Suggested designs for trap-nesting solitary bees

In the following pages I present designs for trap-nesting solitary bees that I have collected from various sources. I have not tested the suitability of any of these designs for local species and conditions. I hope that people try some of them, modify them, and pass on their failures and successes to others so that we learn more of nest sites of local bees species and the use of artificial nests in conservation.

Carpenter bees (genera in Australia: *Xylocopa, Lestis*)

A design based on a Malaysian method for trap nesting and managing carpenter bees for pollination of passionfruit is shown in Figure 1. As the tunnel diameter of carpenter bes varies from 1.2 to 2.3 mm, it is necesary to use thick timber. Naturally, these bees tunnel along the grain of the wood after making an entrance into the log. The wood grain should be horizontal. Soft wood should be used, e.g. any type of pine. The wood must be dry (<20% moisture). The dummy entrance is very important to attract females to begin tunneling in the wood. As carpenter bees always tunnel upwards, the entrances should be low on the wood piece. If the dummy entrance is deep enough to fit an adult bee, they are more likely to remain in the hole and begin tunnelling. The trap nests should be placed near other nesting sites to increase the chance of colonisation. Once colonised, they should spread to all the pieces and the colony may be split by combining colonised pieces with new ones. A supply of water may be helpful, the bees use the water to soften the wood before burrowing. Studies on the size of the tunnels of our local species of carpenter bees are needed to fine tune these measurements.

In Hawaii, carpenter bees have been observed nesting in flowering stalks of *Agave sisalana*. This should be investigated here using introduced *Agave* spp. Carpenter bees in Australia nest commonly in flowering stems of grass trees. The use of these for trap nesting should be investigated.

The blue banded bee, *Amegilla* spp.

This species nests in soil, often gregariously. They can be induced to nest in artificial mud bricks. To make bud bricks, sieve soil, mix with water, pour into a mould. Before it has dried, make holes 10-15 mm in diameter and 25-50 mm deep into the top and sides of the brick. Place the brick in a dry semi-shaded position. If possible place soil containing cells of this species on top of the mud brick. This will attract females to nest there. This method was developed by Josephine Cardale of CSIRO Entomology.

Other species

Various species of bees that nest in stems or trunks can be trap nested. One of the easiest ways is to drill deep holes into pieces of scrap pine. Karl Krombein wrote a 500 page book on the life history, morphology, nest architecture, prey, parasites, etc of the 100 or so species of bees and wasps that he caught in simple nests of this type in the USA. He drilled only one hole per piece of wood to allow the splitting of the piece to examine the cells. He used the following sizes:
20x20x75 mm with a 3 mm hole 70 mm deep,
20x20x165 mm with a 5 or 6.5 mm hole 150 mm deep (most commonly used),
20x20x165 mm with a 9.5 mm hole 150 mm deep,

25x25x165 mm with a 13 mm hole 150 mm deep.
These pieces of wood were then bundled into sixes and placed where bees and waps were likely to be searching for nest sites. E.g. on or beneath branches of trees which contain burrows made by wood boring insects. Generally open areas attract more bees than forested shady areas. You can split the pieces open to observe contents if you wish. You can trap the adult bees when they exit by fastening a pocket made of gauze onto the end of the piece with a rubber band. You can drill more than one hole into each piece of wood if you do not intend to split them open, as in Figure 2.

Other suitable nesting substrates include hollow or pithy stems. Petioles and stems of castor oil plant, bamboo and common reed (*Phragmites*) are hollow and worth trying. Stems of lantana have pithy stems and may be better for species that prefer to excavate their own hollow. Waxed paper drinking straws have been used successfully. Avoid plastic ones as they do not breath and the cell contents may go mouldy. Some bees prefer vertical nests to horizontal ones and so some trap nests should be placed vertically as well as horizontally. Straws, hollow stems etc can be bundled together with wire or twine, they can be packed into a waterproof container such as a milk container, aluminium can or wooden box.

A method for observing bee develop in their cells is shown in figure 3. The terms used to describe the nest architecture are shown in figure 4.

