THE NEW ZEALAND BEEKEEPER

MAY, 1966

NORTHLAND FOREST GIANT

TANE MAHUTA, one of the "big three" in the Waipoua Forest, not far from the road and easily accessible to visitors to Whangarei, venue of Conference proceedings this year.

Vital Statistics: Girth 45ft 6ins. Height to first branch 45ft. The crown covers an area of 11,600 sq. ft. Millable timber content, 6,200 cubic feet.

THE NATIONAL BEEKEEPERS' ASSOCIATION of N.Z. Incorporated

President :

Mr. H. CLOAKE
Fairview, 2 R.D., Timaru

Vice-President :

Mr. T. S. WHEELER
Otewa Road, Otorohanga

Executive :

Mr. BRUCE FORSYTH
R.D. 3, Ohaupo.

Mr. D. A. BARROW
44 Baycroft Av., Tauranga

Mr. J. GLYNN
Box 5, Balfour, Southland

Mr. G. WINSLADE
1H R.D., Oamaru

General Secretary :

Mr. K. E. MOODY
A.P.A.N.Z., A.C.I.S.
P.O. Box 127, Upper Hutt

Editor :

Mr. L. W. GOSS
P.O. Box 3561, Auckland

Hon. Librarian :

Mr. CHRIS DAWSON
P.O. Box 423, Timaru

B R A N C H E S

FAR NORTH
President: Mrs. N. Dean, Unahi Road, Awanui, Northland.
Secretary: Mr. D. Matthius, 24 North Road, Kaitaia.

NORTHLAND
President: Mr. A. G. Tucker, 35 King Street, Whangarei
Secretary: Mr. L. G. Lovatt, 11 Mair Street, Whangarei

AUCKLAND CENTRAL
President: Mr. S. Broadhead, 5 Penney Av., Mt. Roskill, Auck.
Secretary: Mr. P. W. Keenan, 54 Patteson Av., Mission Bay.

WAIKATO
President: Mr. B. W. Forsyth, R.D. 3, Ohaupo.
Secretary: Mr. H. N. Tuck, Kihikihi, Waikato

BAY OF PLENTY
President: Mr. R. J. Mossop, Tauriko, R.D.1, Tauranga.
Secretary: Mr. J. C. Higgins, Bradford Street, Waihi

HAWKES BAY
President: Mr. G. F. R. Gordon, P.O. Box 252, Hastings
Secretary: Mrs. G. O. Dorward, P.O. Box 86, Havelock North

C/S. HAWKES BAY
President: Mr. D. L. Ward, Guy Street, Dannevirke
Secretary: Mr. E. Rowe, 6 Runciman St., Dannevirke.

NELSON
President: Mr R. Brough, 2 Cherry Avenue, Wakatu, Nelson.
Secretary: Mrs. I. M. Cropp, Lr. Moutere, R.D.2, Up. Moutere

WEST COAST
President: Mr. C. Richardson, Ahaura.
Secretary: Mr. T. Holland, Weenink Road, Karoro, Greymouth

CANTERBURY
President: Mr C. Hill, Rangiora
Secretary: Mr D. G. King, Box 5060, Papanui

SOUTH CANTERBURY
President: Mr. F. Bartrum, Pleasant Point
Secretary: Mr. R. Davidson, Hadlow, No. 4 R.D., Timaru

NORTH OTAGO
President: Mr. C. M. Lory, 2C R.D., Oamaru.
Secretary: Mr. G. L. Jeffery, P.O. Box 56, Oamaru.

OTAGO
President: Mr. C. W. Foote, 377 Kaikorai Valley Rd., Dunedin
Secretary: Mr. R. F. Poole, Kyeburn, Central

GORE
President: Mr. S. A. Bryant, Riversdale.
Secretary: Mr. W. A. Clissold, Waikaka Valley, 5 R.D., Gore.

SOUTHLAND
President: Mr. John de Wit, Box 7, Woodlands, Southland
Secretary: Mrs. M. C. Cranstoun, Ham. Burn, 2 R.D., Lumsden

THE NEW ZEALAND BEEKEEPER
VOL. 28 No. 2

Published Quarterly in February, May, August and November, by the National Beekeepers' Association of New Zealand (Inc.) in conjunction with the N.Z. Honey Marketing Authority.

Subscription: 8/- per annum, post free.

Registered for transmission by post as a Magazine.

Editor: Leslie W. Goss **May, 1966**

CONTENTS

FACT and FICTION

"STRANGE POWERS OF HONEY" is the title of a small booklet recently received and reprinted from the "Rosicrucian Digest" which sets out to show that honey has been a beneficial food for mankind throughout the ages. The text is a mixed bag of myth and fact, reporting a mixture of stories which emanate from biblical times with factual quotations from registered medical practictioners and the results of their carefully controlled experimentations.

The cynic could very easily take some references as they stand and hold them to ridicule. Typical is the reference to Charles Butler who, in 1623 wrote that honey was still regarded as a curative for almost every human disease. He also referred to a quintessence of honey, an elixir alleged to revive a dying person swallowing but a few drops, and also possessing the magical properties of melting gold.

This writer may be barking up the wrong tree, but conscientiously believes that publicity for honey must be good publicity founded on fact to educate a much greater number of people to eat this natural food.

Like justice, which must not only be done but be seen to be done, so must our publicity for honey be factual and seen to be factual.

The majority of people who eat honey, eat it because they like the taste, and recognise that it is one of the few natural foods obtainable in this day and age of synthesis obtainable in a form unspoilt by human interference. That it possesses substances contributory to good health cannot be denied even by its critics, and it may well effect the metbolism of the body in ways not yet fully understood.

But it is surely wrong to claim for honey alleged mystic powers verging on necromancy and the black arts. To quote the opinion of a writer

Page 29 ⟶

Observations of

MATING BEHAVIOUR in the HONEY BEE

By N. E. Gary, Dept. Entomology and Parisitology,
University of California, Davis, California, U.S.A.

This interesting treatise was first published in Vol. 2 No. 1 of the "Journal of Apicultural Research", and is reproduced herein by express permission. The original research was conducted at Cornell University. Observations given are of particular interest to branches which attempted similar experiments last summer, held under far less favourable and scientific conditions.

INTRODUCTION

MATING OF THE QUEEN and drone honeybee (Apis mellifera) occurs during flight at unknown locations and at heights that usually preclude observation. With few exceptions, descriptions of mating behaviour have been based on chance observations made in nature under rather adverse observational conditions. The only other information is circumstantial evidence obtained at the hive just before and after the mating flight. General reviews on mating include Buttel-Reepen (1923), Betts (1939), Crane (1954), Fyg (1952), Ribbands (1953), Ruttner (1956), Snodgrass (1956).

METHODS AND MATERIALS

Virgin queens were tethered and displayed in the air at heights ranging from 1½ to 11 metres in an area where drones could be attracted within vision of observers. All queens used were confined after emergence and allowed to age between six days and six weeks in queen-mailing cages placed within populous nurse colonies.

QUEEN SUSPENSION TECHNIQUES

Earlier observers (Shrimplin, 1861; Demaree, 1881; Shuck, 1882; Watson, 1927) tethered queens to lines suspended from a pole that could be swung about. Tethered queens were used in the present study, but with new suspension techniques. The tether lines were either fine thread or mono-filament nylon, glued to the scutum of the thorax with quick-drying acetate cement. Queens thus tethered flew readily. Honey was fed to queens just before they were first suspended, and at irregular intervals thereafter.

Initially, queens tethered to lines 1 metre long were suspended by ordinary toy rubber balloons filled with helium. Later, large dirigible-shaped balloons about 2½ metres long were used. These balloons, designed for uses similar to the present one, are considerably more stable in the air and can be used at higher altitudes than round balloons.

In most of our experiments, however, a horizontal line was stretched tautly between two poles (Fig. 1). The height of the horizontal line was easily and quickly adjusted by pulling a loop of rigging line through a guide and attaching it to one or more stakes in the ground. As many as

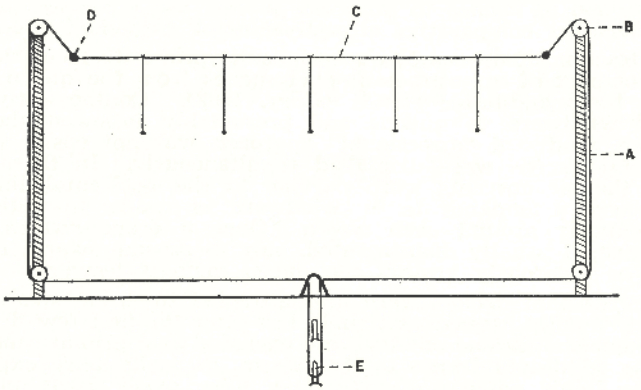


Fig. 1. Stationary queen-suspension apparatus (not drawn to scale)
A. Rigging rope C. Monofilament nylon line (almost invisible).
B. Rigging pulley D. Weight, usually 0·5 kg.
E. Retainer stake, to adjust height of line C

five tethered queens were displayed simultaneously on this line. The tether lines supporting queens were attached at 3-metre intervals along the horizontal line, thus separating queens sufficiently to minimise the shifting of drones from queen to queen.

OBSERVATION TECHNIQUES

Much of the behaviour was recorded by photography, with a 16 mm. movie camera equipped with 300 mm. telephoto lens. Binoculars (10 × 50 mm.) were used for detailed observations.

EXPERIMENTAL SITE

The apparatus was erected at one end of a small exposed area, about 100 × 200 metres, surrounded by a few trees and protected from prevailing winds by an elevation of about 15-25 metres in the terrain. Drones observed were indigenous to the area; none were released at the site.

RESULTS AND DISCUSSION

FLIGHT ACTIVITIES OF DRONES

There was no detectable drone flight before tethered queens were elevated. Flying drones could oftn be heard before they could be seen, except when they were in a swarm concentrated around a queen or a similar elevated object. Within a few minutes, sometimes a few seconds, after tethered queens were elevated, a swarm of drones formed around each of the queens and filled the air with a loud hum, similar to that heard in an apiary when bee flight is active.

From photographic data, it was estimated that during periods of intensive drone flight approximately 100-300 drones were visible in the immediate area when 1-5 queens were displayed simultaneously. Drone swarms constantly formed and disintegrated around the queens as long as these were suspended, or until the normal cessation of drone flight late in the afternoon. It appeared that there were notable differences

in the attraction of drones to different queens, but no assays were performed to measure comparative attractiveness of individual queens.

