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## CONFERENCE ON TROPICAL APICULTURE

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### Introduction

There are various ways of reporting on a meeting, and vigorous comments by *Bee World* readers have shown that they actively dislike a report that stresses how interesting a meeting was, and yet does not share with the reader what it was that aroused the writer's interest. It is, however, often difficult to describe meetings in an interesting way, and a certain number of routine facts and figures are normally necessary. The meeting described here was the Second International Conference on Apiculture in Tropical Climates, New Delhi, India, 29 February to 4 March 1980, which was preceded by a Symposium at Pune on 'Bee research, extension and training in tropical countries' (25-27 February), and followed by a Symposium at Bangalore on 'Bee management, and marketing of bee products in the tropics (10-13 March).

I myself was visiting India for the Conference in almost as many guises as some of the Hindu gods and goddesses. As Chairman of the First Conference on Apiculture in Tropical Climates in 1976, I was concerned with continuity between that Conference and the Second and, as Director of IBRA, also with the maintenance of certain aims and standards, and with the organization—and again the continuity—of Conference Resolutions, and with possibilities for a Third Conference. On various occasions at the meeting, I was the Chief Guest cited anonymously in the programme, although it took me some time to realize this; in this capacity I also served as spokesman for all the participants other than Indians, and I had the benefit of explanations and introductions that were not available to all. Since my visit was funded by the UK Overseas Development Administration I had responsibilities on their behalf. And in a personal capacity, I had not travelled in India before, except for a short stay in Delhi in 1967. During the present visit I found myself quite overwhelmed by the impact of a vast country whose civilization predated that of my own by several thousand years, and whose influences are still interwoven in the daily lives of the people.

The First Conference on Apiculture in Tropical Climates had been held in London on 18-20 October 1976, as a pioneer venture organized by IBRA at the suggestion of Sheikh Najib Alamuddin, an Honorary Member of IBRA in Lebanon. Sheikh Najib was unable to take an active part in the Conference itself, because of the increasing civil unrest in Lebanon during 1976, but without his initiative, and financial guarantees he was able to arrange, neither that Conference nor its successor would have been held.

All papers at the First Conference were invited; they followed a logical sequence, and the *Proceedings* provided a much needed handbook setting out some of the potentials and problems of beekeeping in developing countries. One of the Resolutions of this Conference was 'that another Conference on Apiculture in Tropical Climates be convened by the International Bee Research Association . . . preferably (by invitation) in a tropical or subtropical country . . .'

IBRA Council was most happy to accept an invitation from the Government of India for the Second Conference. In this connection we are indebted especially to our

President, Dr. M. S. Swaminathan, then Secretary to the Ministry of Agriculture in India, and to Dr. N. C. Pant, Director of the Commonwealth Institute of Entomology in London and previously Head of the Division of Entomology of the Indian Agricultural Research Institute. No international apicultural meeting had ever been held in India before, and in view of this the name became Second *International* Conference on Apiculture in Tropical Climates. The commemorative postage stamp (see page 110) bears the name in both Hindi and English and, for lack of space to print 16 words, the name Second International Conference on Apiculture was used, although this would more correctly apply to a meeting held in Belgium in 1897.

The following countries were represented: Bangladesh, Belize, Burma, Canada, Cyprus, Egypt, German Federal Republic, India, Kenya, Kuwait, Malaysia, Mexico, Netherlands, New Zealand, Oman, Papua New Guinea, Philippines, Saudi Arabia, Sri Lanka, Tanzania, Thailand, Tunisia, UK. There were four notable absences, that of Pakistan being inevitable although much would have been gained from that country's participation. There was no one from Israel, which carries out excellent training programmes for bee specialists from developing countries, or from the USA—due not to lack of interest but to the present financial situation—and the only Americans at the meeting were living in India. Finally, we were sorry that there was no representation from any French-speaking developing country, or from France which has undertaken beekeeping activities in a number of them.

The Conference was sponsored by four Indian organizations as well as by IBRA:

Indian Council of Agricultural Research  
Khadi and Village Industries Commission  
Department of Science and Technology  
Indian National Science Academy.

