

PLATES¹

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1.1 Beekeeping is great for maintaining biodiversity. Here a beekeeper works in the central forest of Tobago © Nicola Bradbear



1.2 Beeswax © Ole Hertz



1.3 Pollen © NB



1.4 Propolis © NB



1.5 Forests provide excellent resources for bees and beekeeping. Maasai beekeeping in Ngorongoro, Tanzania © OH



1.6 Bees kept by beekeepers are essentially wild animals and are not domesticated in the way of other livestock species. *Apis mellifera* © NB



1.7 Most of the 30 000 or so species of bees do not store appreciable quantities of honey for harvest by man. Here a bumblebee *Bombus terrestris* forages on *Phacelia tanacetifolia* © NB



1.8 *Apis cerana* is one of the honeybee species whose nest consists of a series of parallel combs, built inside a cavity. It is this nesting behaviour that enables these types of bee to be kept inside human-made hives, and encouraged to build the combs within frames (frame hives), or from top-bars (top-bar hives). Bhutan © NB



1.9 *Apis dorsata* is one of the honeybee species whose nest consists of a single comb, built in the open air. Bee species with this type of nesting behaviour will not accept to live inside any type of human-made container. Bangladesh © NB



1.10 *Apis cerana* is one of the honeybee species whose natural nest consists of a series of parallel combs, built inside a cavity. In top-bar hives, as shown here, the bees build each comb suspended from a piece of wood, or top-bar. These top-bars can be lifted from the hive for inspection or honey harvest. Nepal © NB



1.11 *Apis dorsata* is one of the honeybee species whose natural nest consists of a single comb, here, an *Apis dorsata* nest on a high-rise office building in Bangalore, India © NB



1.12 *Apis dorsata* can also be found nesting in clusters of colonies, as here on cliffs in Tamil Nadu, South India. However, each comb is a separate honeybee colony © NB



2.1 *Apis florea* is one of the honeybee species whose natural nest consists of a single comb. *Apis florea* often nests in sheltered places, such as bushes as here, or in caves, but it cannot be kept inside a container. This Asian species of honeybee has been introduced to Sudan in Africa © NB



2.2 African forests are full of bees. The honeybee species is *Apis mellifera*, with many different races throughout Africa. Here, a log hive with *Apis mellifera* on the slopes of Mount Meru, Tanzania © NB



2.3 Slovenia's forests are home to *Apis mellifera carnica*. Slovenian beekeepers use these bee houses on trailers to move their bees as different sources of forage come into flower © NB



2.4 A honeybee collecting pollen. One of the two pollen 'baskets' on her hind legs containing a pellet of pollen is visible. As she collects pollen from different flowers, the bee transfers pollen from one flower to another, and brings about pollination © OH



2.5 *Apis laboriosa* foraging on hollyhock *Althea rosea* (Nepal) © NB



2.6 In the tropics bees commonly nest in trees, and the largest trees are preferred. In this picture, the bees have made their nest low down, but protected inside the trunk. The Gambia © OH



2.7 Bees as an important part of rural livelihoods: a beekeeper in the Amazon sells his honey © NB



2.8 'Invisible beekeeping': hives in the walls of people's houses, in Northern Iraq © NB



2.9 Natural capital. Everywhere in the world where there are flowering plants, you will find bees – over 25 000 described species. Only a few of these bee species are useful for honey production. Here an African honeybee *Apis mellifera scutellata* forages on *Tagetes* sp. In Tanzania © NB



2.10 Natural capital. Sunflowers need pollination: to get maximum seed set and maximum oil production from the seeds, there needs to be one bee working on each flower head all the time it is flowering. Many crops are highly dependent upon insects for optimal quality and quantity of yield. Ethiopia © NB



2.11 African women add to their livelihoods by brewing and selling honey beer © OH



2.12 Physical capital Beekeeping projects promoting expensive frame hives will fail where people do not have the capital assets available to support this technology. Here frame hives remain unused because one of the inputs, beeswax foundation used in frame hives is not available locally (Cape Verde) © NB



3.1 Beekeepers benefit from the information, support, and marketing opportunities provided by groups and associations. Boy scout beekeepers in Indonesia © NB



3.2 Beekeeping equipment can be low or no cost: here a beekeeper shows his beekeeping protective clothing, all homemade Tanzania © NB



3.3 A priest in northern Iraq producing excellent harvests of honey from homemade hives. In this case available resources: human skills, old ammunition boxes, and bees, are being harnessed to create food and income © NB