The attraction of drones to queens results primarily from the liberation of a complex of sex-attractant pheromones from the queen, particularly from the mandibular glands (Gary, 1962). Consequently, drones approached windward to queens and presumably followed the "odour trails". The windward "directional" approach was not easily perceived unless several queens were displayed simultaneously. In these circumstances, if the air currents were parallel to the horizontal line, drone swarms showed a tendency to fly windward in swarm formation, stopping momentarily around each queen. Once a drone swarm reached the last queen, it usually disintegrated, only to assume swarm formation again just as vigorously around the queen farthest leeward.

It appeared that drones were also attracted to drone swarms, since such swarms usually formed extremely fast after the first few drones had located the queens. Drone odours were excluded as a primary mechanism of recruiting additional drones to the swarm; in preliminary experiments whole drone liquid extracts displayed on filter paper were not significantly attractive to drones.

Visual stimuli alone could be sufficient to stimulate intensive drone pursuit. During one afternoon, when papers were being burned some distance windward from the queen-suspension apparatus, carbonaceous leaves drifted through the air; after they had risen to a height of approximately 15-25 m., drones pursued them; they collided with the material and caused it to disintegate into smaller pieces, which were likewise pursued until these pieces disintegrated.

Furthermore, 75-mm. squares of filter paper displayed in the air attracted a few drones temporarily. Other small inert objects suspended during these experiments prompted the same behaviour. Whenever queen liquid extracts were placed on any of these objects, large numbers of drones were immediately attracted.

DRONE FLIGHT NEAR QUEENS

Drone flight around a tethered queen, and drone mating behaviour, have been briefly described by Shrimplin (1861), Demaree (1881), Shuck (1882), and Watson (1927). Sargent (1900) and others described drone flights in nature. Their observations are generally consistent with the observations described below.

The intensive, dynamic flight of drones in this study was a striking spectacle. After the elevation of queens, drones appeared in great numbers, usually within minutes; at first a few came, then suddenly hundreds appeared almost simultaneously, as if they had been flying in sparse formations that could not be detected, and then suddenly grouped in dense swarms around the queens. The formation and disintregation of swarms occurred rapidly around each queen. Sometimes drones followed a rapid ascent or descent in the comet-like formation described by Jean-Prost (1957) and others. Drone comets usually disintegrated in a few seconds unless there was some object to follow, for example a queen a worker, a large insect, or a drone mounted on another drone in the precopulatory position. This evidence, together with high-speed film studies that revealed co-ordinated flight movements within a swarm, seems to indicate that once drones approach within effective visual range of other drones within the swarm, the comets or swarms of them are integrated primarily by vision. The genesis of drone comets is inherent in this behaviour. If the body of the drone swarm becomes sufficiently distracting to the drones within—if one drone mounts another and thus forms a primary object of attraction, or if the queen suddenly makes an elusive movement—then some or all of the drones dart collectively in one direction, exhibiting a "follow the leader" pattern of

flight. Such a group of drones forms the familiar drone comet.

The remarkable ability of drones to manoeuvre through the air, changing direction, hovering and suddenly accelerating to full speed, is indicative of their superior flight capabilities. However, a drone comet was occasionally observed to collide with the ground or other objects when in close pursuit of a free-flying queen or a stray worker bee.

Swarms of drones around stationary tethered queens or queen chemicals on inert objects, under conditions of minimal air movement, assumed an interesting conical formation with the apex towards the queen, described adequately by Hanneman (1850) and Watson (1927). However, wind movement or flight by the queen caused a transitory elongation of swarm formation, sometimes to as much as 3 m. The formation changes constantly, responding instantly to the rapidly changing stimuli — chemical, visual and possibly auditory.

ORIENTATION OF SWARMS

Drone swarms were always below the queen. The dorsal extremity of the swarm formations invariably pointed toward the queen. This is partly accounted for by the

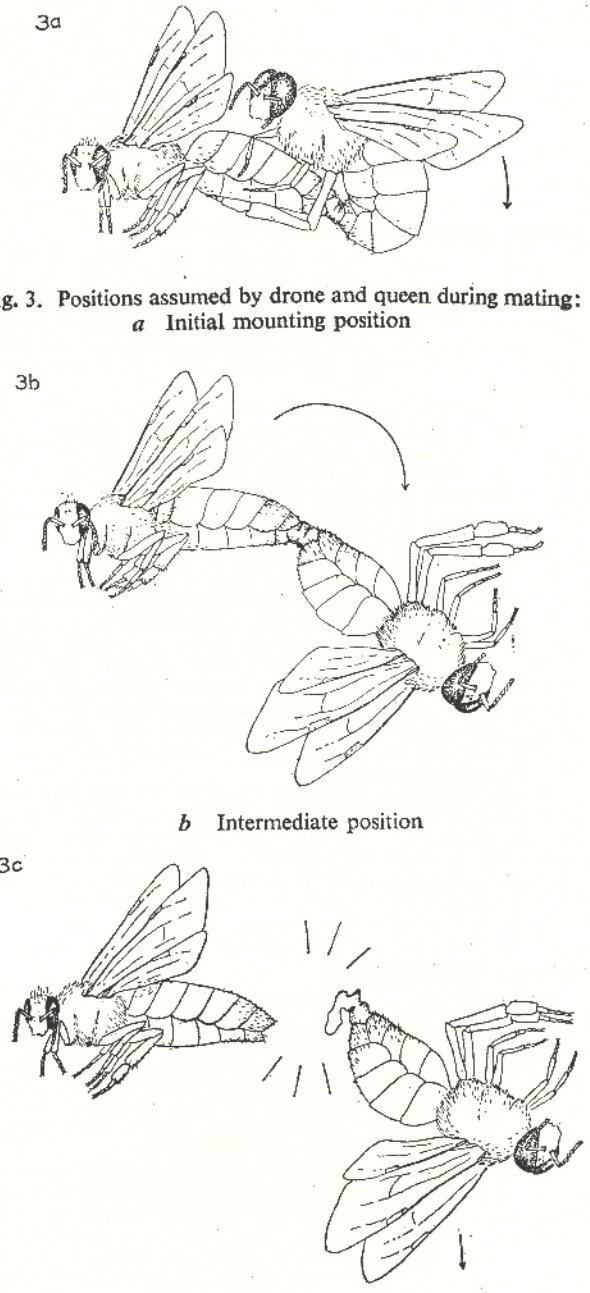


Fig. 3. Positions assumed by drone and queen during mating:
a Initial mounting position
b Intermediate position
c Drone separation by genital explosion

dorsal orientation of the drone's eyes. It also suggests the possibility that drones may need to have the queen silhouetted against either clouds or blue sky to be able to follow her visually. This posibility was substantiated by the observation that drones were reluctant to approach closely to a tethered queen when she was at rest in the centre of a square piece of wire screen suspended vertically in the air. When the queen crawled to the edge of the wire where she was silhouetted against the sky, drones readily approached, but not so actively as when the queen was dissociated from any such object. This was true whether the queen was flying or resting.

FLIGHT ATTITUDES OF DRONES

Drone swarms were usually not inclined to remain very long in swarm formation around tethered queens that were lowered too near the ground; perhaps they were unable to do so. On some days the critical height was for example 2.-5 m.; the same queens raised above this height were usually very attractive. Some drones were able to follow the queens as they were lowered, but even these few drones usually dispersed soon afterwards.

The altitude at which drones were attracted to queens varied greatly from day to day. On a few exceptional days, drones followed queens down to very low levels of approximately 1-2 m. On some days they would not descend as low as 10 m., even when as many as five queens were displayed simultaneously, and drones were known to be flying in great numbers. Perhaps the most striking example occurred at 15.15 hr. August 31, in weather that appeared ideal for drone flight: no significant air movement at ground level, temperature about 29 deg. C., no clouds in the sky. On this day several groups, containing five queens each, were displayed **without attracting a single drone,** even though no changes had been made in the experimental conditions under which hundreds of drones had previously been attracted during seemingly less favourable conditions. By coincidence a butterfly happened to fly directly over the tethered queens, at a height estimated to be approximately 25 m., pursued by a **dense drone swarm;** still no drones were attracted to the queens approximately 15 m. below the butterfly. These observations strongly suggest that drones fly at rather constant altitudes in any given meteorological conditions.

Many observations have been recorded, for example by Diaz (1955) and Jean-Prost (1957), in which drones pursued animals and insects other than queen bees. Similar observations were abundant in this study. Besides the pursuit of butterflies mentioned earlier, drones often pursued dragonflies so vigorously that the dragonflies quickly left the experimental area. Such drone behaviour probably functions as a defence mechanism. Predators intercepted by dozens of drones that actually collide with them would seem to have little chance of preying on a queen bee.

MATING BEHAVIOUR

Drones invariably approached the queen posteriorly and ventrally. They oriented below the queen because of their dorsally oriented eyes; prhaps there is also a silhouette requirment as suggested earlier. They oriented posteriorly, by approaching the lowest end of the queen, and during normal flight the queen's abdomen is held lower than her head. But when a queen was tethered by the abdomen instead of the thorax, so that her head hung considerably lower than normally, drones oriented to her head instead of to her abdomen.

When drones approached within several centimetres of a queen's abdomen, they usually attempted to mount the abdomen. Movement of the queen seemed to stimulate the drones to mount, since they often hovered behind an immobile queen, apparently reluctant to mount, whereas they pursued and attempted to mount whenever a queen was flying.

Perhaps the most controversial facet of mating behaviour concerns the mating position of the drone and queen. Woyke and Ruttner (1958) stated that "the anatomical facts known are not yet sufficient to enable

us to determine the relative position of the queen and drone during mating". Early reports (Shuck, 1882; Bishop, 1920) suggested that a "face-to-face" position is assumed during mating. Conversely other workers, for example Rothschild (1955), suggested that the most likely position is with the queen above. Ruttner (1962) favoured the drone-superior position, and the author has observed this position some hundreds of times; it can now be stated that the normal starting position is with the drone superior. The long hind-legs of the drone hang downwards during the approach, and appear to be used to orient the drone tactually to the queen's abdomen. An examination of individual frames of moving pictures revealed that the other legs are also used to clasp the top of the queen's abdomen. Locked in this position (Fig. 3a), the pair was invariably able to fly readily. Drones frequently mounted drones in the same position, and these pairs were pursued by drone swarms. On several occasions when it was possible to observe mounted on dead tethered queens, the drones actually carried these queens in flight, making it appear superficially that the queens were alive and flying too. Betts (1939) had suggested that the drone could possibly carry the queen; in her experiments drones had been induced to carry in flight a weight (148.5 mg.) approximating to that of a virgin queen.

