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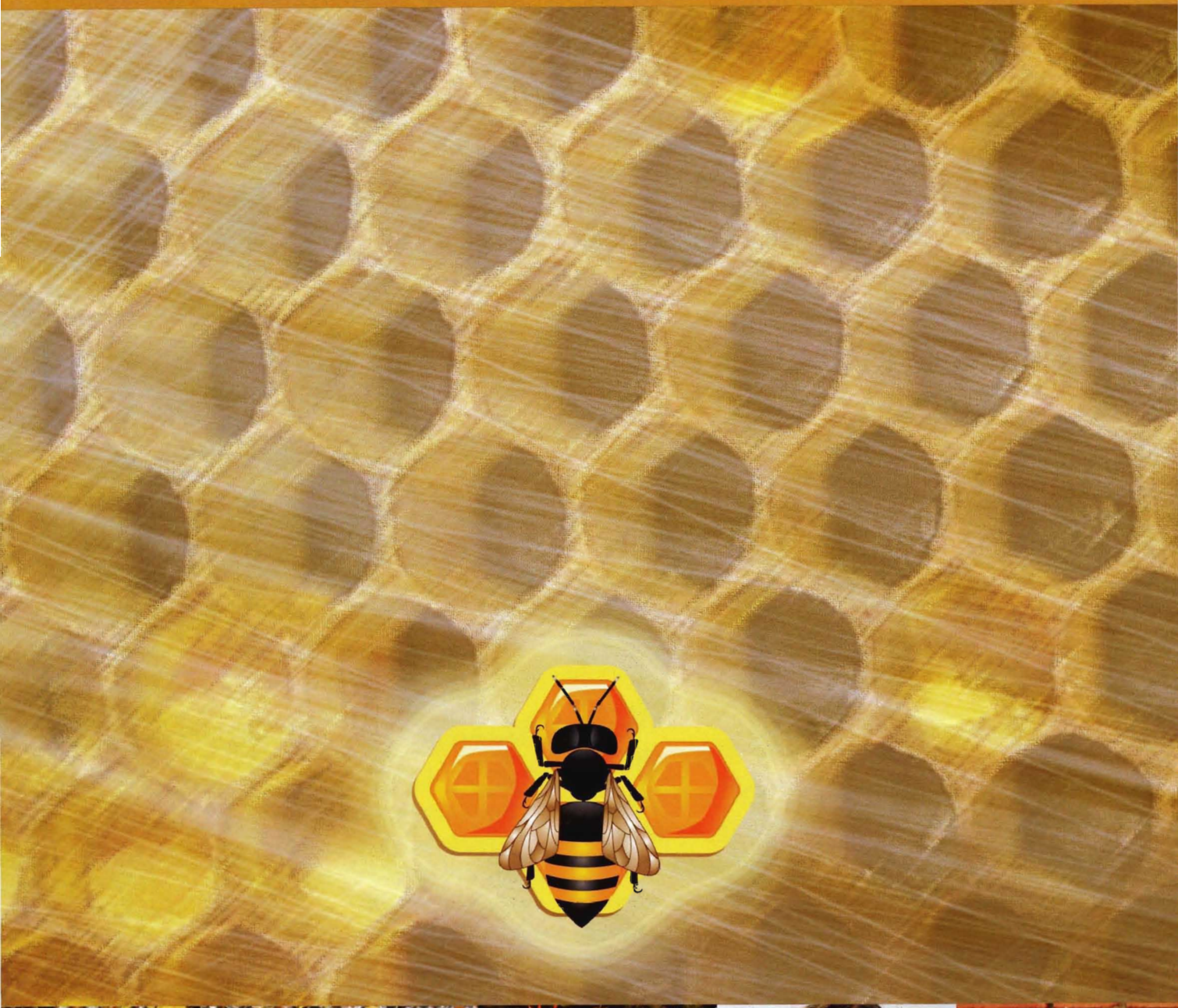

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VERDOEMENDE SCENARIO'S EN DIE LOT VAN DIE AFRIKA-HEUNINGBYBEVOLKING

Senaatsaal Universiteit van Pretoria 26 Augustus 2010 17:00

Programdirekteur Prof Anton Ströh Dekaan: Fakulteit Natuur- en Landbouwetenskappe