### Formal inauguration ceremonies

Each series of meetings, in Delhi, Pune and Bangalore, was inaugurated in a solemn session which began with a chanted invocation taken from the Rigveda. This is the oldest of the sacred books of India, which has been variously dated from 2000 to 5000 BC, and has many references to honey: as a sacrifice, as the choicest food of the gods, and as bestowing all delights to man, including eloquence. For instance:

Anoint me with the honey of the bee,

That I may make forceful speech among men'. (III, 61, 19).

At Delhi, in addition, the many wicks of a ritual brass lamp were ceremonially lit, beside burning sticks of incense. We had already seen India's largest collection of such ritual lamps, in the Raja Dinkar Kelkar Museum at Pune.

The importance attached to the Conference by the Indian authorities may be judged by the number of senior government representatives who took part in the Inaugural Session in Delhi. From left to right in Fig. 1 are:

Secretary of the Khadi and Village Industries Commission, Shri V. Ramchandran  
Secretary for Philately, Shri S. U. Ghosh  
Secretary of State for Agriculture, Dr. M. S. Swaminathan (Chairman of the Conference) who is also President of IBRA  
Chairman, Khadi and Village Industries Commission, Shri Somdutt Vedalankar  
Minister for Agriculture and Rural Development, Shri Rao Birendra Singh (not in photograph)  
State Minister for Agriculture, Shri R. V. Swaminathan

Director of International Bee Research Association, Dr. Eva Crane  
 Director-General of the Indian Council of Agricultural Research, Dr. O. P. Gautam  
 Deputy Director of the Indian Agricultural Research Institute, Dr. K. N. Mehrotra  
 (Secretary of the Conference).



Shri S. U. Ghosh, representing the Minister for Communications and Parliamentary Affairs, performed the ceremony of 'releasing' the postage stamp, of which an enlarged copy stands in front of the table in Fig. 1.

## The papers

Apart from formal sessions of inauguration and some special lectures, short papers were presented in the following sessions:

Beekeeping in tropical climates (status in different countries)	21
Bee morphology, biometrics, genetics and breeding, including introduction and utilization of exotic bees	9
Bee physiology and biochemistry including behaviour	14
Bee pathology and toxicology	6
Apiculture and tropical agriculture (bees as pollinators) including bee botany	17
Bee products, their marketing and their control	8

Of these papers, 56 were from India, and the rest from twelve other countries. The published booklet of *Abstracts of papers* will be superseded by the full *Proceedings* of the Conference, which will be published in India and available also from IBRA, at about £4. The following are a few of the interesting points that emerged.

Rubber (*Hevea brasiliensis*), in which the nectar is secreted by extrafloral nectaries, is now a very important honey source, for instance in southern India, Sri Lanka and Malaysia. One speaker reported that half India's honey was produced from rubber, but this probably refers only to that from *Apis cerana* colonies in hives; these can be moved into the rubber plantation for the flow and out again afterwards. The rubber plant produces no pollen, so colonies cannot survive there long. Probably because of the climatic conditions in which the honey is produced, a high water content is usual, and this presents problems with storage and fermentation. Reports quoted the area under rubber production as 0.2 million hectares in India (1974) and 7 million hectares in 22 tropical countries altogether, with an optimistic estimate of annual honey-producing potential of 125 thousand tons. Coconut (*Cocos nucifera*) is also a valuable honey source, and its pollen enables colonies to continue brood rearing, so where plantations of coconut and rubber occur close together on coastal plains, relatively high honey yields per colony can be produced.

Several speakers stressed the incompleteness of our knowledge on the biology and behaviour in general of the three Asiatic species of *Apis* (*dorsata*, *cerana*, *florea*), and the profitability of beekeeping must often fall short of what could be achieved if management practices could be based on better knowledge. The natural migration of *Apis cerana* colonies from apiaries, when nectar and pollen sources in the neighbourhood fail, causes frustration to many beekeepers. The capture of migratory swarms on the other hand is part of beekeeping management, as it is in Africa where *Apis mellifera adansonii* is migratory. The behaviour patterns of migration, the life history of the colonies at the new site, and their return to the original area, do not seem to have been studied systematically, and this must be an urgent necessity if the bees' productive potential is to be exploited to the full.