Successful mounting does not necessarily mean that mating will follow. On the contrary, the mating of tethered suspended queens occurred infrequently. Observations indicate that mating occurs only if the sting chamber of the queen is open. This important detail was emphasised by Laidlaw (1944) and discovered by accident in this study after the "accidental" eversion of a drone's genitals beneath a queen's sting chamber, at the intersegmental membrane connecting the sterna of segments 6 and 7. Sternum 7 was permanently crimped inwards, leaving a small opening between the sterna that apparently simulated an open sting chamber. Before this happened, the queen had been suspended 90 minutes (except for the few moments when she was lowerd for feeding) without mating. Yet, after the drone was manually removed from her and she was again suspended, 25 drones everted into the opening during the ensuing 45 minutes. Each drone was removed manually after each eversion.

The necessity of an open sting chamber was confirmed in other observations, using other queens in which (1) the sting chamber was forced open in such a manner that it would remain open (2) the terminal segments 7-10 were removed, leaving the body cavity exposed to represent an artificial sting chamber, or (3) an artificial aluminium foil sting chamber was provided. Techniques 1 and 2, although crude, successfully induced multiple "mating" on a number of occasions. Several free-flying drones everted into each queen that was properly displayed. In the most spectacular experiment, one queen modified by technique 2 "mated" with 37 drones in 28 minutes before the experiment was terminated arbitrarily. On one occasion a normal virgin queen's abdomen was enveloped in a cone-shaped aluminium foil casing with an opening approximately 3 mm. in diameter at the end, simulating an open sting chamber. In free flight the queen was intercepted by a drone at approximately 3 m. altitude, where the drone quickly mounted and everted into the open end of the tube. No part of the drone made contact with the queen, yet the characteristic snap of exploding drone genitals was easily audible. The drone genitals adhered to the inside of the tube, and the pair thus fell to the ground and was recovered. In another instance, a free-flying drone was induced to mate with a tethered queen that had died a week earlier, her sting chamber remaining open.

All the above observations indicate that the terminal stimulus for drone genital eversion is a physical one: the open sting chamber. Drones induced to evert into the artificial or modified sting chambers never separated spontaneously from the queens after ejaculation. In all the induced "matings" the drones had to be removed manually after eversion.

The many failures to get successful matings of tethered queens as well as of free-flying queens (described below) were probably caused by closed sting chambers at the critical moment when the drones mounted.

Obviously drones are not physically equipped to force the sting chamber open; otherwise they would mate with most of the tethered queens they mount. Both the development of the mating stimulus in the queen and the inclination to open the sting chamber are related to physiological readiness to mate, determined in part by ageing and by treatment given to the virgin queen by workers. The critical worker-queen relationship prior to mating has been described (Is'hak Ogly, 1936; Alber, Jordan and Ruttner, 1955; Ruttner, 1957; Hammann, 1958).

During the series of observations, the following two queens can be considered to demonstrate typical mating behaviour, characterised by multiple mating and spontaneous queen-drone separation after ejaculation. The first queen mated six times in rapid succession. The second mated 11 times, in circumstances enabling detailed observations; the procedure was also witnessed by M. P. Johansson. The queen (age unknown) had been tethered within about 10 minutes after removal from confinement in the colony. Within seconds after the queen was elevated to about 7 m., mating with the first drone occurred. Then, in rapid succession, within about 5-10 minutes. she mated with 10 other drones, after which she was retrieved and replaced in the cage. During these matings I stood directly beneath the queen, catching each drone as he fell. Only a few sconds were required for each drone to approach, mount, and mate. Immediately after mounting the queen, drones become paralysed (this is a result of the eversion process). Then they released their hold on the queen's abdomen and swung backwards, still attached by the genitals (Fig. 3b). Roseman (1878) also observed that the drone fell backwards during mating. About 2-4 seconds after swinging back, an explosive snap was heard clearly, and this snap coincided with the separation of the paralysed drone from the queen (Fig. 3c). After each mating, the tethered queen was lowered quickly, cursorily examined visually, and quickly elevated again; as the matings progressed the sting chamber appeared to become increasingly engorged with mucus. She was removed from the tether line after the eleventh mating. The mucus plug apparently did not preclude successful mating activity. In fact, the sting chamber was held open by the plug, possibly providing a stimulus for subsequent matings. The queen's wing was clipped immediately after the final mating, and she was introduced to a colony where she performed normally, laying fertile eggs.

The above observations are in close agreement with those made by Shuck (1882), in which he apparently observed a single mating of a tethered queen. Carey and Otis (see Langstroth, 1861) also described the explosive snap that occurred during the separation of a queen and drone mating in flight, three feet from the ground in front of a hive. Gilchrist (1878) and Melzer (1956) also cited evidence indicating that drones fall free after mating in the air. The genital eversion process apparently proceeds as the paralysed drone swings backwards (Fig. 3b), the dorsal bending of the male genitalia allowing for the change of angle between queen and drone. Finally, when the drone hangs down from the queen, trapped air within the indophallus is compressed, causing the explosion associated with the separation of the pair (Fig. 3c). The description of the explosion by Carey and Otis led Langstroth (1861) to postulate for the first time that the function of the explosion is to separate the queen and drone.

The "separation by explosion" mechanism may also explain why drones that "mated" with the simulated open sting chambers of queens modified by techniques 1 and 2 above, always remained attached by the genitals. The characteristic snap was never heard, presumably because the modified sting chamber restricted the eversion process in some way that prevented the explosion.

During the entire series of observations, many normal virgin queens were observed to mate with single drones only, again without the genital explosion, and again with the drone remaining attached to the queen. These matings were considered somewhat abnormal, because multiple

matings did not occur even though these queens had ample opportunity, and because drone separation by genital explosion was not accomplished.

Since the complete mating act of one drone required only a few seconds, and drone-queen separation was spontaneous, it seems probable that queens do not necessary fall to the ground each time they mate. For example, if a queen and drone begin copulation at a height of 15 m. and the queen maintains active flight throughout the mating act, it seems likely that the drone would be separated before the queen lost sufficient altitude to touch the ground.

The observations in which copulating pairs fell to the ground (Alber et al., 1955) have still to be accounted for. Several factors may be responsible: (1) inability of the last drone to evert normally into a sting chamber greatly distorted by engorgement with mucus and semen, (2) attempted copulation into a partially open sting chamber, preventing normal eversion, or (3) as suggested by Woyke and Ruttner (1958), a mating act initiated too near the ground, not allowing sufficient time in flight for normal eversion and separation.

OBSERVATIONS ON FREE-FLYING QUEENS

After large numbers of drones were attracted to the immediate area of tethered suspended queens, free-flying virgin queens 1-8 weeks old were released; this led to some interesting observations. These queens had never flown previously, so they oriented to the cage from which they were released, usually returning there after flights. Of the many queens liberated for free flight in the presence of an abundance of drones, only one mated. Drones were observed to **mount** many of the queens, at heights as low as 2-3 m.; the drone-queen pairs flew freely, without losing altitude, and could sometimes be followed visually for several seconds as they circled in the area. Often typical drone swarms formed at heights of about 15-30 m. above the ground; it was presumed that drones were pursuing the liberated queens, but distances precluded verification.

The single queen observed to mate (observed jointly with C. Zmarlicki) was intercepted by a drone as she was flying about 30 cm. from the ground. The drone mounted and everted in an instant, but instead of separating with the explosive snap, the coupled pair collided with the ground. The drone was removed manually from the queen. The queen showed no further mating behaviour after she was freed.

In all the foregoing experiments, drone behaviour—whether elicited by tethered or free-flying queens—was probably normal, since the drone population was not manipulated in any way. This indicates that the failure to obtain routine matings must be associated in some way with abnormal queen behaviour, due to some unknown deficiency in the experimental conditions.

CONSIDERATION OF DRONE BEHAVIOUR IN BIOASSAY FOR SEX ATTRACTANTS

Several substances are involved in the sex-attractant complex produced by the queen; individual fractions of the complex are moderately, weakly, or very weakly attractive to drones (Gary, 1962). However, in order to identify all components of the complex, each of these substances must be detected and evaluated by bioassay, singly and in various combinations. This requirement, together with the need for bioassays to accommodate normal flight behaviour of drones, makes any study of the problem a complicated one. The apparatus for suspending stationary queens is useful for sex-attractant bioassays. A substance that has been isolated can be impregnated on an inert object to be suspended at appropriate heights. In judging drone attraction, consideration must be given to both the **duration** of visits and the **number** of drones attracted. A bait sample (crude lipid extract of virgin queens), or a tethered queen, can be used to lure drones close to fractions of the queen-attractant complex, so that the drones can perceive the weakly attractive substances which might not otherwise be detected. Page 29 ➸

NATIONAL EXECUTIVE

holds one-day meeting

A meeting of Executive was held in Wellington on April 14th and the following is a resume of proceedings:

Biological Control of Insect Pests

A cetrain amount of work has been done in this field by Dr Cumber and research work was still continuing. An invitation is to be made to Dr Cumber to give an address at Conference, and it is hoped that he will be able to be present.

Pollen Substitutes

Research work carried out in the previous season will be the subject of an article in the August issue of "The N.Z. Beekeeper".

Nectar Sources Bulletin

Notes prepared by Mr Walsh, Apiculturist, Auckland, have now been made available by the Department of Agriculture. Investigation is being carried out as to the best method to have them printed. The full script will be available at Conference but in the meantime, branch secretaries should ascertain from members the degree of interest in such a publication. The cost is likely to be 5/- for hte booklet in cyclostyled form if a reasonable quantity are printed.

Sugar Prices

The minimum quantity of sugar supplied direct by the New Zealand Sugar Company Ltd is half a ton. Terms and conditions of sale vary from area to area. The same prices for each area are applicable for minimum of half-ton lots ordered through or purchased direct from any wholesale grocery merchants throughout New Zealand. Orders can be placed with local merchants.

Taranaki Branch

It is apparent that there are sufficient beekeepers, both commercial and otherwise, in the Taranaki area to warrant an investigation into the re-formation of the branch. Enquiries are to be made as to the degree of interest but it is not expected that there will be any finality prior to Conference.

Apiaries Amendment Act

The Amendment to the Act which was passed in the closing stage of the 1965 Session will be put into effect this year. Beekeepers will be advised of requirements, etc., by apiary instructors. Preparatory work has almost been completed and Departmental officers will receive full co-operation from beekeepers.

Tutu Problem

The Department has continued with testing and it was disappointing to learn that two apiaries had been destroyed because they were illegally in the closed area in the Bay of Plenty region.

General

Matters under consideration on which it was not possible to report progress were

The price structure of N.Z. honey on the U.K. market; compensation for diseased hives as applicable in overseas countries; the method in which a queen-testing programme can be implemented—this is being further investigated by Mr Winslade whilst in Australia with the Beekeepers' Tour.