3.4 Cultural value. An Ethiopian beekeeper on his way to his daughter's marriage, carries a calabash with special honey to make Tej (honey wine) for the ceremony © NB



3.5 Honey hunters in The Gambia. The bees are killed by fire during honey hunting at night, and the whole nest is destroyed as honey is removed. The colony does not survive this treatment. If there are plenty of honeybee colonies remaining in the area, with its scent of beeswax, will be attractive to a new swarm, migrating or absconding colony. The honey hunter is opening the bees' nest with an axe. © OH



3.6 A torch on a stick used to burn bees that are nesting out of reach. (The Gambia) © OH



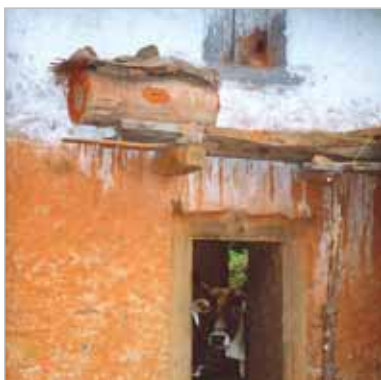
3.7 The hunter-gatherer tribes of Hazabe people in Tanzania sometimes keep bees in hollow trees. The entrance is protected by stones against honey badgers. Most bees are killed during harvesting. This is more 'bee nest site maintaining', with personal ownership of the bees until they are killed during harvest © OH



3.8 This pattern left by combs shows the 'bee space' Tanzania © NB



3.9 Fixed comb hives: basket hives in Uganda © NB



3.10 Fixed comb hives: a log hive and a wall hive in Nepal © NB



3.11 Movable frame hives, here a beekeeper in Albania inspects his movable frame hive © NB



3.12 A top-bar and comb is lifted from a top-bar hive housing *Apis cerana* in Nepal © NB



4.1 Top-bar hive in Amhara, Ethiopia © NB



4.2 Woman beekeeper with a top-bar hive in a calabash. Guinea Bissau © OH



4.3 Cutting comb attachment, Tobago © NB



4.4 Frame being replaced in a frame hive (Egypt) © NB



4.5 A frame hive being examined in Nepal © NB



4.6 Frame hives in Bosnia Herzegovina © NB



4.7 Queen excluder on top of a brood box (Jamaica) © NB



4.8 The spacing between frames must be correct for frame hives to function well © NB



4.9 A home made smoker (Tanzania) © NB



4.10 A home-made veil for beekeeping: simple and effective (Tanzania) © NB



4.11 Hive tool © NB



4.12 Shade provided for frame hives in Oman © NB



5.1 A stand providing shade for bees in hives made from bamboo (Ethiopia) © NB



5.2 Stands for frame hives in Jamaica. The foot of the stand is in a container of oil, to prevent ants from being able to reach the hives © NB



5.3 Top-bar hives hanging in woodland in Uganda © NB



5.4 Working with top-bar hives in Cape Verde © NB



5.5 A torch on a stick used to burn bees that are nesting out of reach (The Gambia) © OH



5.6 The entrance to a stingless bee nest inside a tree © OH



5.7 Log hive with stingless bees at Mount Meru, Tanzania © OH



5.8 Hive box for stingless bees in Trinidad. Most stingless bees are peaceful and hives can be paced outside inhabited houses © OH



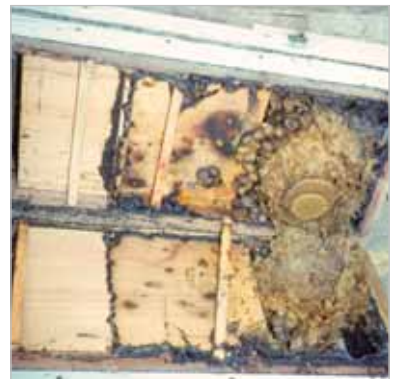
5.9 The entrance to the nest of the small "sweat bees" is a narrow tube made of wax and propolis, 2-3 mm in diameter. Outside the tube is sticky, to protect against ants. Just inside the tube sit 3-6 bees to defend the nest against intruders. The Gambia © OH



5.10 Harvest of honey from stingless bees. Mount Meru. Tanzania © OH



5.11 A box hive for stingless bees, in use in Trinidad © OH



5.12 A 'rational hive' for stingless bees, in use in Brazil. The bees nest with horizontal combs can be seen © NB



6.1 Boxes for *Melipona beecheii* in El Salvador, protected from theft with barbed wire © NB



6.2 The Promabos Project in El Salvador has promoted stingless bee keeping and marketing of honey © NB



6.3 Mama Christine opens one of her beehives with the help of two other women beekeepers © Paul Latham



6.4 A beekeeper has placed a hive in one of the last mature trees standing in this area of Rwanda. Deforestation has meant loss of livelihood for beekeepers in many countries © NB



