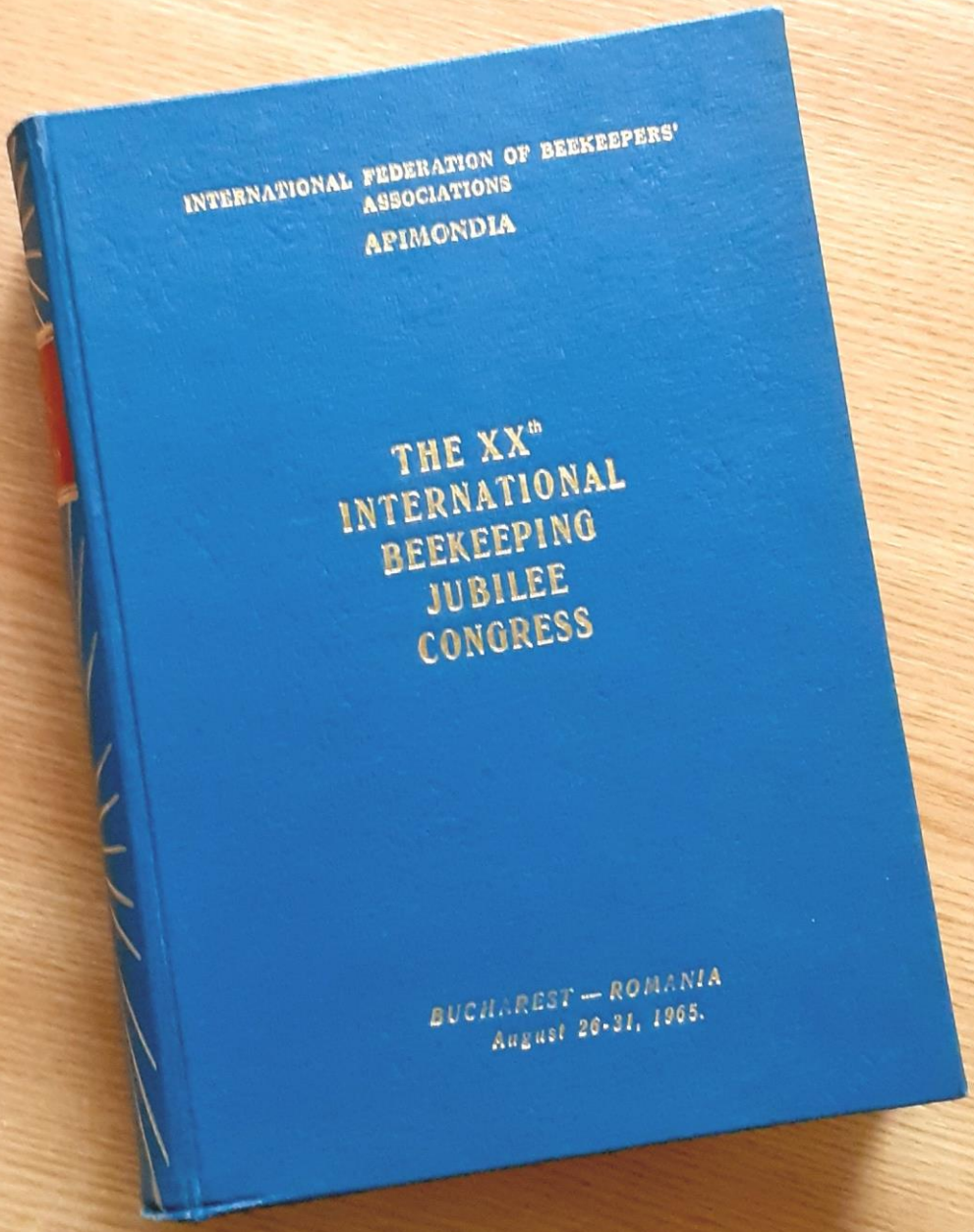

INTERNATIONAL FEDERATION OF BEEKEEPERS' ASSOCIATIONS
APIMONDIA
THE XX^th INTERNATIONAL BEEKEEPING JUBILEE CONGRESS
BUCHAREST — ROMANIA
August 26-31, 1965.