Annual Conference

Branch secretaries were reminded to forward accounts and remits to the General Secretary as early as possible. A list of members whose subscriptions are in arrears according to association records has been provided and it would be appreciated if every effort could be made to have these collected and forwarded.

Travel Bursary

The bursar, Mervyn Cloake, left Auckland on Thursday, April 14, for Canada.

THE COST OF PROTEIN in POLLEN SUBSTITUTES

By F. G. SMITH, D.Sc., B.Sc., N.D.B., F.R.E.S.

Director of the Western Australia Department of Agriculture, Perth, and Editor of "APICULTURE", Dr. F. G. Smith has made some notable contributions to Australian research. This practical review of the cost structure of various pollen substitutes is of considerable interest and the comparisons between factory and home produced products provides food for thought. A review of the work study undertaken by scientists of the New Zealand Department of Agriculture will be published in our August issue.

Pollen is the sole source of protein in the natural diet of bees. It is this protein, together with lesser quantities of fatty substances, minerals and vitamins, which enables bees to raise brood and so maintain and increase the population of the hive. If we know the amount of protein in pollen and in the various substitutes for pollen, we will have some idea of the relative value of these substances.

The protein content of each of the substitutes for pollen currently recommended is shown in column 2 in the table below.

Knowing how much a substance costs, and the amount of protein it contains, the price the beekeeper has to pay for each pound of protein in that substance can be calculated. This information is given in column 4 of the table.

The Cost of Protein in Substitutes for Pollen

(Based on Perth bulk prices in Australian currency)

Substance	Protein content (N x 6.25)	Cost per lb. of substance	Cost per lb. of protein
	per cent.	s. d.	s. d.
Soya flour, "T.S.P. 100" (SF)	50.7	1 2	2 3½
Dried brewers' yeast (DBY)	37.5	1 0	2 8
Dry skim milk (DSM)	36.9	1 1	3 0¾
Pollen, natural dried	20.6	trapped	
Haydak's formula .. .. SF 4 DBY 1 DSM 1	47.5	1 1½	2 4½
"Sojapyl" .... SF 9 DBY 1 Added vitamins	49.4	2 6	5 1
"Kra-waite" (sample supplied)	12.75	2 4	18 4

Soya flour has the highest protein content, more than 50 per cent, and is the most economical of the recommended pollen substitutes. It is the basis of both Professor Haydak's formula as well as Dr Svoboda's "Sojapyl". In both of these, other substances have been added to make the balance of the diet as near as possible to the ideal. Professor Haydak added dried brewers' yeast and dry skim milk, and Dr Svoboda added dried brewers' yeast and small amounts of some vitamins.

Dried brewers' yeast is next in protein content (37.5 per cent) followed closely by **dry skim milk.** Dried brewers' yeast, in the form of the waste product from the manufacture of yeast extracts, is the main constituent on which experiments have been done in South Australia and Victoria. The South Australian "Kra-waite" includes about four parts of dried brewers' yeast to one part of dry skim milk, while the Victorian mixture has three parts of the same yeast to one part of natural pollen.

Dried natural pollen, trapped from Banksia wooded heathland in July, was found to have a protein content of about 20 per cent. Although this is low compared with the substitutes, it contains all the essential elements, including that which attracts the bees to collect and eat it.

Of the formulae of substitutes for pollen, "Sojapyl" has the highest protein content (49.4 per cent), followed very closely by Professor Haydak's formula with 47.5 per cent. "Kra-waite" was the lowest, with only 12.75 per cent.

The reason why "Kra-waite" has such a low proportion of protein is because it contains about two parts of honey and water to one part of the dry material. It is this honey which makes the bees eat it, even when good and free pollen is available in nature. At 2/4d per pound it is an expensive way of obtaining a mixture of mainly honey and water for feeding bees. It is understood that in the commercial product the honey is replaced by invert sugar and an attractive essence.

The beekeeper is saved the bother of collecting together the materials and of mixing them up when he buys ready made "Kra-waite", but the protein in it costs him 18/4d per pound.

The best buy is Professor Haydak's formula which can be made from locally-available materials at less than half the price of the imported "Sojapyl". The cost per pound of protein in the Haydak formula is 2/4½d. The beekeeper can add his own honey to the protein substances in the proportion of 2 lb. of honey to 1 lb. of the dry mixture. A little water can be added to give it the right consistency.

THEIR TASTE is YOUR Livelihood

By C. G. ROPE, Honey Grader, Auckland.

Volumes have been written about the sight, hearing and touch senses of Man, but information regarding his senses of taste and smell is not so readily available, nor have they been accorded the publicity they deserve.

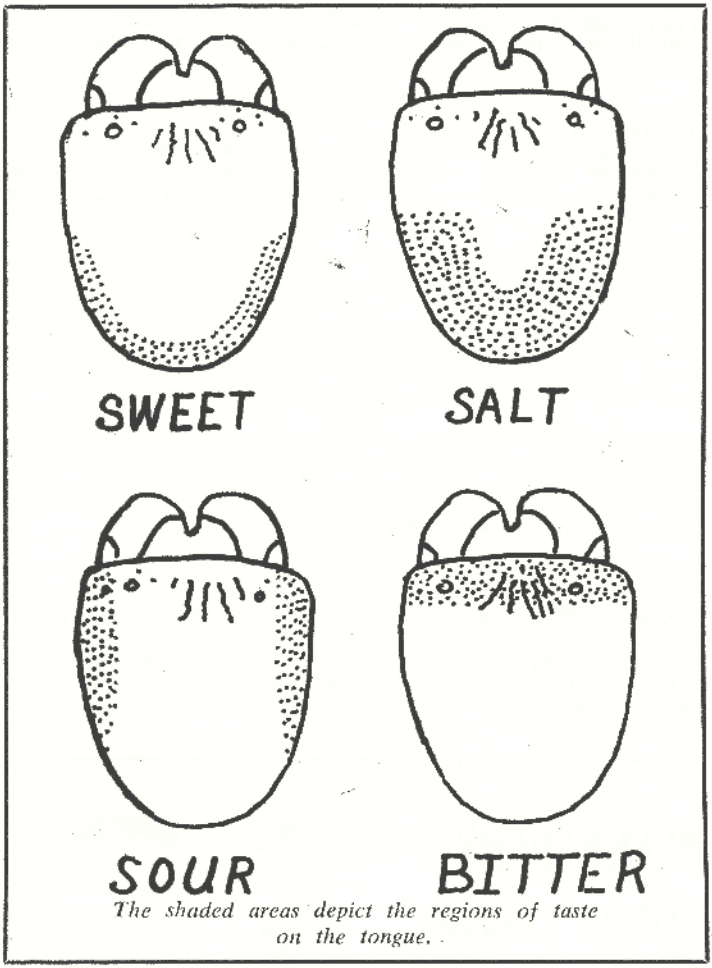
Pleasant flavours are discernible by most, but few people are connoisseurs, thus our individual responses to taste stimulation are far from universal. We find at one extreme those with acute and cultivated palates capable of savouring and differentiating flavours, and at the other extreme those who are almost insensitive to "taste" and when they eat are more concerned about filling a void than deriving a sense of satisfaction from the food they eat.

People unfortunate enough to be insensitive to flavours are incapable of making comparisons, and therefore they tend to be somewhat sceptical of the opinions of others regarding flavours. Connoisseurs, on the other hand, are noticeably critical of even the best of fare because of the demanding standards they set themselves. The intermediate group between these two extremes is comprised of every-day people.

Need we then as members of this middle group wonder why there is such divergence of opinion when once we learn how our palates function; that there are no less than 10,000 taste "buds" on the tongue, the number decreasing from birth; and that most of the things we think we can "taste" we in fact "smell".

The tongue is the only organ in the mouth that registers a taste response, the other delicate surfaces within the mouth and throat are sensitive only to temperature, to touch and to the effects of caustic substances. Our taste "buds" are really highly sensitive touch-nerve-endings communicating to the brain the sensations we experience. A single "bud" will respond to one only of the five basic stimuli, namely sweetness, saltiness, sourness, bitterness or metallic. "Buds" are unevenly dispersed over the tongue's surface, and are congregated into certain areas where neighbouring "buds" respond to a similar type of stimuli. Those which detect sweetness are situated in a narrow band around the tip and along the forward side-margins of the tongue. Those which respond to salt occupy a wider band in the same regions. Sourness is detected by a taste "bud" region found at the side margins towards the back. These responses can be easily tested by placing a sweet, sour, or salty pill upon the centre of the tongue. If it is moved about the mouth the appropriate zones will soon be located. Bitterness is distinguished at the back of the tongue. A simple test is to ask someone to swallow lemon. Their facial expression will reveal when it has reached the "bud" region in question.

All the other "tastes" we think we experience are actually aromas. Saliva, which contains enzymes, and the temperature of the mouth acting in concert on food cause the release of volatile substances such as oils, acids, alcohols and esters.



The shaded areas depict the regions of taste on the tongue.

These waft upwards into the passages behind the nose where an extremely sensitive smell-detecting surface is to be found. It is interesting to note that this surface has a larger area in dog than in man. When we are afflicted with a cold or similar ailment, this surface becomes coated over with mucus and so our food seems less interesting.

Because the taste and smell organs respond differently in individuals, it is understandable that people develop their own flavour preferences. Consumers are never unanimous as to which is the best flavour of say, a range of coffees, or wines, nor is there complete agreement on pleasant or unpleasant flavours. Popular preferences for certain flavours are evident, however, in all commodities and have

a direct bearing on prices and the quantity sold. Chocolate milk shakes, for example, outsell the other flavours and deliactely flavoured honeys are most in demand.

General agreement can be reached regarding the strength of flavours, but the identification of flavours, especially when they are mixed or blended, is more elusive. Orange flavour is an easy example, some like it and some don't, but we all have a "flavour memory" associated with the word "orange" and would all recognise it whenever it was tasted. Flavour memory is a forceful influence in the sale of food.

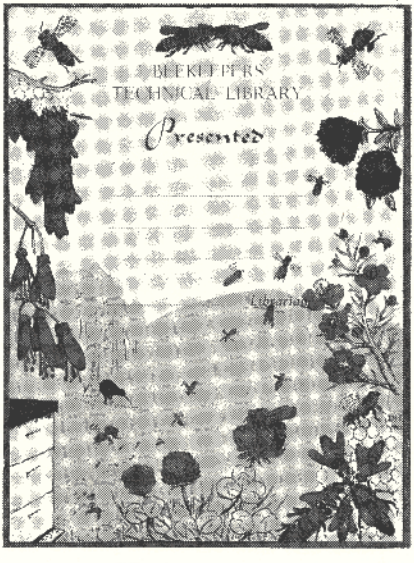
Temperatures, too, are indispensible to the enjoyment of food. Ice cream for instance, can be enjoyed only when it is cold, and is appreciated even more on sunny days. Spicy foods appeal to the palate much more in hot climates. The optimum temperature for the perception of taste is around 68° F. although some people prefer a slightly higher temperature. At 80° F. sensitivity is declining and mild flavoured foods become insipid. Approaching 100° F. the palate becomes jaded, and at 122° F. the gustatory nerves cease to function altogether.