6.5 A bark hive made from *Julbernardia paniculata*. The end of the hive, or door as it is known by Zambian beekeepers, is made from woven grass © NB



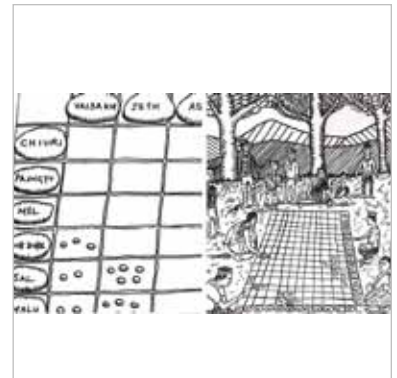
6.6 *Koompassia excelsa* with *Apis dorsata* colonies Malaysia. The honey hunter's ladder, constructed from forest bamboo and vines, is visible on the right hand side of the tree © NB



6.7 Beekeeping, pit-sawing timber and panning for gold are the main economic activities within this *Miombo* woodland in western Tanzania © NB



6.8 Forest beekeeping in Tanzania. The hives are made from hollowed-out logs © NB



6.9 Using participatory approaches to create a floral calendar for Jarjarkot in West Nepal ©



6.10 Coconut trees are mainly pollinated by smaller insects but honeybees can improve the harvest (Commonwealth of Dominica) © OH



6.11 A colony of *Apis mellifera* for the pollination of citrus fruits. Commonwealth of Dominica © OH



6.12 Brassica benefits greatly from honeybee pollination. Here *Apis laboriosa* forages on a mustard crop in Bhutan © NB



7.1 *Apis mellifera* colonies loaded on to a trailer ready for pollination work. The Philippines © NB



7.2 Pollination research underway in Poland © NB



7.3 Colonies should have high populations of worker bees for effective pollination © OH



7.4 Wild 'bird cherry' flowers early in the woodlands of Europe (UK) © NB



7.5 An estimate is that there should be one bee for every ten open flowers for optimal pollination of cotton © OH



7.6 All fruits in this picture benefit from bee pollination except for the tuber crops and the bananas (Ghana) © OH



7.7 The result of adequate bee pollination in an orange orchard (The Gambia) © OH



7.8 Room for development of leafcutter bees (Denmark) © OH



7.9 Leafcutter bees ready to leave their leaf cells (Denmark) © OH



7.10 Even herbicides can be dangerous for honeybees when they collect poisoned 'dew' in the morning © OH



7.11 Tin cans holding water for honeybees in The Gambia © OH



7.12 It is easy to obtain pesticides in some developing countries, but much more difficult to obtain information about their correct usage and hazards (Commonwealth of Dominica) © OH



8.1 Bees killed by pesticides in The Gambia © OH



8.2 Mixed farming in traditional agricultural systems: a mixture of crops creates a natural protection against heavy attack of any pests. Here, a colony of *Apis cerana* ensures good pollination of nearby crops in Nepal © NB



8.3 Pic of hive and forager © NB



8.4 A frame of honey stores. The upper part has been covered with a thin covering of wax: this is known as 'capped' honey: this is the bees' food store that will last them until the next flowering season (unless harvested by man). The bees are still working on the lower part of the frame © NB



8.5 Honey is a popular, natural food, known and liked everywhere. India © NB



8.6 Granulated and liquid forms of the same honey © NB



8.7 Honeys of many colours on display in India © NB



8.8 Straining honey combs in Rwanda © NB



8.9 Uncapping a frame of honey UK © NB



8.10 A manual honey extractor UK © NB



8.11 Straining honey through cotton muslin as it runs out of the extractor UK © NB



8.12 When buying honey in the market it is impossible to know whether it might be poisonous because of honey-hunters use of pesticides (Guinea Bissau) © OH



9.1 Beeswax comb © NB



9.2 Honeycomb offered on banana leaf. This is the simplest way to eat freshly harvested honey. The beeswax comb is perfectly safe to eat – it passes through the human gut undigested. South India © NB



9.3 Buckets of honeycomb in Ethiopia. Beekeeping using local style, fixed-comb hives results in greater yields of beeswax since the honeycomb is broken to enable the extraction of honey, and cannot be returned to the hive © NB