17:00
Verwelkoming Prof Cheryl de la Rey Visekanselier & Rektor

17:10
Lesing Prof Robin Crewe Viserektor: Navorsing & Nagraadse Studies
Leier: Sosiale Insekte Navorsingsgroep

18:00
Bedankings

Gaste geniet verversings

DOOMSDAY SCENARIOS AND THE FATE OF AFRICAN HONEYBEE POPULATIONS

Senate Hall University of Pretoria 26 August 2010 17:00

Programme Director Prof Anton Ströh Dean: Faculty of Natural and Agricultural Sciences

17:00
Welcoming Prof Cheryl de la Rey Vice-Chancellor & Principal

17:10
Lecture Prof Robin Crewe Vice-Principal: Research & Postgraduate Studies
Leader: Social Insects Research Group

18:00
Vote of thanks

Guests enjoy refreshments

SENARIO SA LETSATŠI LA TAHLEGO LE PHELETŠO YA GO ATA GA NOSE YA MAMAPO YA AFRIKA

Holo ya Senate Yunibesithi ya Pretoria 26 Phato 2010 17:00

Molaodi wa Lenaneo Profesa Anton Stroh Motikone: Lefapha la Thutamahlale a tša Tlhago le Temo

17:00
Kamogelo Profesa Cheryl de la Rey Motlatšamokhanseliri le Hlogo ya Yunibesithi

17:10
Thuto Profesa Robin Crewe Motlatša Hlogo: Nyakišišo le Dithuto tša Sealogasegolwane
Moetapele: Sehlopha sa Nyakišišo ya Dikhunkwane tša Leago

18:00
Ditebogo

Baeti ba ipshina ka dilapološi

Prof Robin Crewe Viserektor: Navorsing & Nagraadse Studies
Leier: Sosiale Insekte Navorsingsgroep

Prof Robin Crewe Vice Principal: Research & Postgraduate Studies
Leader: Social Insects Research Group

Robin Crewe is Viserektor: Navorsing en Nagraadse Studie aan die Universiteit van Pretoria en die leier van die "Social Insects Research Group" (SIRG). Hy het grade in Chemie en Biochemie aan die Universiteit van KwaZulu-Natal in Pietermaritzburg verwerf. Hy het sy PhD in Entomologie aan die Universiteit van Georgia voltooi, waar hy sy belangstelling in chemiese kommunikasie en sosiale organisasie by sosiale insekte ontwikkel het. Hy was Direkteur van die Kommunikasie-biologienavorsingsgroep ("Communication Biology Research Group") van die Universiteit van die Witwatersrand vir tien jaar en Dekaan van die Wetenskapfakulteite aan beide die Universiteite van die Witwatersrand en Pretoria. Hy was aktief betrokke by die ontwikkeling van professionele registrasie van natuurwetenskaplikes en die bevordering van 'n aantal geleerde wetenskaplikes, insluitend die voorsitterskap van die Entomologiese Vereniging van Suidelike Afrika. Hy is tans die President van die Academy of Science of South Africa.

Honneurs: Goue Medalje van die Soölogiese Vereniging van Suid-Afrika, erelid van APIMONDIA, Genoot van die Koninklike Entomologiese Vereniging.

Chevalier: "L'Ordre Nationale du Mérite".

Akademies: Lid van Academy of Science of South Africa (ASSAf), lid van Academy of Science of the Developing World (TWAS) en lid van die Royal Society of South Africa (FRSSAf).

Robin Crewe is Vice-Principal: Research and Postgraduate Studies of the University of Pretoria and the leader of the Social Insects Research Group (SIRG). He obtained degrees in Chemistry and Biochemistry at the University of Natal in Pietermaritzburg. He obtained his Ph.D. in Entomology from the University of Georgia where he developed his interest in chemical communication and social organisation in social insects. He was Director of the Communication Biology Research Group of the University of the Witwatersrand for ten years and Dean of Science Faculties at both the Universities of the Witwatersrand and Pretoria. He has been active in the development of professional registration of natural scientists and the promotion of a number of learned scientific societies, including the presidency of the Entomological Society of Southern Africa. He is currently the President of the Academy of Science of South Africa.