Migration in *Apis dorsata* also deserves a far more systematic and positive study in India than it has so far received, particularly as the major part of India's honey crop is harvested from this bee, nesting in the wild. In Sri Lanka some work has already been done.

*Apis cerana*, and *A. mellifera* where it has been successfully introduced, are the only 'managed' bees in southern Asia. Like *Apis mellifera*, *A. cerana* is in general larger and darker at high altitudes. In Kashmir, a valley in the western Himalayas with a temperate climate, the ecotype of *Apis cerana* is different from elsewhere, showing many behavioural characteristics of *Apis mellifera*. The bees can be kept satisfactorily in Langstroth hives, store much honey, and survive quite severe winters by clustering.

Some rather curious findings had been published by B. J. Rajashekarappa<sup>7</sup> of Bangalore in *Journal of Apicultural Research* in 1979. He demonstrated in certain experiments that information about the presence of a queen could be transmitted by one worker to another *above* her, but not to a worker *below* her. This could be accounted for if the transmission were by impulses from the forelegs of one bee to receptors on the hind legs of the next bee, since *A. cerana* workers at rest are oriented head upwards. At the Conference, the author (who had meanwhile taken the helpful step of shortening his name to Raj) described practical applications of his finding. In nature *A. cerana*

queen cells are normally built along the bottom edge of the comb: by confining the queen of a colony to the top of a comb, bees below that level were made to behave like queenless bees, and the queenright colony could be used for queen rearing. The observations open up some interesting lines of enquiry, which will surely be extended to the other *Apis* species. With *A. mellifera* other factors must come into play; for instance, the resting position of the bees is much more variable.

In general, diseases are less troublesome than predators in tropical Asia, but in higher parts of northern India acarine disease—introduced with *Apis mellifera*—has caused losses, and also EFB similarly introduced; a recently discovered viral disease is present in Kashmir. Nosema disease was reported from several countries represented at the Conference. As in other parts of the world, colony losses due to a multitude of factors tend to be attributed to any single disease that has recently been in the news, and this sometimes inflates the apparent effects of the newcomer to disastrous proportions.

Hazards of beekeeping in India and south-east Asia include: predatory wasps and birds, bears, flying squirrels and various mites; floods in the monsoon season; and drowning of bees in 'toddy' pots when palms are tapped. I was told of one area where black-faced monkeys open the hives and remove the combs; they climb a tree carrying a comb and throw it down to the ground, which knocks the bees off, then run down and quickly eat the comb and honey. But this behaviour is initiated only if a beekeeper leaves pieces of comb lying about, and the monkeys discover that they are good to eat; the monkeys then watch the beekeeper taking combs from the hives and learn to copy his actions.

Pollination requirements of many tropical crops are not yet known. It was reported that cardamom (*Eletharia cardamomum*), an important Indian spice crop, was visited by all three Asiatic *Apis*, and that the presence of honeybees increased fruit set by 22% and 37% in two different cultivars. In one area 98% of the insect visitors were honeybees. *A. cerana indica* was reported to be the major pollinator of the soapnut tree (*Sapindus emarginatus*), and more effective than *A. florea* where both bees were present. On the other hand moving colonies of *Apis cerana* to pollinate pigeon pea (*Cajanus cajan*) was not successful, as the bees appeared unable to obtain nectar from the flowers.

## Beekeeping in India

Beekeeping in India is almost entirely carried out with *Apis cerana* colonies, in moveable-frame hives that are like a scaled-down version of hives used for *Apis mellifera*. The variation in size of *Apis cerana* within India is sufficiently great to warrant standards for hives of three sizes, produced by the Indian Standards Institution. ISI staged a display at the exhibition in Pune, and in consultation with beekeeping organizations has published standards on hives and hive accessories, foundation, honey processing equipment, honey and beeswax, and a 'Code for conservation and maintenance of honeybees'.

