appeared in *Pest Control Technology*, the leading pest management magazine in the USA.