Honours: Gold Medal of the Zoological Society of South Africa, honorary member of APIMONDIA, Fellow of the Royal Entomological Society.

Chevalier: L'Ordre Nationale du Mérite.

Academies: Member of Academy of Science of South Africa (ASSAf), Fellow of the Academy of Science of the Developing World (TWAS) and Fellow of the Royal Society of South Africa (FRSSAf).

VERDOEMENDE SCENARIO'S EN DIE LOT VAN DIE AFRIKA-HEUNINGBYBEVOLKING

Robin Crewe Sosiale insekte-navorsingsgroep Departement Dierkunde en Entomologie

Daar was onlangs baie aandag in die media op die wêreldwye lot van heuningbykolonies met voorspellings oor die drastiese ekologiese gevolge van die verlies van heuningbye as bestuiwers. Alison Benjamin en Brian McCallum het 'n oorsig hieroor in hul boek - *A World without Bees: the mysterious decline of the honeybee* - en wat dit beteken, gepubliseer. Die wetenskapsjoernaal *Apidologie* het 'n spesiale uitgawe oor byegesondheid uitgegee om die grootskaalse verlies aan heuningbykolonies wat wêreldwyd aandag trek, aan te spreek. Daar was sprake van die kwaal van ineenstorting van kolonies, winterverliese en swak kolonies wat in baie byehokke voorkom en wat lei tot 'n ernstige toestand vir byeboere en bestuiwing.

Hierdie verdoemende scenario's het voortgespruit uit navorsing in die VSA, Europa en Latyns-Amerika en het daarop gedui dat ons besorg moet wees oor die klaarblyklike wêreldwye pandemie wat heuningbykolonies raak. Ongelukkig word daar feitlik geen melding van heuningbykolonies in Afrika gemaak nie en daar word geen woord gerep oor die 'lot' van Afrika se heuningbye nie. Daarby is daar bitter min erkenning vir die betekenis van Afrika se heuningbykolonies in die hele aangeleentheid. Soos met mense, is Afrika die plek van oorsprong van alle heuningbykolonies en 'n verkenning van die impak van Afrika en veral Suider-Afrika se heuningbye op wêreldwye heuningbykolonies moet verstaan word om oplossings te vind vir die streekskrisisse in die VSA, Europa en Latyns-Amerika wat deur die verliese van die afgelope drie of vier jaar veroorsaak is.

Die lesing gaan kyk na die evolusie van heuningbye in Afrika, hul verspreiding na Europa en die Midde-Ooste, gevolg deur hul antropogeniese verspreiding na ander kontinente waar hulle klassieke indringerspesies geword het. Die rol van Suidelike Afrika se heuningbykolonies in hierdie ontvouende drama sal in diepte verken word om beide een van die verstommendste indringings van 'n kontinent deur 'n organisme te beskryf, asook om die interaksie tussen heuningbykolonies op die verste punte van spesieverspreiding te verstaan. Daarby het die ontdekking van sosiale parasitisme in heuningbykolonies tot groter insig in die plastisiteit van die sosiale organisasie van heuningbye gelei.

Insigte verkry oor Afrikabye sal gebruik word om aan te dui dat bedreigings vir heuningbykolonies in die Noordelike Halfrond en Latyns-Amerika opgelos kan word deur herkolonisasie van hierdie gebiede met bevolkings van heuningbye uit Afrika.

DOOMSDAY SCENARIOS AND THE FATE OF AFRICAN HONEYBEE POPULATIONS

Robin Crewe Social Insects Research Group Department of Zoology and Entomology

Recent media attention has been focused on the perceived worldwide plight of honeybee populations with predictions about the drastic ecological effects of the loss of honeybees as pollinators. Alison Benjamin and Brian McCallum published a review of this position in their book - *A World without Bees: the mysterious decline of the honeybee* - and what it means for us. The scientific journal *Apidologie* has published a special issue on bee health to address: "... the large-scale loss of honeybee colonies (which) has come into focus under a worldwide spotlight. Colony collapse disorder, winter losses and weak bee colonies are pervasive in many apiaries leading to a serious situation for beekeepers and pollination."