To fully appreciate flavour, one should be relaxed, in a pleasant environment where one can insulate oneself from routine, noise, odours, interruptions and other disagreeable influences. The manner in which food is served, the "tasteful" embellishment of the dishes and the employment of appetizing colours which promote eye-appeal are the final stimuli to the gustatory system.

The trained palates of food tasters and graders enable them to make uniform judgments year after year of the commodity with which they are dealing. They are aware of the influences likely to affect their judgment, and take precautions to protect themselves against them. The producer or buyer on the other hand is not so aware of these things and sometimes misunderstands the grader's decisions. It is hoped the contents of this article will help towards greater mutual understanding of this question and of the sense of taste in Man.

BEEKEEPERS
TECHNICAL LIBRARY

PICTURED here is the LIBRARY BOOK PLATE for presentation purposes. Printed on white art paper, the illustration of bees, clover and other blossom is in gold; so, too, is the surrounding border. The gum on the right, the kiwi, hive, lid and pollen sacs of the worker are all in red. General background of the lower portion of the plate is a bright green with black outlines. It is certainly an attractive ancillary to a book, and the black and white reproduction does not portray the design to its best advantage. Original size is five inches wide and 6¾ inches deep.



List of Books in Alphabetical Order of Authors in the

BEEKEEPERS TECHNICAL LIBRARY

ABC and XYZ of Bee Culture 1908 to 1962 Editions
Queen Breeding for Amateurs C. P. Abbot 48p. 1947
Law Pertaining to Honeybee—American 88p. 1924
The Management of Bees S. Bagster 244p. 1834
Infectious Diseases of the Honeybee Leslie Bailey 176p. 1963
Beekeeping for Beginners F. C. Baines 42p. 1920?
Beekeeping in Victoria F. R. Beuhne 168p. 1934
Honey Flora of Victoria F. R. Beuhne 136p. 1935
The Honeybee Edward Bevan 404p. 1827
The World of the Honeybee Colin G. Butler 223p. 1962
Bees and Honey G. A. Carter 113p. 1945
The Hive Bee G. A. Carter 44p. 1946
Management Herbert N. Casson 179p. 1932
A Honeybee and Her Master A. D. Chapman 237p. 1944
Bees and Beekeeping F. R. Cheshire 742p. 1886
Beekeeping for Biginners Walter Chitty 87p. 1903
Beekeeping Kenneth K. Clark 222p. 1951
How to Keep Bees Anna B. Comstock 228p. 1911
Manual of the Apiary A. J. Cook 543p. 1910
My Bee Book William C. Cotton 368p. 1842
British Beekeepers Guide Book T. W. Cowan 226p. 1924
The Honeybee T. W. Cowan 220p. 1890
The Hive John Compton 174p. 193?
Dadant System of Beekeeping C. P. Dadant 115p. 1932
Outapiaries M. G. Dadant 126p. 1932
The Beekeeper's Enclycopaedia A. S. C. Deans 190p. 1949
Beekeeping Techniques A. S. C. Deans 160p. 1963
Bees and Beekeeping A. S. C. Deans 76p. 1962
Five Hundred Answers to Bee Questions G. S. Demuth 104p. 1947
Practical Bee Guide J. C. Digges 305p. 1945
Scientific Queen Rearing 126p. 1901
The Skyscraper Hive M. Dugat 78p. 1948
Bees, Wasps and Ants Duncan 87p. 1920?
The Key of the Hive J. M. Dunning 129p. 1945
Beekeeping Do's and Don'ts Tichner Edwardes 56p. 1925
Beekeeping for All Tichner Edwardes 138p. 1934
The Bee Master of Warrilow Tichner Edwardes 219p. 1920
The Honey Star Tichner Edwardes 344p 1913
The Lore of the Honeybee Tichner Edwardes 196p. 1933
The Mystery of the Hive E. Evrard 369p. 1923
The Mind of the Bees Julien Francon 146p. 1939
Beekeeping in Antiquity H. M. Fraser 157p. 1931
Australian Bee Lore and Bee Culture A. Gale 313p. 1912
Profitable Beekeeping Henry Geary 124p. 1919
Practical Bee Breeding A. Gilman 248p. 1928
The Shilling Bee Book R. Golding 68p. 1848
The Hive and the Honey Bee Ed. by Roy A. Grout 550p. 1963
The Art of Beekeeping William Hamilton 200p. 1951
Blazing the Trail L. S. Harker 137p. 1938
Bees Ellison Hawkes 120p. 1912
The Bee Gertrud Hess 68p. 1955
Producing, Preparing, Exhibiting and Judging Bee Produce W. Herrod 168p. 1912
Beekeeper's Guide W. Herrod-Hempsall 169p. 1943
Beekeeping: New and Old. W. Herrod-Hempsell 772p. 1930
Australasian Bee Manual Isaac Hopkins 162p. 1906?
New Zealand Bee Manual Isaac Hopkins 148p. 1882
Practical Beekeeping Isaac Hopkins 288p. 1926?
Plants and Beekeeping F. N. Howes 224p. 1945
New Observations upon Bees Francis Huber 230p. 1814
Natural History of Bees Francis Huber 314p. 1808
A Treatise on Bees R. Huish 414p. 1815
Manual of Beekeeping John Hunter 239p. 1876
Advanced Bee Culture W. Z. Hutchinson 205p. 1911
Beekeeping for Beginners I. H. Jackson 112p. 1920?
Bees W. Jardine 301p. 1840
Book About Bees F. G. Jenyns 200p. 1886
The Spell of the Honeybee W. Eric Kelsey 274p. 1947
Breeding and Management of Bees John Keys 272p. 1814
Bees I. Khalifman 366p. 1953

Queen Rearing H. H. Laidlaw and J. E. Eckert 150p. 1963
The Hive and the Honeybee L. L. Langstroth 378p. 1914
The Hive and the Honeybee Langstroth (Revised by Dadant) 575p. 1919
Wonders of the Hive S. A. Lavine 90p. 1958
Honeycraft in Theory and Practice J. A. Lawson 228p. 1931
The Flower and the Bee J. H. Lovell 286p. 1918
Honey Plants of North America J. H. Lovell 408p. 1926
Ants, Bees and Wasps J. Lubbock 377p. 1929
A Man and His Bees H. J. Lund 156p. 1947
Beekeeping in Britain R. O. B. Manly 439p. 1948
Honey Farming R. O. B. Manly 293p. 1946
Honey Production in the British Isles R. O. B. Manly 328p. 1936
Adventures Among Bees Herbert Mace 144p. 1930?
A Book About the Bee Herbert Mace 138p. 1922
Beekeeper's Handbook Herbert Mace 256p. 1952
Bee Matters and Bee Masters Herbert Mace 144p. 193?
Modern Beekeeping Herbert Mace 225p. 1933
Some Other Bees: Moths and Butterflies Herbert Mace 160p. 19??
Practical Beekeeping and Honey Production D. T. Macfie 127p. 1920?
The Life of the Bee M. Macterlinck 356p. 1912
A Thousand Answers to Beekeeping Questions C. C. Miller 276p. 1919 and 1931
Fifty Years Among the Bees C. C. Miller 340p. 1911
Beekeeping for Profit W. S. Morsley 124p. 1914
Bees, Beehives and Bee Culture Alfred Neighbour 359p. 1878
Bees and Honey Thomas G. Newman 191p. 1890?
Beekeepers Convention Handbook T. G. Newman 1890?
Bees in Amber Jno. Oxenham 116p. 1914
Life of the Honeybee E. C. Parnwell 52p. 1940
American Honey Plants Frank C. Pellett 419p. 1930
Practical Queen Rearing Frank C. Pellett 103p. 1945
Productive Beekeeping Frank C. Pellett 302p. 1928
Australasian Queen Rearing W. S. Pender 59p. 1926
The Handy Book of Bees A. Pettigrew 193p. 1870
Beekeeping E. F. Phillips 490p. 1939
Honey Bees and Fairy Dust M. G. Phillips 213p. 1926
Beekeeping Mysteries Explained M. Quinby 348p. 1865
Quinby Also see Root
Beekeeper's Folly J. R. Ratcliff 270p. 1949
Money in Bees in Australasia Tarlton Rayment 293p. 1920?
A Cluster of Bees Tarlton Rayment 750p. 1935
Profitable Honey Plants of Australasia Tarlton Rayment 132p. 1920?
The Behaviour and Social Life of Honeybees Ronald Ribbands 352p. 1953
The Hive and the Honey Bee H. D. Richardson 122p. 1860?
Alexander's Writings on Practical Bee Culture H. H. Root 96p. 1910
Quinby's New Beekeeping L. C. Root 270p. 1882
Starting Right with Bees E. R. Root 104p. 1947
A Book for Beekeepers Alfred Rusbridge 63p. 1875
Bees for Pleasure and Profit G. G. Samson 122p. 1921 and 1892
Teach Yourself Beekeeping A. N. Schofield 148p. 1943
Honey Getting E. L. Sechrist 128p. 1944
The Spirit of the Hive D. L. Sharp 240p. 1925
A Modern Bee Farm S. Simmins 506p. 1928
Better Queens Jay Smith 100p. 1949
The Introduction of Queen Bees L. E. Snelgrove 205p. 1943
Anatomy and Physiology of the Honeybee ... R. E. Snodgrass 327p. 1925
Right Use and Ordering of Bees Edmund Southerne 18p. 1593
Adventures in Hiveland F. Stevens 227p. 1900?
City of the Bees Frank S. Stuart 183p. 1951
Beekeeping Practice Frank S. Stuart 206p. 1946
Practical Beekeeping A. M. Sturges 308p. 1924
Life of the Queen Bee L. Sutherland 126p. 1946
Beekeeper's Manual Henry Taylor (revised Watts) 372p. 1880
The Golden Throng Edwin W. Teale 199p. 1946
Beekeeping Times Beemaster 234p. 1864
Beekeeping J. Tinsley 94p. 1945
The Townsend Bee Book E. D. Townsend 82p. 1914
The Behaviour of Bees H. J. Wadey 175p. 1948
The Bee Craftsman H. J. Wadey 116p. 1945
Introducing Beekeeping H. J. Wadey 74p. 1916?
Beekeeping for Profit and Pleasure A. Webb 116p. 1945
Book of Beekeeping W. B. Webster 104p. Old (undated)
A Manual of Beekeeping E. B. Wedmore 413p. 1932
Successful Beekeeping. E. B. Wedmore. 163p. 1946.
Honeybees and Their Management. S. B. Whitehead. 153p. 1946.
The Story of the Hive. C. Williams. 200p. 1928.
Bees, Their Habits, Management and Treatment. J. G. Wood. 114p. 188?.
Vinetum Britannicum Treatise of Cider. F. Worlidge. 100p. 1675.
Curative Properties of Honey and Bee Venom. 198p. 1959.
Bound Copies of:
American Bee Journal. 1931, 32, 33, 34, 35.
Gleanings in Bee Culture. 1913, 14, 15, 33, 34, 35, 36.