Only in a few areas such as Coorg near the west coast, and Kashmir, have traditional types of hive been developed. Most of them are pots, and I heard of hives being made from pairs of toddy pots, mouth to mouth, in one coconut growing area on the east coast. Elsewhere hunting wild nests was the main way of harvesting honey until the last few decades, and even today more honey is produced in India from hunting wild nests of *Apis dorsata* than from the 650 000 hives of *Apis cerana*. Honey hunting has

not been the subject of as much training and research as *A. cerana* beekeeping; it may well be that the Indians who are honey hunters by tradition are not so receptive to new ways as people starting beekeeping as a fresh venture.

Beekeeping in India with *Apis cerana* is dominated by the Khadi and Village Industries Commission which controls and organizes much of it. The best published account is in two lectures by Shri C. V. Thakar, in the Proceedings of the First Conference on Apiculture in Tropical Climates in 1976. These tell the remarkable success story of the promotion of beekeeping through the Maharashtra State K&VI Board, which was later used as a model for the whole country under the national K&VI Commission. It now organizes 150 000 beekeepers in 33 000 villages throughout India.

In his lecture at the Pune Symposium, Shri Thakar said 'Our experience has also shown that a Central Bee Research Institute with a comprehensive, broad-based, integrated approach, is a necessity . . . It can function as a co-ordinating nucleus. Similarly, the training programme needs to be expanded considerably, to reach the growing beekeeping community and to cope up with future expansion. Our experience has also shown that the growth of this industry in its totality can best be ensured if the major wings of the industry viz. Extension, Research, Training and Marketing, function under one umbrella'. Dr. G. B. Deodikar, who was Honorary Research Director of the Institute at Pune from its foundation in 1952 until 1961, spoke of a future potential need for 150 million colonies of bees—over 200 times the present number and 15 times as many as in the whole of the USSR.

One thing is certain: there is the will and the dedication among the officers and staff of the Commission to continue their steady progress in expanding beekeeping, and in increasing its productivity, throughout the great country in which it operates.

## Apicultural research in India

The Central Bee Research Institute at Pune has associated institutes and stations (under the K&VIC) in different parts of the country, somewhat on the pattern of those in the USSR, and they employ about 75 scientific staff in all. Research work under the K&VIC is concentrated on building up a representative collection of beekeeping data for different parts of the country, on bee forage and the honeys produced, on the seasonal patterns of colony growth and production, and on hives and management practices suitable for the different areas. Pollination studies are made, and characteristics of beeswax and other bee products are established.

Bee research is carried out in a number of the universities, especially the Agricultural Universities of Himachal Pradesh in the north (Solan and Simla), Karnataka in the south (Bangalore), Punjab in the west (Ludhiana), and Andhra Pradesh in the centre (Hyderabad). Papers were also presented at the Conference from the Indian Agricultural Research Institute in New Delhi, the Institute of Horticultural Research near Bangalore, the Lac Research Institute at Ranchi in the east, and other research centres.

In these universities and scientific institutes, specific research work to do with bees

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\* *Khadi* is a word for a certain type of handwoven white cotton cloth, and was used by Mahatma Gandhi to symbolize rural handicrafts that could create employment in villages and the countryside in general. The Commission has under its wing 19 village industries (leather, fibre, pottery, carpentry, and so on) and the three khadis (cotton, silk, wool). It employs between 3 and 4 million people, and its annual production is worth over 400 million rupees.

is undertaken for more diverse reasons than the overriding one in the K&VIC—the development of beekeeping—and the studies are more wide-ranging. The fact that there are these two rather different types of approach is clearly beneficial. On the other hand I formed the impression that some of the scientists undertaking research on bees work in too much isolation, with inadequate reference material, and that they lack facilities for comparing their own work with that done elsewhere.

The 56 papers from India in the Proceedings of the Conference will present a most useful account of recent bee research work in the area represented.