Many parasites may also emerge from the nests. These are part of the natural balance and are just as interesting and of conservation significance as the bees themselves. Other parasites such as some mites and the tiny wasp *Melittobia* can be a problem resulting from the artifically high populations you may be maintaining by bringing your trap nests home.

Best of luck. I hope to hear from you regarding your attempts. Perhaps we can all meet and pool our knowledge some time in the future.

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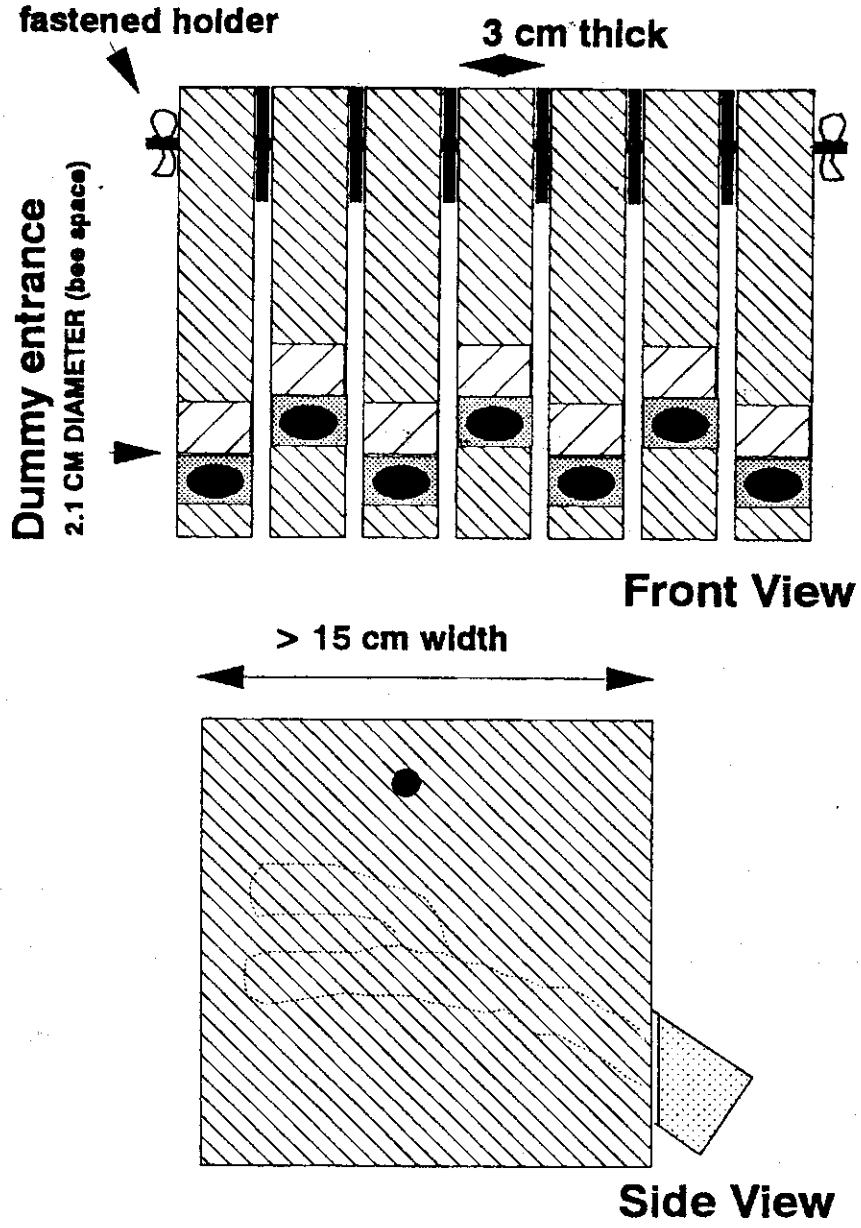
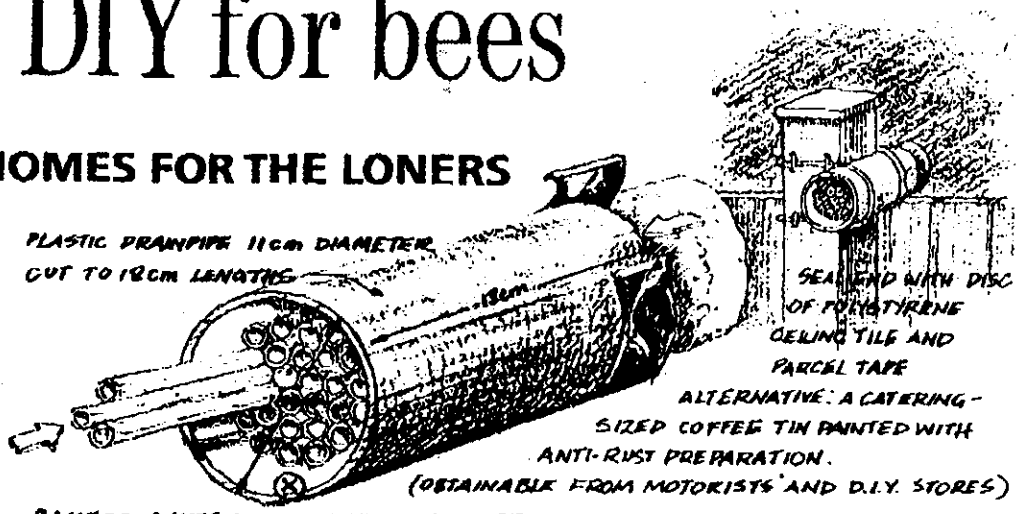