These doomsday scenarios arise from research in the US, Europe and Latin America and suggest that we should be concerned by this apparently global pandemic affecting honeybee populations. However, very little is said about honeybee populations in Africa, and nothing is said about the 'plight' of African populations of honeybees. Furthermore there is very little recognition of the significance of Africa honeybee populations for this story. As with human populations, the origin of all honeybee populations is the African continent and an exploration of the impact of African and particularly Southern African honeybees on global honeybee populations needs to be understood in order to provide solutions to the regional crises in the US, Europe and Latin America occasioned by honeybee colony losses over the last 3 or 4 years.

The lecture will explore the evolution of honeybees in Africa, their expansion to Europe and the Middle-East followed by their anthropogenic transmission to other continents where they became classic invasion species. The role of Southern African populations of honeybees in this unfolding drama will be explored in depth both to describe one of the most extraordinary invasions of a continent by an organism and to understand the interaction between honeybee populations from the extremes of the species distribution. In addition, the discovery of social parasitism within honeybee colonies has lead to a much better understanding of plasticity of honeybee social organisation.

The insights gained from African honeybees will be used to indicate that the threats to honeybee populations in the northern hemisphere and Latin America may be resolved by recolonisation of these areas using populations of African honeybees.

"If the bee disappears from the surface of the earth, man would have no more than four years to live" ~ Albert Einstein

1. Noem die twee byespesies wat in RSA voorkom?
Apis mellifera scutellata - of die sg moordby ("killer bees"). Hulle is die mees aggressiewe bye ter wêreld en word makliker kwaad, groot getalle bye val slagoffers saam aan en volg slagoffers oor groot afstande.
Apis mellifera capensis - die Kaapse bye. Hierdie bye is minder aggressief.

2. Noem drie heuningby kastes en elk se funksie?
Koninginby: Leeftyd 3, 5 jaar.
Sy paar slegs een maal in haar leeftyd met ± 20 hommels en is in staat om die sperme vir haar lewensduur lewendig te hou en sodoende genetiese diversiteit te verseker.
Haar enigste funksie is om eiers te lê.

Werkerbye (vroulike bye): leeftyd ± 6 weke.
'n Werker spandeer $^{2}/_{3}$ van hul leeftyd binne-in die korf en $^{1}/_{3}$ buite die korf.

Werk binne die korf:
- maak selle skoon en bou nuwe selle
- voer jong byelarwes
- produseer was en prinsesselei ("royal jelly")
- tree op as wagte en beskerm die korf

Werk buite die korf:
- versamel nektar en stuifmeel

Hommelbye (mannetjie bye): leeftyd twee maande en hommels se enigste funksie is om met koninginne te paar.

3. Watter byekaste het nie 'n pa nie?
Hommelbye.

4. Hoe besluit 'n koningin of sy 'n bevrugte eier (werkerbye) of onbevrugte eier (hommels) gaan lê?
Die koningin meet die grootte van die sel met haar antennas en afhangende van die grootte word die keuse gemaak.

5. Wat is die lewenssiklus van bye?
Eier, larf, papie en volwasse by.

6. Hoeveel eiers lê 'n konigin per dag?
'n Maksimum van 3 500 eiers per dag; 200 000 eiers per jaar.

7. Hoeveel werkerbye is daar in 'n gemiddelde byeswerm?
Tussen 40 000 en 50 000 bye.

8. Wat eet bye?
Bye versamel stuifmeel, nektar en water.
Stuifmeel is hul primêre bron van proteine terwyl nektar (omgeskakel in heuning) energie verskaf. Water word gebruik om gestoorde heuning te verdun en ook om die humiditeit en temperatuur van 'n korf te reguleer.

9. Wat is die temperatuur in 'n korf?
Bye hou die temperatuur in 'n korf konstant tussen 34°C en 36°C ongeag die omgewingstemperatuur. Hulle reguleer die temperatuur deur hitte wat deur hul liggaamsbewegings afgegee word en wanneer dit te warm raak gebruik hulle die verdampende water van die nektar. Lug word gesirkuleer wanneer hulle vlerke soos waaiers gebruik word.

10. Hoe word byewas geproduseer?
Werkerbye het 'n spesiale klier wat op 'n sekere ouderdom aktief raak om wasselle te produseer.