COMMENTARY

from the Editor's Desk and Mail

AN INDEPENDENT selection committee comprised of members of the National Beekeepers' Association, and the Department of Agriculture, interviewed applicants for the Canadian Study Bursary who complied with the terms and conditions of the award.

By unanimous decision, the award was deservedly given to Mr Mervyn Cloake, who assists his father, Mr Harry Cloake in running the family apiary at Fairview, Timaru, Canterbury.

Mervyn left Auckland on April 14 by air for Canada and although it is doubtful whether the time factor will permit an initial report of activities to be made in this issue, the knowledge gained will be made available for publication in subsequent editions.

The bursary covers the period April-September and commercial apiary management in Central, North Central, Northern and Southern Districts of Alberta will be studied at first hand under the aegis of the local Canadian association and the Department of Agriculture in Alberta.

Every apiarist will wish Mervyn well and his reports will be awaited with interest. He has a great opportunity provided by beekeepers and suppliers to undertake this work study, and will surely make the most of his great chance. With the pre-knowledge that his son was making application with other young men, the President of the Association, Mr Harry Cloake, declined to take any part in the interviewing or selection of the final applicant.

II II II

IT'S SURPRISING WHAT A DIFFERENCE a little "0" will make. In the last edition a graph was reproduced to show production records in Canterbury, and by a typographical error the hives were shown in hundreds. It should have been thousands. Reference to the graph itself would clarify the situation, but if anyone was mislead, profuse apologies are offered. Honey production has been good for this season in Canterbury. If Griff's Graph runs true to form, the next two seasons will be pretty poor. We shall see.

II II II

CLAIMED TO BE the largest apicultural gathering in the world, the North Eastern Apiculturists' Association of Victoria, Australia, had their field day at Glenrowan in November last on the theme "Science and Research in Beekeeping". Ivor Forster, of Oamaru, was a guest speaker and the title of his talk was "Pollination Research in New Zealand". Kevin Ecroyd of Alliance Bee Supplies,

Christchurch, was also a guest speaker and demonstrated the New Zealand frame nailing machine and other equipment. It is certainly a tribute to New Zealand that two active representatives were invited as guest speakers at such an important overseas function. Ivor took the opportunity whilst there of spending several days at the Bee Research Laboratory at Waite Institute, Adelaide, and some field trips to see Australian beekeeping.

II II II

THE BEEKEEPERS' SPECIAL to Australia takes off on Friday, May 20th, for Sydney, and on the Saturday a special charter coach will collect members at their hotel for a three-day trip to Orange and Bathurst, visiting typical Australian apiaries and mobile and central extracting plants. Returning to Sydney a further full programme has been arranged prior to departure for Brisbane, where coach visits will be made to a variety of apiaries and establishments and places of interest. Return will be made on June 10 by some of the participants; others will include a visit to Canberra whilst on the great continent will return on June 11.

II II II

MR L. E. SNELGROVE, M.A., M.Sc., F.R.E.S., President of the Somerset Beekeepers' Association for many years, and author of "Queen Rearing" and "The Introduction of Queen Bees" died on November 21 last at the age of 88.

II II II

THE TV. COMEDY programme featuring Eric Sykes and Hettie Jacques rendered a very good service to beekeepers in one of their recent sketches screened throughout New Zealand. Eric was shown as a would-be champion long distance runner and hurdler who, whenever interviewed by Press and screen reporters attributed his staminer and staying power to the nourishment obtained from honey, a liberal supply of which was kept in the hip pocket for convenient dips of the finger and sucks during practice runs. In the marathon steeplechase event, allegedly held in London's White City Stadium, Eric is shown in all his gawkiness matched against obvious athletic types, and his chances of out-pacing such he-men seems pretty remote. Judicious speeding up of the camera and a little trick photography, however, causes Eric to shoot ahead at amazing speed leaving champion runners and entrants from other clubs well in the rear. Interviewed at the winning post by news-hungry reporters, Eric again testifies that all his success is due to honey. Asked how he ate it whilst running, Eric pointed out that he had not time to eat it on this occasion; the honey in his hip pocket had attracted both bees and wasps and had stung his nether regions so well that he ran like the wind to get away from them!

II II II

HOW DAFT CAN YOU GET? The following news item appeared in the mass-circulation London "Daily Mirror" in connection with a new film to be called "Deadly Bees":

"It is essential to the plot of a new film that bees should settle on the shapely legs of actress Suzanna Leigh. But it is equally important that 21-year-old Suzanna should not be stung.

"The 'props' department on the set of 'Deadly Bees', being made at Twickenham, Middlesex, found the answer. They had dummy bees made at £1 a time.

"Make-up artist Jill Carpenter is pictured above fixing the stingless 'bees' to Suzanna's valuable legs".

If the producers had used his "nut" there would have been no need to produce artificial bees at £1 a time! No doubt there will be hysterical letters after the film has been released from writers who think that ALL bees are lethal.

THE INTERNATIONAL APICULTURAL CONGRESS will be held on the campus of the University of Maryland, U.S.A., from August 11-17 1967 and an initial committee meeting has already been held to plan tentative details.

Board of directors is comprised of the American Beekeeping Federation, the Canadian Beekeeping Council, Bee Industries Association, and the National Honey Packers and Dealers Association. Secretarial assistance will be provided through the Entomological Research Division of the U.S. Department of Agriculture.

The auditorium of the Fine Arts Centre is air-conditioned and seats 1,400 people, and additionally, there will be 110 rooms available for committee meetings, special sessions and exhibits. Target is for 2,000 registrations, with a registration fee of $20. Sight-seeing trips will include Washington, D.C., Mt. Vernon, and the Bee Laboratory at Beltsville. After-Congress itineraries will include honey producing centres in New York State and Canada, a visit to Guelph and a stop at Niagara Falls.

The first two days of Congress will be devoted to scientific meetings open to research workers under the chairmanship of Professor Townsend, of Guelph, Ontario. The Congress will be undertaken and carried through with American thoroughness. There will be much to see, much to learn and a great deal to do.

II II II

AN INTERESTING NOTE on the uses of propolis was recently published in the "British Bee Journal" and is reproduced here. The musically inclined will note that the author, Joan Marshall, refers to the violin varnish as being the covering employed by the famous violin maker, Stradivarius:

Equal parts of propolis and linseed oil make a good salve for chapped hands. Mixed with 3 per cent Vaseline it can be applied to wounds.

For corns, soften a piece of propolis in the fingers and spread it thinly on a leather dressing. Warm the treated dressing before applying to the foot. It should effect a cure within one to two weeks.

Regarding the anti-bacterial and therapeutic value of propolis, Russian workers have cast a new light. Kival Kina of the Caucasian Institute of Veterinary Medicine in the U.S.S.R. outlined its value and use as a pharmaceutical product. Drugs made from it were used to treat farm animals. It has been used internally for the treatment of bronchitis in pigs and various pulmonary diseases of young cattle. It is a rapid healer for septic wounds also.

To clean propolis, collect together all the scrapings and boil them in soft water. The wax and any dross will float to the surface whilst the pure propolis will remain as a sticky sludge on the bottom of the container. Remove before cold and knead it into a ball. Chill until quite hard and brittle and reduce to a powder.

Propolis can be used as a flux for soldering.

Prepare one part propolis to one half-part beeswax and mix in hot boiled linseed oil, two parts. Immerse the article to be dealt with for 20 minutes, dry and polish.

Shake powdered propolis in a bottle with rectified spirits of wine. Use several coats as a varnish for wood, tin, or steel.

Violin varnish. "Un Rucher Nait" by Raoul Alphandery.

Recipe (1) One litre of methylated spirits to 120 grammes of propolis.

Recipe (2) 200 grammes of propolis, 100 grammes of beeswax and 400 grammes of linseed oil. This is said to be the "lost" recipe used on Stradivarius violins.

Shoe polish. Mixed with lamp black propolis makes a shoe polish which waterproofs, and restores flexibility in leather.

A DISEASE at present unidentified has made an appearance in California which has variously been named "autumn collapse", "the disappearing disease", etc., because of the fact that bees are rarely seen to be obviously affected. It appears that the bees crawl away from their hive for as much as half an hour to a distance of 20-40 feet from the alighting board, spin round in a circle, and die. To the beekeeper, the only obvious sign of trouble is that the stock is getting progressively lighter.

Entomologists have announced that it is unlikely pesticides are to blame, and work so far has eliminated known diseases of bees. The Sacromento Valley district of California is the most hard hit with the mysterious malady, and urgent research is being undertaken by the Department of Agriculture to ascertain cause and effect.

II II II

IT IS COMMON parlance amongst beekeepers to refer to a good **tight** cluster of bees in the brood box, but apparently our forefathers used the description in an entirely different context, as may be evidenced from an extract from "Old Moore's Almanack" of 1846. The reference to February is, of course, in the Northern Hemisphere, still gripped by winter ice and cold:

WINTER FOOD FOR BEES

"In February bees begin to recover from their torpid state. When this takes place, if there is reason to suspect that the hive is weak and in need of support, they should be fed occasionally. The best thing to give them is a mixture made of a pint of ale with a pound of sugar and about half an ounce of salt. The whole boiled together and skimmed, when cold it will have the consistency of honey. It should be given occasionally in a shallow plate, with some short clean straw, or very small twigs laid across it, before it is put into the hive, it should be given at night and taken away in the morning, and as soon as it is found that little or none is consumed desist from giving it."

A LONG AND INTERESTING letter has been dispatched to beekeeping organisations all over the world by the Federacion Argentina de Sociedas Apicolas explaining that Argentinian beekeepers are not the big bad wolves responsible for gluts on the honey market and the low prices sometimes obtaining.

Undercutting to capture the world honey consumer market, they say, is quite false and that in fact, because they had no support prices or subsidies of any kind, the selling agents forced them to sell at a loss. Exporters forced down the price of their surplus of 45 million pounds of honey, and caused the sharp drop in world prices.