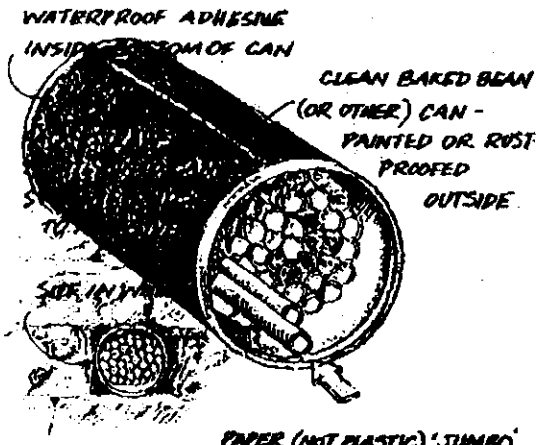
Figure 1. A trap nest for carpenter bees (from Mardan 1992)

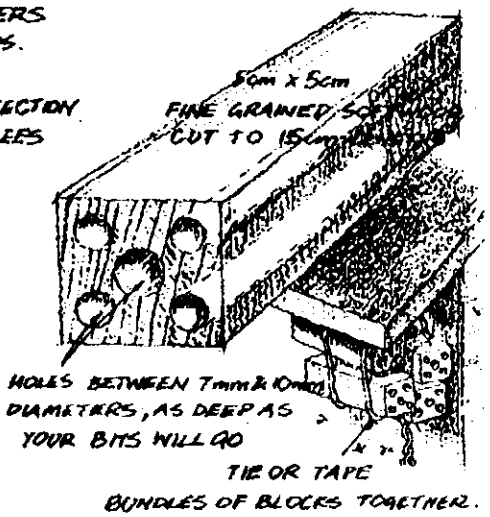
DIY for bees

HOMES FOR THE LONERS

Bees need your help. With intensive agriculture and development in the countryside reducing their wildflower food supplies and destroying potential nest sites, gardens are now providing refuges for many wild bees. The simplest way to make your garden more attractive to bees is to grow flowers they particularly like. Raspberries, flowering currant, and most of the garden herbs in the mint family – thyme, marjoram, oregano, mints and catnip – are all popular with bees. Aim to provide food throughout the summer by growing plants such as purple toadflax, chives, geraniums, aubretia, custard-and-cream, cotoneaster, ornamental thistles, knapweeds, teasels and clovers. Lamb's ears *Stachys lanata* not only attracts bees to its flowers but also provides nest-lining material for the solitary carder bee *Anthidium manicatum*. And to encourage your visitors to stay, offer a few strategically placed bee homes.