9.4 Blocks of rendered beeswax for sale in Uganda © NB



9.5 Useful beeswax can be salvaged even from old comb like this. Cape Verde © NB



9.6 Heating old comb in a pot of water. Cape Verde © NB



9.7 Molten combs heating with water in a water bath made from one metal container inside an oil drum half full of water, heated by fire underneath Tanzania © NB



9.8 Using a ladle to transfer the water and molten beeswax mixture into a piece of hessian sacking Tanzania © NB



9.9 Filtering the molten beeswax and water mixture through hessian sacking Tanzania © NB



9.10 Using sticks to squeeze the bag of molten beeswax and water Tanzania © NB



9.11 Using an embossed roller to make foundation in Iraq © NB



9.12 A honeybee with the corbiculae on her back legs full of propolis UK © NB



10.1 The smooth and shiny surface on the inside of a hive is a thin layer of propolis UK © NB



10.2 The dark colouration is due to bees applying a layer of propolis © NB TRI



10.3 Brood comb of the Asian honeybee *Apis cerana* for sale in a Japanese supermarket © NB



10.4 Bees have a cultural history connected with healing. Here in the Gambia, *jujus* contain honeybees © OH



10.5 Afghan beekeepers scrape propolis from frame hives - use in medicines in Afghanistan © NB



10.6 A 'crate' of nine 40 g jars each with a different honey, packed by Cearapi Apicultura e Produtos Orgânicos, Ltda, Brazil © NB



10.7 'Buying Malawian Forest products helps Malawian forests' Five beeswax candles, neatly made and presented for sale by the Wildlife and Environment Society of Malawi. Wrapped in a piece of local fabric and labelled to explain that these candles are made with beeswax from Nyika National Park © NB



10.8 'Honey jam' – a product incorporating honey with dried grapes, pineapple, cardamom, cashew nuts and vanaspati roots, made by Savimadhu in Karnataka, South India © NB



10.9 Honey cakes – enable other sectors to create livelihoods based on the products of bees © NB



10.10 A range of sweets containing honey and/or propolis © NB



10.11 Harvested leaves of Gesho – used for making Tej © NB



10.12 'Body shop' honey shampoo and hair conditioner, coating fair traded honey from Zambia © NB



11.1 Simple labelling and using recycled bottles for effective local honey marketing in Nepal © NB



11.2 Soap made with honey from stingless bees. A product of Meliponarios Pisil Nekmej, Guerra Tlalpan, Mexico © NB



11.3 Making value-added products in Dominica. The ingredients for making skin ointments are clean wax, a water bath for melting the wax and vegetable oil © OH



11.4 Filling 35mm film canisters with the molten ointment © OH



11.5 Batik pictures being made in Tanzania. Here Stephen Burton applies the beeswax © NB



11.6 The picture takes shape © NB



11.7 Silk patterned with batik in Malaysia © NB



11.8 Lost wax casting being used to make small metal ornaments for sale to tourists in Ghana © NB



11.9 Beeswax candles made from the wax of *Apis dorsata* by Keystone Foundation, South India. These have been made by rolling sheets of beeswax © NB



11.10 Making candles by the dipping method in Tanzania © NB



11.11 Propolis can be incorporated into many products, and is most well known in products for oral hygiene. These are made by Bee Vital, UK © NB



11.12 Propolis insect repellent spray made by Ilog Maria Honeybee farm, Philippines © NB



12.1 Medicine containing honey for sale in the Gambia © OH



12.2 Sections of honeycomb harvested from frame hives, prepared for sale UK © NB



12.3 Local honey, well packaged. Plastic jars, simple labels with tamper-evident seals Soroti, Uganda © NB



12.4 Glass jars being recycled for honey packing in India © NB



12.5 The most common container for honey retail throughout the Caribbean is the recycled rum bottle. Jamaica © NB



12.6 Roadside marketing of honey in Bosnia Herzegovina © NB



12.7 Honey for sale by the road in Afghanistan © NB



12.8 A sign effectively advertising honey and the benefits of bees in Ghana © NB



12.9 Poor market access: Ethiopian beekeepers walk long distances carrying 20 kg tins of honey to market © NB



12.10 Keystone honey, candles and other secondary products for sale in 'The Green Shop' Kotagiri, South India © NB



12.11 Inserting a miticide strip into an *Apis mellifera* colony housed in a top-bar hive in Tobago © NB



12.12 Examining a colony of *Apis mellifera* for symptoms of American foulbrood (AFB) *Paenibacillus larvae larvae*, Afghanistan © NB