11. Hoe kommunikeer bye met mekaar?
Werkerbye kommunikeer deur middel van danse met mekaar om die rigting en afstand na voedselbronne aan mekaar oor te dra. Die koningin regeer die werkers deur middel van feromone.

12. Watter produkte word deur bye geproduseer?
Heuning - kan gebruik word as kos en het ook anti-bakteriese kwaliteite wat beteken dat dit gebruik kan word om wondinfeksies te keer.

Was - word gebruik deur mense in medisyne, velsorgprodukte, kunstenaarsprodukte, politoer en as kerse.

Propolis - dit word deur mense gebruik in gesondheidsprodukte en as basis in hout vernis.

Stuifmeel - dit is een van die rykste en suiwerste natuurlike voedsels en bevat proteine, suiker, koolhidrate, minerale en vitamiene.

Byegif - word ook gebruik as behandeling teen bv. arthritis, hoë bloeddruk en hoë cholesterol.

13. Waarvan word heuning gemaak?
Heuning is eintlik die nektar van blomme waarvan die meeste water deur die bye verwyder is. 'n Werkerby sal gedurende haar leeftyd maar $^{1}/_{12}$ van 'n teelepel heuning produseer.

Dit vereis 556 werkers om 500g heuning van ± 2 miljoen blomme te maak. 'n By besoek ongeveer 50 tot 100 blomme gedurende 'n enkele versamelvlug.

14. Hoe ver vlieg 'n by om ±500g heuning te maak?
'n By kan so ver as 10km vlieg teen 'n spoed van 24km/h en sal dus 3x om die aarde moet vlieg om 500g heuning te maak.

15. Hoekom het heuning verskillende kleure en smake?
Die kleur en smaak van heuning word bepaal deur die verskillende nektarbronne.
Aalwynheuning is bv wit, bloekomheuning is amber met 'n baie unieke aroma en avokadoheuning is baie donker.

16. Hoe ver vlieg bye van die korf af om nektar en stuifmeel te versamel?
'n Radius van $1^{1}/_{2}$ tot 2 km.

17. Hoeveel heuning word deur 'n gemiddelde byswerm per jaar geproduseer?
Tussen 20kg tot 30kg.

18. Wat is prinsesselei ("royal jelly")?
Dit is 'n produk wat gemaak word van stuifmeel en heuning of nektar en word gemeng met 'n chemiese stof wat deur kliere in werkerbye se koppe geproduseer word. Dit word gebruik om die koningin mee te voer sodat sy drie maal haar liggaamsgewig in eiers kan lê.

19. Hoeveel byebesoeke is nodig om een appelbloeisel te bestuif om 'n uitvoerkwaliteit appel te produseer?
Tussen 50 en 60.

20. Hoekom word bye in kommersiële landbou gebruik?
Bye is die enigste bestuiwers wat in groot getalle beskikbaar is en wat op 'n spesifieke datum ingebring en verwyder kan word.

21. Wat verstaan ons onder byekorf en byeswerm?
'n Korf is 'n gestandardiseerde grootte houer wat bye huisves terwyl 'n byeswerm uit 'n groot aantal bye bestaan en dit sluit in die koningin, werkers en hommels.

22. Wat gebruik 'n byeboer wanneer hy met bye werk en hoekom?
Rook - dit kalmeer die bye.

23. Watter kleur is die beskermende klere van byeboere en hoekom?
Wit; donker kleure maak bye meer aggressief.

24. Die waarde van heuningbye?
Bye is verantwoordelik vir die bestuiwing van 80% van insekbestuiwing en ongeveer 'n derde van die mens se dieet. Die waarde van bye in die ekosisteem is 20x meer as die waarde van heuning.

"If the bee disappears from the surface of the earth, man would have no more than four years to live" ~ Albert Einstein

1. Name the two bee spesies occurring in RSA?
Apis mellifera scutellata - also known as "killer bees". These are the most aggressive bees on earth; they get angry very easily, attach in great numbers and also follow their victims over large distances.
Apis mellifera capensis - The Cape bee. These bees are less aggressive than the killer bees.

2. Name the three types of bees in each colony?
The queen: Lifespan 3, 5 years.
She mates once in her lifetime with ± 20 drones and is able to keep the sperms alive for the duration of her life, thus ensuring the genetic diversity of the colony.
Her only function is to lay eggs.