Set up your nests in places where female bees are likely to look for nest-sites, such as under the eaves of garden sheds, among wood piles, on wooden fence posts and, for *Osmia* bees, which sometimes burrow in soft mortar, on walls. Set them up before the end of April. Bees seem to prefer weathered nests, and so don't be disheartened if yours aren't occupied this season.

Figure 2. Some methods for trap nesting bees (from BBC Wildlife 1992)

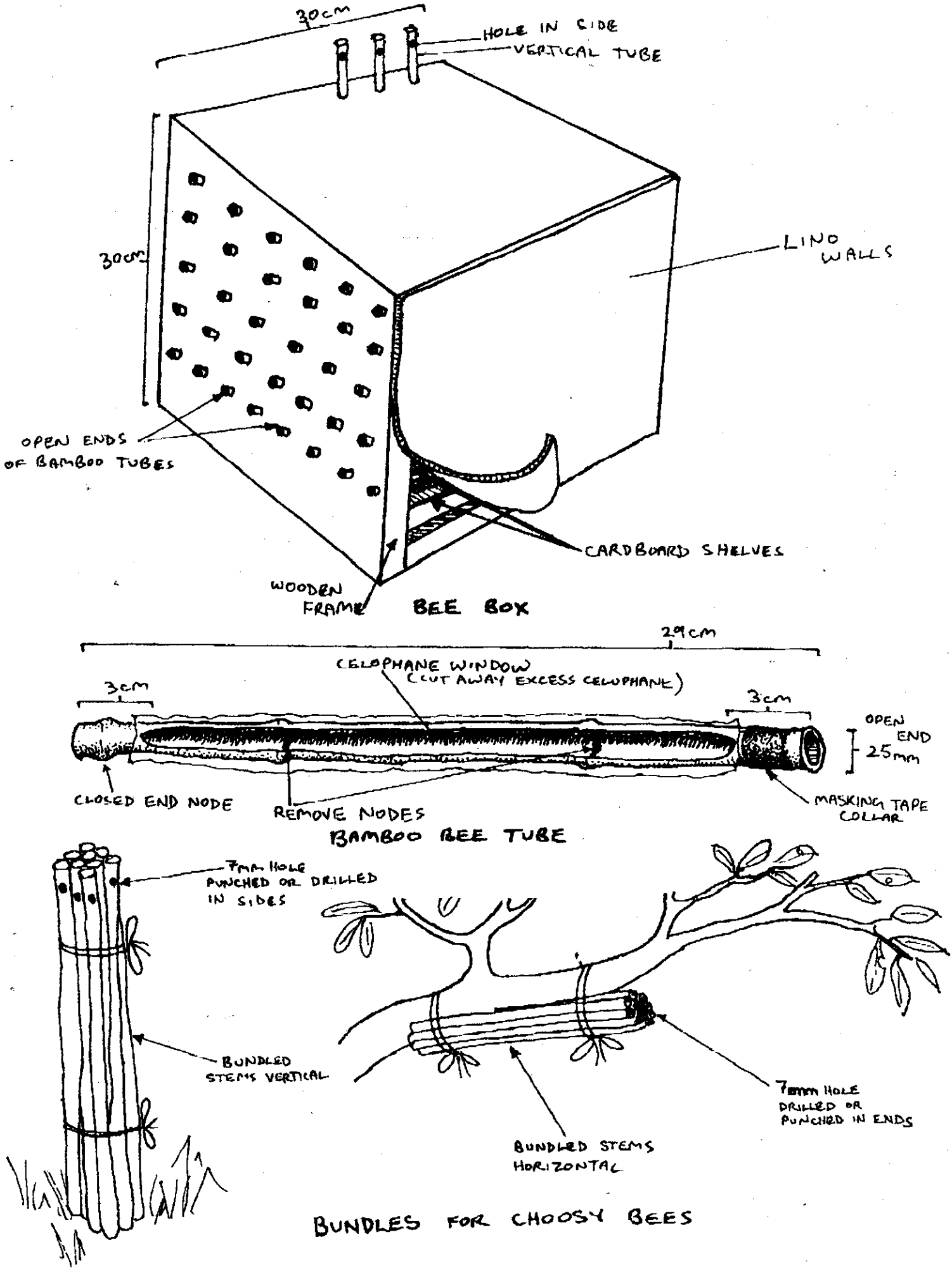


Figure 3. A method for observing bee develop in their cells (top) and a method of using hollow stems for trap nesting bees (bottom) (from Australian Museum)