## Appendix: Resolutions of the Second International Conference on Apiculture in Tropical Climates, 1980

1. *The Conference resolves* that a letter of appreciation should be sent by the Director of International Bee Research Association (IBRA) to the Government of India, the Indian Council of Agricultural Research, the Department of Science and Technology, the Indian National Science Academy, the Khadi and Village Industries Commission, and personally to Dr. M. S. Swaminathan, Chairman, National Organizing Committee, and Dr. K. N. Mehrotra, Member-Secretary, *informing* them of the success and value of the Conference, *acknowledging* their initiative, and *thanking* them for their support.
2. *The Conference resolves* that a letter should similarly be sent to Sheik Najib Alamuddin, *informing* him about the Conference and its success.
3. *The Conference resolves* that a letter should similarly be sent to the Commonwealth Foundation, *informing* them of the benefits of the Conference to the participants who were funded by the Foundation's grant to IBRA.
4. *The Conference, recognizing* the value of IBRA's presence at and contribution to the Conference, *resolves* that a letter be sent to the India Department of the UK Overseas Development Administration expressing appreciation of that Department's sponsorship of Dr. Crane (Director) and Dr. Free (Vice-Chairman).
5. *The Conference confirms* the decision of IBRA Council to convene the Third International Conference on Apiculture in Tropical Climates in Nairobi, Kenya, in 1984 (probably August) at the invitation of the Government of Kenya. *The Conference appreciates* the two further invitations for the Third Conference, from Cyprus and from the German Federal Republic.
6. *The Conference resolves* that the Third International Conference on Apiculture in Tropical Climates should include small round-table discussions without formal papers, on subjects of urgent and immediate importance.
7. *The Conference resolves* that the Third International Conference on Apiculture in Tropical Climates should pay special attention to the identification of constraints responsible for the prevailing gap between actual and potential productivity of apicultural systems occurring in the tropics and of effective measures for removing these constraints. Meanwhile the *Conference urges* IBRA to do whatever exploratory work is possible towards identifying both the above constraints and effective measures that would remove them.
8. *The Conference, whilst deeply regretting* that current financial constraints have precluded IBRA from answering queries from or providing guidance and information directly to rural beekeepers, extension services, and agricultural organizations and schemes in developing countries, *greatly values and welcomes* the declared interest of the UK Overseas Development Administration (ODA) in supporting these aspects of IBRA

activities, and *hopes* that ODA's proposed grant designed to fund an Information Officer for Tropical Apiculture at IBRA will be made available in 1980/81, and continued thereafter.

9. *The Conference, noting* that the Organization of African Unity (OAU) is playing an important part in promoting apiculture in Africa, *urges* the Kenya Ministry of Livestock Development:
  - (a) to keep OAU informed about the activities of the Third Conference on Apiculture in Tropical Climates in Nairobi, and to seek its active support for the Conference;
  - (b) to invite delegates from OAU and from its 49 member countries to the Conference;
  - (c) to request OAU to provide financial support to enable bee specialists from its member countries to attend this and other international meetings;
  - (d) to request OAU to contribute financially towards the development of apiculture in the tropics, especially in rural youth employment programmes.
10. *The Conference, knowing* that suitable training in beekeeping is a major component for beekeeping development, *recommends* that there should be recognized international centres for training in certain developing countries, for teaching tropical apiculture to at least the extension diploma level:
  - (a) that the locations cover Asian, tropical African, and European honeybees;
  - (b) that the diploma offered be given international status, and that international support be sought for scholarships, equipment and other needs;
  - (c) that an International Committee be formed to facilitate the establishment of admission standards and other requirements.
11. *The Conference, recognizing* the importance of honeybees both as honey producers and as pollinators of crops, *urges* the International Bee Research Association and other bee-oriented organizations to publicize the value of apiculture in dryland and other farming systems, preferably by active participation in suitable international, national and regional conferences on arid-zone agriculture, etc.
12. *The Conference, recognizing* that pollination can be as important a factor in improving crop yields as pest control, fertilizers or mechanization, *urges* appropriate agencies that, whenever they are planning an agricultural or horticultural project which involves plant species requiring insect pollination, they should integrate a beekeeping project into the main project as an essential part of it.
13. *The Conference, recognizing* the enormous potential of beekeeping projects in developing countries, particularly in providing an extra source of food and a cash income for peasant farmers and others in rural areas; *noting* the considerable benefits which experience has shown can accrue to rural communities in terms of food, cash and more efficient pollination of crops; *urges* the governments of developing countries to *consider* this potential and to give high priority to the opportunities for beekeeping projects in their rural communities, and to *consider* gradual modification of old beekeeping methods; and *suggests* that support for the development of beekeeping projects in rural development programmes may at present successfully be sought from both governmental and multi-lateral aid agencies.
14. *The Conference urges* all aid agencies to send the fullest possible information and reports on actual and proposed beekeeping activities to the International Bee Research Association, for reference and dissemination.