Worker bees (female bees): lifespan ± 6 weeks.
A worker bee spends about $^{2}/_{3}$ of their lives inside the hive and only $^{1}/_{3}$ outside

Work inside the hive:
- cleaning and building of new cells, removal of sick/dead bees
- nurse bees, feeding young larvae
- production of wax and royal jelly
- guard bees, protecting the hive

Work outside the hive:
- foraging to collect nectar, pollen and water

Drones (male bees): lifespan 2 months.
Their only function is to mate with queens.

3. Which type of bee does not have a father?
Drones.

4. How does a queen decide when to lay a fertilised (worker) or unfertilised egg (drones)?
The queen measures the size of the cell with her antenna and depending on the size decides.

5. The lifecycle of a bee?
Egg, larva, pupa and adult bee.

6. How many eggs does a queen lay per day?
A maximum of 3 500 eggs per day; 200 000 eggs per year.

7. How many worker bees are there in an average swarm?
Between 40 000 and 50 000 bees.

8. What do bees eat?
Bees collect pollen, nectar and water. Pollen is the main source of protein while nectar (converted into honey) supplies the energy. Water is used to dilute the concentrated honey as well as to regulate temperature and humidity in the hive.

9. What is the temperature in a hive?
Bees regulate the hive temperature between 34°C and 36°C, regardless of the ambient temperature. They use heat produced through body movements to regulate temperature and when it gets too warm inside the hive they use evaporating water from the nectar. Air circulation is caused by wing movements.

10. How do bees produce beeswax?
Worker bees have a special gland that becomes active when they reach a certain age through which wax cells are produced.

11. How do bees communicate with each other?
Worker bees communicate through dance (vision) to transfer information about direction and distance to food sources. The queen rules the workers through pheromones (smell).

12. Products of the hive?
Honey - can be used as food and also as an antibacterial substance to prevent wound infections.

Wax - used as medicine, skincare products, artistic products, polish as well as candles.

Propolis - healthcare products and in wood varnish.

Pollen - one of the richest and purest foods that contains proteins, sugars, carbohydrates, minerals and vitamins.

Bee venom - is used as treatment against e.g. arthritis, high blood pressure and high cholesterol.

13. Where does honey come from?
Honey is the nectar of flowers of which the water has been removed. A worker bee will produce $^{1}/_{12}$ of a teaspoon of honey during her lifetime. In order to produce 500g honey 556 worker bees need to visit ± 2 million flowers; a worker bee visits between 50 to 100 flowers during a single foraging flight.

14. How far does a bee fly to make ±500g honey?
A bee can fly as far as 10km at a speed of 24km/h and will thus have to fly 3x around the earth to produce 500g of honey.

15. Why does honey differ in color and taste?
The color of honey depends on the nectar source.
Aloe honey, for example, is white, blue gum honey has an amber color with a strong, distinct aroma while avocado honey is very dark.

16. How far will a bee fly to collect nectar and pollen?
A radius of $1^{1}/_{2}$km to 2km.

17. How much honey does an average bee swarm produces per year?
Between 20kg - 30kg.

18. What is "royal jelly?"
It is a product that is produced from pollen and nectar and it is mixed with a chemical secretion that is produced by special glands in the head of worker bees. It is used to feed the queen bees and that enables her to lay 3x her bodyweight in eggs.

19. How many bee visits are required to pollinate an apple blossom in order to produce an export quality apple?
Between 50 and 60.

20. Why are bees being used in commercial agriculture?
Bees are the only pollinators that are available in large numbers and that can be transported to arrive on and be removed from site on a specific date.

21. What is the difference between beehive and bee swarm?
A beehive is a container of standardised size that can accommodate bees while a bee swarm is a large number of bees including the queen, workers and drones.

22. What does a beekeeper use when he works with his bees and why?
Smoke since it calms down the bees.

23. What is the color of the protective clothing of beekeepers and why?
White; dark colors make the bees more aggressive.

24. What is the value of honeybees?
Bees are responsible for the pollination of 80% of all insect pollination and one third of the food we eat. The value of bees in the ecosystem is considered to be 20x more than the value of honey production.