To alleviate this situation, 90% of Argentinian beekeepers represented by 52 beekeeping associations have now banded themselves into a single Federation with a levy of 1 kilo of honey per hive holding, with the result that domestic consumption has increased in eight months from 250 grammes per head per year to 800 grammes. Thousands of recipe leaflets were distributed as well as other forms of advertising and created an internal market equal to the demands of the export trade.

Official backing by banks to assist beekeepers and prevent acceptance of low prices have been promised, and a minimum price of $300 c.i.f., European port, per ton of honey, agreed to.

The letter is comprehensive and detailed in its assessement of world consumption and possibilities. **It is also a monumental expose of the dire need for an efficient honey marketing authority in the Argentine and elsewhere.**

HONEY MARKETING AUTHORITY

H.M.A. prices as from 1/4/66 as charged to merchants. (Figures in brackets indicate previous prices):

	"Imperial Bee' Brand Clover Blend, Delicate Flavour Colour 86 Per Dozen		"Honeygold" Brand Light Amber, Full Flavour Colour 60 Per Dozen	
½lb. Cardboard Carton (Cardea)	13/3	(13/-)	12/9	(12/-)
½lb. Plastic Pots (ACI 7.7 oz)			15/8	(14/11)
1lb. Cardboard Carton (Cardea)	23/7	(23/1)	22/7	(21/1)
1lb. Plastic Pot (Polypropalene)	26/3	(25/9)	25/3	(23/9)
1lb. Plastic Tumber (ACI 12.2 oz)			24/7	(23/1)
1lb. Glass Jars (ACI 12 oz Food Jar—Plastic Cap)	28/3	(27/9)	27/3	(25/9)
2lb. Cardboard Carton (Cardea)	46/1	(45/1)	44/1	(41/1)
5lb. Tins	115/9	(113/3)	110/9	(103/3)
28lb. Tins	49/-	(47/10)	46/8	(45/6)
58lb. Tins	96/8	(94/3)	91/10	(89/5)

The following is an indication only of Merchants' and Retailers' prices for honey in the Auckland area. (These prices could be and in many cases are subject to varying discounts, rebates, etc.):

	Packer to W'saler Per Dozen	W'saler to Retailer Per Dozen	Retailer to Consumer Each
½lb. Cartons	13/3	15/2	1/7
1lb. Cartons	23/7	27/-	2/10
1lb. Plastic	26/3	30/2	3/2
1lb. Jars	28/3	32/3	3/4
2lb. Cartons	46/1	52/8	5/6
5lb. Tins	115/9	132/4	13/9

DOMINION CONFERENCE

at Whangarei - July 6 7 & 8

CONFERENCE ARRANGEMENTS

Conference will be held in the Town Hall, Bank Street, Whangarei, on July 6, 7 and 8.

A get-together is being arranged for Tuesday evening at the Forester's Hall, Alexander Street, at 8 p.m. and a social function is being held in the Town Hall on Wednesday evening.

There will be bus tours and outings for the ladies.

Those travelling by trains, planes or buses are invited to notify the Northland Branch of their expected time of arrival and local beekeepers will be pleased to escort them to their hotels.

Members of the Northland and Far North Branches are looking forward to Conference, and visitors from other provincies are assured of a warm welcome.

If you have not yet made your hotel, motel, or boarding reservation, be sure to do so NOW! A full list of suitable establishments was published in the February issue, and a reservation form is provided here for your use.

RESERVATION COUPON

To: Mr A. G. Tucker, 35 King Street, Whangarei:

Please reserve the following accommodation for the DOMINION CONFERENCE.

NAME(S) .....

ADDRESS(ES) .....

Number of Rooms ..... Single or Double Beds .....

Date of Arrival ..... Date of Departure .....

Establishment preferred ..... Deposit(s) enc. .....

YOU ARE AGAIN REMINDED: THE LIONS WILL BE A BIG DRAW AND HOTEL OR OTHER ACCOMMODATION MAY BE DIFFICULT. MAKE YOUR BOOKING EARLY.

BRANCH NOTES

WAIKATO

The annual field day of the Waikato Branch was held at Opal Spring, Matamata. Attendance was again good, with many visitors from Bay of Plenty, Auckland, Hawke's Bay and South Island. A feature of the day was the discussions which followed the talks. This swapping of experiences and information was much appreciated. For example, some of our large operators described how they "shifted beehives". Just so that you will not think we are all now migrating beekeepers, our largest thoughtfully said he had "given up shifting bees".

Mr Mansell, the farm safety man, gave us some good hints on lifting supers; well demonstrated by a working model. This should cut down "beekeeper's back".

After lunch and a swim in the hot springs, we had an auction sale, and lolly scramble for the children. The cooking with honey competition again drew many entries and prizes were won by Miss Valerie Forsyth and Mrs Tuck.

Principal speaker was the chairman of the H.M.A., Mr Jack Fraser. He said that it appeared that the intake would be the same as last year, and also showed us the latest packs of local bush flavours (rata, rewa-rewa, etc.), which are being tried on the Auckland market. We were impressed with the dedicated way that the H.M.A. members and staff are serving our industry.

Many gadgets were demonstrated: forklift barrows, a frame nailing device, a queen cell-rearing cage, tool for fitting 40 gallon drum lids, frame holder, non-blocking smoker valve, hive cover and

Members of the Hawkes Bay Branch pose for the camera at their February Field Day.

a three-legged hive table.

Mr Percy Berry gave us a very good address on how he kept apiary records.

Branch President, B. Forsyth, then presented to Mr Lloyd Holt, the original framed cartoon by Minhinnick which was published in the "N.Z. Herald" recently. This was subscribed for by Bay of Plenty and Waikato beekeepers as an expression of thanks to Mr Holt for his fight to get justice. Other speakers were Messrs Barber, Lorimer, Berry and Bates. Mr Holt sincerely thanked everyone for their support and mentioned that during the period that the population of New Zealand had increased 5 per cent, Government Departments had gone up by 20 per cent.

—Reported by H. N. Tuck.

NORTHLAND

A competition was held among non-commercial beekeepers with prizes awarded to those having hives in best condition.

In late summer hives were judged by Messrs A. G. Tucker and T. Gavin and prize-winners were: 1st, Mr J. Price; 2nd, Mr A. J. Dickie; 3rd, Mr G. O. Budd.

Few points separated these competitors. Considerable interest was aroused and it is proposed to hold a similar competition next season.

Honey crops have been erratic, but on the average a fair crop is expected.

—Reported by L. G. Lovatt.

HAWKES BAY

An enjoyable field day was held in February at the out-apiary of Mr L. H. Maultsaid on Ohiti Station, 12 miles from Hastings. The site is on an historic Maori stronghold and visitors found much to interest them and, as the weather was perfect, all enjoyed the picnic atmosphere.

Practical demonstrations and the presence of Mr P. Berry's new boom loader gave beekeepers much to think about.

Crop reports for the Province indicate an average season for most of us and the weather has been all that could be desired.

—Reported by F. D. Maultsaid (Mrs.)

Dad Had Trouble With His Homework . .

"THE ROVING BEE"

a successful school project

A HIGHLY SUCCESSFUL COMPETITION organised for primary school children by the Honey Marketing Authority in Auckland on a national basis should do much to promote and establish in the minds of the young the theme song: "Eat Lots of Honey—It's a Mighty Good Food".

Every month, 422 prizes are given to school children who submit the best entries in "The Roving Bee" colouring competition. Outline drawings are provided free to contestants who obtain their colouring pictures from local stockists and honey retailers and every design—of which there are six—incorporates "The Roving Bee" motif, regularly plugged on the radio network for the past two years.

The Honey Marketing Authority invited schools to participate in a project on bees and beekeeping through the medium of the publication "Trades Alphabet And School Projects", and the response has been extremely good.

Some of the children who write for their copy of "The Story of Bees and Honey" write in a serious vein; many of them contain schoolboy howlers and examples of subconscious humour, and some are quite prosaic for nine to 11-year-olds.

One youthful correspondent addresses his request to "The Removing Bee"; another says, "my five year old sister she has to do a project at school and she has no material to tell I want to supprise her with the book. I am not much of a riter. It is very shot short letter because the page is very short". The latter excuse for brevity is worth remembering.

A young man named Stephen opines: "I would licke to have one of your booklet thanking you. I would licke to no all about Honey and I licke honey very much".

Parental co-operation obviously enters into the scheme of things in that a young man with a neat hand from the South Island writes decorously: "Would you please be kind enough to send me a booklet all about "The Story of Bees and Honey" to help my father. Thanking you, Yours faithfully". Dad obviously has some difficulty in doing his homework.

The born bargain-hunter writes with confidence and an unfettered conscience: "I like honey very much and would like to kno whow it is made so could you please send me a free book and any thing else you can get free".

A true seeker after knowledge who needs some convincing that bees are wonderous creatures, states: "I am interested in your little project in the New Zealand Trades Alphabet and I would like to now some more exciting thinks about bees and honey. Could you answer one question please? Who makes the bees homes and how do they no thats their home because Im shore they don't make their own home? And their homes are made of wood. With thanks".

Some of us are born to be more socially minded than others. Marie, for example, asks: "How are you getting on. It is a pleasure to be writing to you. I would like to no about bees. And how you make honey".

These extracts are unexpurgated and uncorrected for grammatical or spelling errors, not, of course, to poke fun at the earnest endeavours of the participants, but to emphasise the personal interest of these youngsters who are to gain some useful knowledge about bees at a young and impressionable age.

This is publicity—or propaganda—of the right kind that can have good results for the industry and encourage youngsters to form a liking for an unadulterated food. Preferences acquired in chilhood often last a life time.

The H.M.A. also sponsored a stand at the Easter Show in Auckland, in co-operation with the Auckland Branch of the National Beekeepers' Association, at which the observation hive and the invitation to spot the queen attracted the crowds and resulted in substantial direct sales. Few mothers were able to resist the urgent request of the children to buy a pack from the place "where the honey was being made".

FACT and FICTION

(from page 1)

in 1623 may be interesting and indicative that honey was popular as a food at that time, but we are also fully aware of the undoubted fact that views commonly held by thinking people today would have resulted in a gentle roasting at the stake in that same year of grace or disgrace.

Increases in honey sales can only be brought about by better publicity, better presentation of the product, wider dissemination of the known facts that honey is a good food, and that it is good to eat.

You can fool some of the people some fo the time, but not all of the people all of the time. Stories or pamphlets that can be shot so full of holes that they resemble a rusted colander will never help the industry.