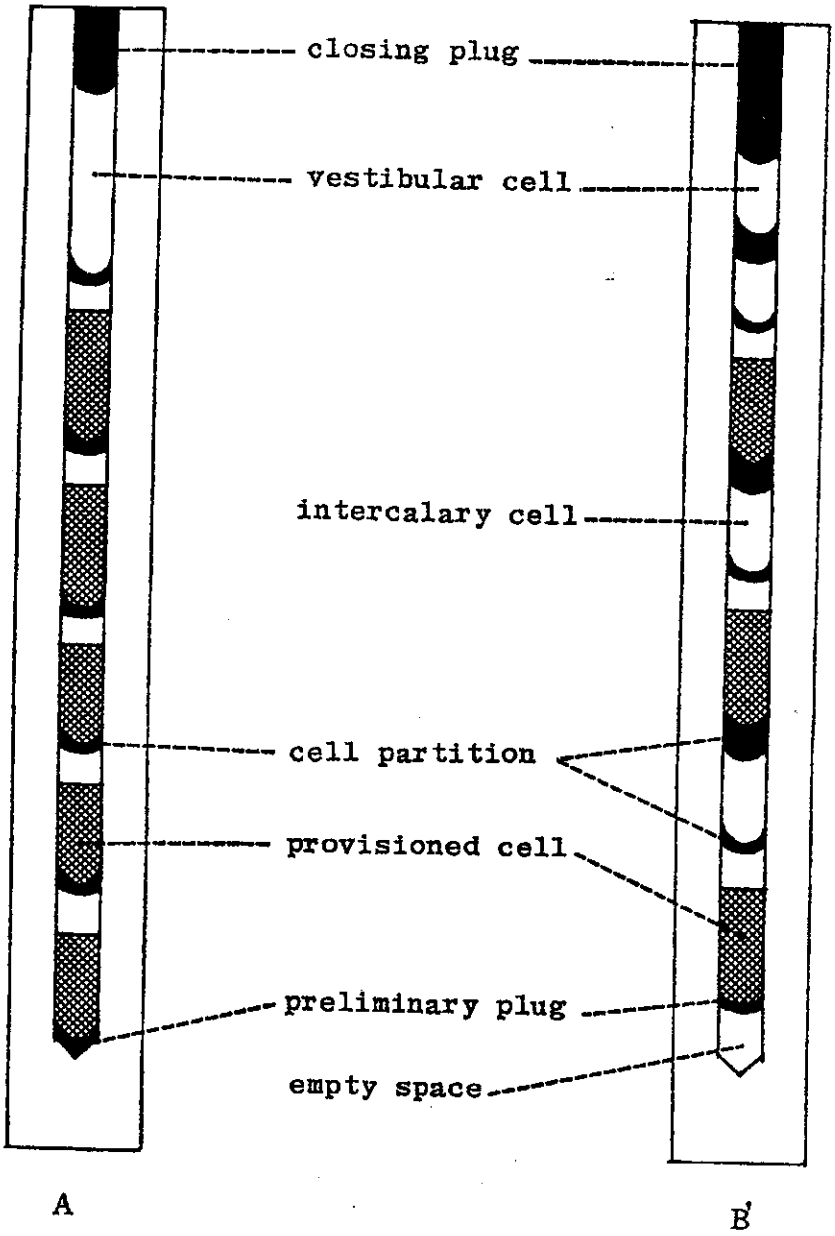


Figure 4 Diagram of linear nests of bees showing the terms used to describe the nest architecture (from Krombein 1967)