15. *The Conference, recognizing* the need for accurate determination of the species, subspecies, races and strains of *Apis*, both for breeding programmes and for elucidating the genetic and environmental effects which can occur in the genus in exotic habitats, *urges* governmental and international aid agencies to accord high priority to the taxonomy of *Apis*, especially in transitional areas.
16. *The Conference recommends* to the government of each country where *Apis* species are found that native varieties of these species should be conserved, so that a gene pool resource of indigenous *Apis* species is maintained in the country.
17. *The Conference emphasizes* the danger of introducing exotic species of honeybee into areas with their own native *Apis* fauna, and *recommends* that governments should be urged to prohibit such introductions.
18. *The Conference, recognizing* the present lack of coherent knowledge concerning the extensive honey-producing plant resources of the tropics and subtropics; *knowing* the urgent need for this information; *knowing* that the International Bee Research Association has prepared a working plan for making a survey of these resources with the promised co-operation of botanists and other scientists internationally, and for collating it and making it available; *knowing* that this plan was approved in principle at a special meeting during the 25th International Apicultural Congress at Grenoble, France, in September 1975; *urges* IBRA to continue its search for funds so that this work can be done, utilizing the knowledge already obtained in temperate zones and such information as exists in tropical and subtropical zones. In addition to collating and making available this much needed information, such a survey will *identify* areas where new collection of data is most needed.
19. *The Conference, recognizing* that forests and woodland containing honey-producing species of trees, such as (but not confined to) *Eucalyptus* species, can give an additional harvest of honey and wax, *urges* the International Bee Research Association and other bee-oriented organizations to establish a liaison with the principal organizations concerned with afforestation programmes, so that in selecting species for planting they may take into account the potential of individual species for producing nectar and pollen.
20. *The Conference, knowing* that exports can provide valuable foreign exchange to developing countries, *urges* governments of these countries to facilitate future exports of their honey and other bee products by establishing, in consultation with importing countries, quality standards that are consistent with the special circumstances operating in the producing country.  
*The Conference encourages* scientists involved in product research in developing countries to develop and use methods of analysis that facilitate comparisons between honey samples from tropical and from temperate zones and to deposit relevant unpublished data with IBRA for reference.
21. *The Conference, knowing* that widespread destruction of beneficial insects (including pollinators such as the honeybee and wild bees) often occurs in the tropics and subtropics as a consequence of irresponsible and improper use of pesticides, and *recognizing* the great value to crop production of pesticides, *urges* all governments to formulate and enact legislation to regulate the use of pesticides in their countries so that harmful effects on beneficial insects are minimized.
22. *The Conference, recognizing* that among many peoples in the tropics and subtropics honey hunting and beekeeping are still practised by methods which have remained virtually unchanged for centuries, *knowing* that these methods constitute a basis for further development, but *fearing* that being traditional they may be despised and therefore lost,

*urges* national museums and appropriate cultural institutions to record and study in depth, and to preserve, both traditional methods and equipment, and the traditional beekeeper's knowledge about bees and their environment.

Final text of resolutions approved:

M. S. Swaminathan, India	Asia
E. Crane, UK	Europe
I. Kigatiira, Kenya	Africa
U. Miranda, Belize	Latin America
S. E. Rashad, Egypt	Middle East
G. F. Townsend, Canada	North America
K. N. Mehrotra, Conference Secretary, India	

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