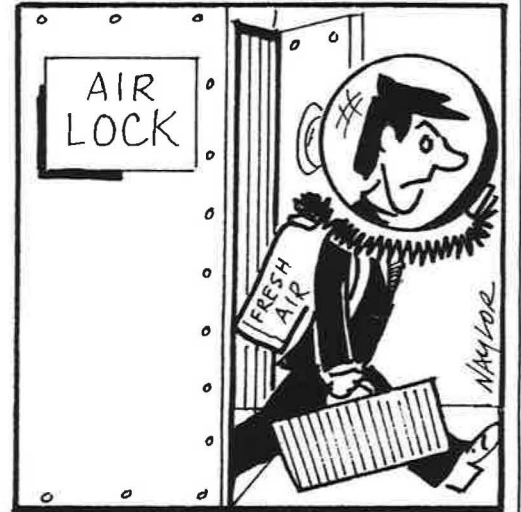


Sick building syndrome

In spite of an international research effort, there is disagreement about the cause of sick building syndrome and about what form a cure will take. Gary Raw summarises the understanding of what is meant by sick building syndrome, what is known about possible causes, what research is needed, and the rationale behind current BRE investigations into the cause of sick building syndrome.

Sick building syndrome (s.b.s.) is a group of symptoms which people specifically experience at work, the typical symptoms being headache, lethargy, loss of concentration, itching, watering or dry eyes, itchy, runny or stuffy nose, dryness or irritation of the throat and dry skin. These symptoms are present in the population at large, but are distinguished by being more prevalent in some buildings in comparison with others.

S.B.S. is therefore defined in terms of symptoms and conditions of occurrence, rather than cause, because there is as yet no proven cause. Various attempts have been made to add to the definition adopted here. For example, it has been defined as a problem of indoor air quality or of tight buildings. Such



definition are valid as descriptions or hypothesis, but are premature as definitions until there is a better understanding of the cause of s.b.s.

Although neither life-threatening nor disabling, sick building syndrome is clearly perceived to be important to those affected by it, and it is not an isolated or occasional phenomenon. Among its likely consequences are reduced work performance, increased absenteeism and even building closure. Although the direct evidence for these is limited at present, a BRE re-analysis of existing data¹ indicates a strong linear relationship between the number of symptoms reported and self-rated work productivity. In addition, because s.b.s. may become associated with energy conservation measures it

could, probably unjustly, work against their wider implementation.

Ventilation

A specific cause has yet to be identified, although many have been suggested. Most explanations have focused on ventilation systems and the air supply of outside air, pollutants released in the building or distributed by recirculation of air, micro-organisms breeding in humidifiers, and inadequate control of temperature and humidity. Other factors which have been implicated are noise, artificial lighting, static electricity and psychological effects due to sealed or tinted windows, lack of privacy, stress and lack of control over the indoor climate.

"Current evidence suggests there is not a single cause of sick building syndrome"

Current evidence suggests there is not a single cause. Taken individually, there is evidence against (or at least no evidence for) each proposed explanation. S.B.S. is found mainly in air conditioned buildings, but this cannot be regarded as a cause in itself; it is necessary to discern why air conditioning is significant. In fact one symptom may have a different cause from another, and the same symptom may have a different cause in different buildings.

There is some evidence that symptoms can be improved by increasing ventilation. However, inadequate air supply alone is unlikely to explain s.b.s., since air conditioned buildings

often have higher air supply rates than naturally ventilated buildings. Furthermore, s.b.s. has been found in the absence of recirculation and even in naturally ventilated buildings.

Pollutants

Pollutants may originate from the ventilation system, maintenance, materials, cleaning, equipment and building users. Modern materials could account for differences between air conditioned and naturally ventilated buildings, since many of the former are of relatively recent origin. In a recent Danish study symptoms were found to be correlated with the amount of soft furnishings (e.g. carpet, curtains, fabric chair covers) and open shelving. These factors reflect the extent of possible sources of pollution such as organics, dust and microbiological elements. There is also some direct evidence that removing carpets may reduce symptoms. A current BRE study is investigating the effect of intensive office cleaning on symptoms and the early results are showing beneficial effects.

Other studies have examined variation in symptoms in relation to indoor air pollutants and the conclusion has been that there is no difference in pollutant concentration between sick and non-sick buildings. Evidence on the role of tobacco smoke in s.b.s. is ambiguous, although symptoms are more frequent among individuals exposed to passive smoking.

Risk indicators

Although the evidence on individual pollutants is inconclusive, s.b.s. could result from the additive or synergistic effect of many pollutants, each of which individually is sub-threshold. If this is the case, then summary risk

indicators such as the furnishing and shelving factors noted above, or odour may be more useful in some cases than measurements of specific pollutants.

There is some evidence that s.b.s. may be related to the use of a humidifier, and this may be due to micro-organisms in the humidifier. There may also be other sites where micro-organisms can breed, for example in furnishings. Therefore, micro-organisms may be significant, but an infection is unlikely to be the cause since symptoms disappear quite quickly when away from work. An allergen or irritant substance would fit this pattern better. Again, it must be noted that s.b.s. can occur in buildings without humidifiers.

BRE has assembled a multi-disciplinary team of

researchers which is pushing forward the search for a cause (and a cure), by means of a multi-factorial study of a small number of buildings, involving continuous monitoring of building users, building systems and the indoor environment. During this monitoring, changes are being carried out which might reduce symptoms, for example cleaning, repairing or adjusting the building systems and changing cleaning practices. Only with this very systematic approach can building owners and building users be assured that problems are being effectively dealt with. □

¹WILSON, S. and HEDGE, A. The Office Environment Survey. London: Building Use Studies Ltd, 1986.

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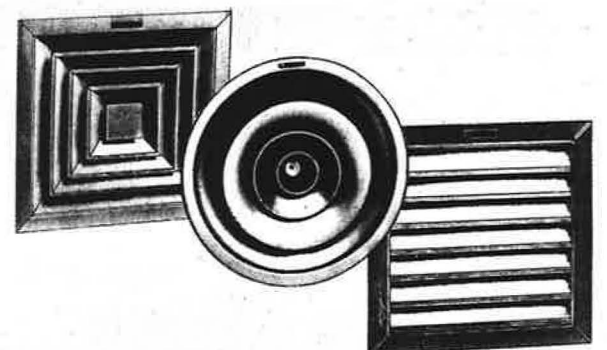
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