MATING BEHAVIOUR in the HONEY BEE

(from page 10)

ACKNOWLEDGEMENTS

The author deeply appreciates the assistance given by Dr. Roger A. Morse, Dr. Cyprian Zmarlicki, Mrs. M. P. Johansson and Mr. David Miksa in these observations. He is further indebted to Dr. Harry H. Laidlaw, and to the Editors, for suggestions in the preparation of the manuscript, and to Dr. Colin G. Butler for his suggestions concerning the suspension of queen bees in the air for study.

PREPARATION of HONEY FOR MARKET

By Dr. Gordon F. Townsend,
Guelph, Ontario, Canada

Reprinted from Publication 544 of the Ontario Department of Agriculture

Introduction

Honey is our only natural sweetener. The naturalness of honey is its main selling point and every effort must be made to maintain the delicate flavour and aroma found in newly extracted honey.

Freshly extracted honey is in liquid form, but it is natural for most honeys to granulate sooner or later, depending upon the source of the honey and the manner in which it is handled. Natural granulation takes many forms, ranging from very coarse to smooth. It may even be half liquid and half granulated. For best appeal the honey should be either liquid or granulated. If granulated most customers desire a uniform, preferably smooth, granulation.

Many of the problems encountered by the honey packer, whether beekeeper or commercial packer, may be overcome if the honey is handled properly up to and including the extracting. The main problems encountered in the packing of honey are excessive moisture, air, pollen, or wax. All of these problems may be overcome by the beekeeper if the honey is properly handled. The most practical time to remove moisture from honey is before it is extracted. Excessive pollen may be avoided by keeping brood combs out of the honey supers as much as possible. Even the colour of the honey may tend to be darkened by using brood combs in the supers. Air bubbles, which are almost impossible to remove, and small wax particles may be avoided by proper use of extracting equipment.

In recent years the honey market has demanded that much greater attention be paid to the preparation of the product. Honey is marketed by the beekeeper-packer in addition to the commercial packer. Therefore, no one type of packing equipment will suit all conditions.

This publication attempts to bring together in concise form the principles either influencing or involved in the preparation of either a liquid or a processed honey for market purposes. Equipment developed at the Ontario Agricultural College will be described in detail.

PHYSICAL CHARACTERISTICS AFFECTING HANDLING

Moisture

The moisture content of honey is important because of its effect upon keeping quality. Marked variations in water content do occur, and may be primarily attributed to the degree of ripeness of the honey. This degree of ripeness, to a large extent, is related to the prevailing atmospheric humidity both before and after removal of the honey from the hives. Honey is hygroscopic, a term which may be described as the ability to absorb moisture. Thus honey which is permitted to remain too long above bee escapes, or is stored in a cool, damp honey house, may absorb considerable moisture. The optimum relative humidity for a maintenance of a 17.8 per cent honey is approximately 60 per cent.

The Canadian Grading Regulations state that a No. 1 honey shall have no more than 17.8 per cent moisture. This figure was arrived at because most honeys under normal conditions have approximately this moisture content when extracted, but it is no guarantee that fermentation will not take place. The lower the moisture content, the less chance there is that fermentation will take place. Honeys below 17.2 per cent moisture will rarely ferment.

Moisture content also influences the set of granulated honey. The higher the moisture content, the softer the set, and if it should become too high the pack will break down under normal storage conditions. The lower the moisture content the more difficult it is to handle honey, especially at temperatures below 100° F, owing to increased viscosity.

Temperature

Heat properly applied can be the greatest aid in the handling of honey. Heat dissolves coarse crystals and destroys yeasts which cause fermentation. It also lowers the viscosity, thus facilitating straining and general handling.

Honey may be injured by heating to too high a temperature or keeping it hot for too long a time. A few countries, including Germany, will not permit the entry of honeys which have been heated sufficiently to destroy some of the enzymes. Never use live steam except to heat water for warming honey.

Questions and Answers . . .

TO HELP BEGINNERS

By Bob Walsh of Auckland

Question: When a colony prepares to swarm a change in their composure is very noticeable. At such times the bees appear to sulk and are not very industrious, and the queen goes off the lay. Once this point arises, short of very drastic action tantamount to artificial swarming, it seems virtually impossible to maintain the hive as a productive unit. Is there some way to alter this condition and so maintain production of the colony and restore the queen to full lay?

Answer: Some kind of drastic action cannot be avoided. The least upsetting being to take away all the brood and replace with empty drawn combs below and foundation above. When the hive has settled down again combs of hatching brood can be returned gradually if the hive appears to need this help.

Question: If you were a young man starting out in bees would you go for a vast number of hives operated on as near as practical a "let alone" system, or would you operate only the number of hives that you could manage intensively?

Answer: This would depend on the area in which I would be setting up business and the type of production I proposed to go in for. If I was situated in Northland, for instance, an area I know well, I would be inclined to run double the hives I would, say, in the South Island. In Northland the flow is much more varied and continues for a much longer period. The type of the honey produced here does not demand the highest prices so more honey would be required for a payable crop. The bees require less attention in Northland. Given ample stores, young queens and plenty of comb space they would require only half as many visits as in the South Island. Some movement of hives may be necessary late in the season if a late crop is desired. This is, of course, for extracted honey. Should I be interested in section honey production which is intensive beekeeping, I doubt if, because of the attention necessary to each hive, it would be possible to increase the number kept, whatever the area one may operate in.

FOR SALE

WE HAVE AN ASSORTMENT OF EQUIPMENT FOR SALE

Approx. 20 single storey hives with bees

Two burner "Speedway" Boiler, complete with automatic water feed and superheater.

Cappings Oven—steam or elec.

Eight-frame Pender Extractor.

Honey Pump complete with sump, float switch and elec. motor.

Honey Warmer—steam or elec.

Complete Uncapping Equipment including heated tray and motorised rake.

Two 1-ton Honey Tanks complete with lids and stands.

Set of platform scales. (200lbs.) Govt. stamped.

One Electric motor (1 h.p.)

Super Waxing Trough.

Hatch Wax Press.

Queen Rearing Equipment and a host of sundries.

Everything in Good Order

Priced to Sell

RANGITATA APIARIES LIMITED

No. 1 R.D., Geraldine
Telephone (Woodbury) 821

HIVE MATS HIVE MATS
HIVE MATS HIVE MATS

FABRIC HIVE MATS (16in. x 20in.), manufactured from phormium tenax (native flax fibre), are available ex MANUFACTURER in bales of 150 mats at £4/15/- per bale, f.o.r. Foxton.

Orders for not less than one bale, accompanied by cash and stating railhead to which delivery is required, should be sent direct to:—

N.Z. WOOLPACK AND TEXTILES LTD.
P.O. Box 44, Foxton

FOLDING WIRE GAUZE BEE VEILS

—— £1/5/-, Post Free ——

Mail your order now to:

S. DARBY

8 Tobin Street, Pukekohe, Auckland

BUY

SMALL BEEKEEPING OUTFIT WANTED

With room for expansion
Anything considered.
Please give details of price, locality and equipment. Replies to:

"Apiary"
P.O. BOX 73, ROTORUA

---

100 TO 200 HIVES

On sites or for removal. Small numbers also. North Island from Taupo up.

Write: "Developing",

C/o P.O. BOX 3561, AUCKLAND.

OVERSEAS PUBLICATIONS

THE AUSTRALIAN BEEKEEPER
Published by Pender Bros. Pty. Ltd.
P.O. Box 20, West Maitland, N.S.W.
Subscription $3 per annum.
Sample copy free on application.

ECROYD'S 'ACORN' WEED PROCESS COMB FOUNDATION

Good stocks of Medium Brood and Full Depth
Thin Super now on hand.
Obtainable from

T. R. W. NICHOLAS

235 Te Atatu Road HENDERSON Phone 1314
(Rail wax to Henderson Station)

The National Beekeepers' Association

(For the advancement of the Beekeeping Industry in New Zealand)

'Better Beekeeping—Better Marketing'

SUBSCRIPTIONS

Up to	£ s. d.	Up to	£ s. d.
60 colonies	10 0	330 colonies	2 15 0
	minimum	360 colonies	3 0 0
90 colonies	15 0	390 colonies	3 5 0
120 colonies	1 0 0	420 colonies	3 10 0
150 colonies	1 5 0	450 colonies	3 15 0
180 colonies	1 10 0	480 colonies	4 0 0
210 colonies	1 15 0	510 colonies	4 5 0
240 colonies	2 0 0	540 colonies	4 10 0
270 colonies	2 5 0	570 colonies	4 15 0
300 colonies	2 10 0	600 colonies and over (maximum)	5 0 0

An associate members shall pay 5/- per annum.

JOIN YOUR NEAREST BRANCH AND DERIVE FULL BENEFITS

APIARY INSURANCE

(Public Risk Indemnity)
Free Cover for Association Members

All financial members of the Association are automatically indemnified against Public Risk claims up to £5000 in any occurrence of injury or death to persons or livestock directly attributable to the action of the members' bees and arising from his or her negligence as the beekeeper. The cover is underwritten by the New Zealand Insurance Company Ltd. and the premium met by the Association from consolidated funds.

THE N.Z. BEEKEEPER

This Journal is issued free to all beekeepers in New Zealand having 30 or more registered hives, and to others who are members of the National Beekeepers' Association.

Literary contributions and advertisements must be in the hands of the Editor, Mr. L. W. Goss, P.O. Box 3561, Auckland, not later than the 25th of the month preceeding publication.

Nom-de-plume letters must be signed by the writer and address given, not necessarily for publication, but as proof of good faith. Letters accepted for publication do not necessarily express the views of the Editor.

ADVERTISEMENT RATES

Quarter Page	£1 16 0	Per Inch	10 0
Half Page	£3 6 0	Minimum charge, 5/-	
Full Page	£6 0 0	for each insertion.	

Front Page Story

This year's Conference is being held in Whangarei, Northland, would-famed for its kauri forests.

A. H. Reed's "Story of New Zealand's forest king, the Kauri" gives the first comprehensive account of one of the world's most famous trees and one of the most useful to man.

Some notable kauris included one of 66ft circumference and 100ft to the the first limb, found standing on Tu-ta-moe mountain, Northland, in 1874.

Some kauris up to 20ft girth are today growing within two miles of Whangarei City.

Among its numerous uses, kauri was used in making bee-hives and some bottom boards made from 1½" thick heart kauri are still in use.

At the close of the 19th century there was available nearly 2,500,00,000 feet of kauri. In 1951, 44,000,000 feet was estimated to be left standing—a pity, indeed.

WHANGAREI in the winterless north will welcome you to Confeernce in July. Be wise.. Book your hotel NOW. Coupon on page 19.

Printed by Observer Printing Works Ltd., 12 Wyndham Street, Auckland.