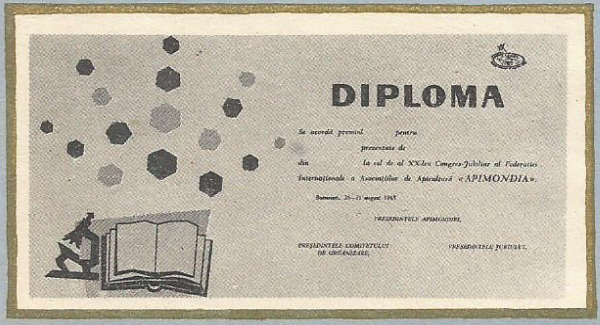
APIMONDIA

XX

CONGRES JUBILIAR

BUCURESTI 1965

EXPOZITIE-TIRG INTERNATIONAL DE APICULTURA · PRIMA



INTERNATIONAL FEDERATION
OF BEEKEEPERS' ASSOCIATIONS
APIMONDIA

THE 20th INTERNATIONAL BEEKEEPING JUBILEE CONGRESS

BUCHAREST — ROMANIA
August 26 — 31, 1965.

Edited under the guidance of the Romanian Organizing Committee of the XXth International Beekeeping Jubilee Congress headed by Prof. Eng. V. HARNAJ — *President of the Congress and of the International Federation of Beekeepers' Associations* — APIMONDIA

Editor-in-chief : *Eng. Dimitrie Georgescu*

FOREWORD

Prof. Eng. V. Harnaj — *President of the Congress and of the International Federation of Beekeepers' Associations — APIMONDIA.*

The choice of Romania as a host country of the XXth International Beekeeping Jubilee Congress was met with particular satisfaction by all the beekeepers in our country, who spared no efforts to secure the best conditions of development to this international event.

Wishing to materialize this particularly cherished event so that it may remain in the course of years a living memory of many unforgettable moments which marked the friendship among the beekeepers all over the world united by their love for beekeeping, the Romanian beekeepers tried to minutely present in this work the characteristic elements of this international event.

We feel sure that this work will be a particularly important document in the world beekeeping field and maybe a guide for the future organizers of International Congresses of Apimondia, thus having the possibility of improving their work by doing away with some shortcomings — which despite our efforts we could not obviate.

The Romanian beekeepers' satisfaction was fully justified as they had the opportunity to show the beekeepers all over the world the beauties of their country and the achievements of Romanian beekeeping. They made the foreign visitors convince themselves once more of the traditional hospitality of the Romanian people.

The organization of the Congress as well as of all the other events attached to it required a concentrated work on the part of the Romanian beekeepers and particular pecuniary efforts from the Romanian Beekeepers' Association with a view to provide a proper standard for these international events.

We tried to chronologically show the way in which the events connected with the organization and proceedings of the Congress succeeded, describing not only the main events but also those of less importance, thus enabling the participants to revive the proceedings of the Congress as a warm memory of the moments spent amid the Romanian people. The reader who for different reasons could not take part in the Congress will also have as faithful an image as possible of this world beekeeping event.

We hope that this work will contribute to the strengthening of co-operation and friendly relations among the beekeepers all over the world serving as a living pattern of co-operation among the practitioners and scientists, all of them prompted by the same ideal : the continuous progress of beekeeping all over the world, being positive that they will help in this way to raise the welfare of peoples and to maintain peace.

Prof. Eng. V. HARNAJ,

THE ACTIVE PRESIDIUM OF THE CONGRESS

APIMONDIA HONORARY MEMBERS

RUDOLPH RIDDER VAN RAPPARD, *Netherlands*
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R. BORNECK, *France*
F. BRÜCKNER, *Austria*
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Prof. Eng. V. HARNAJ, *Romania*
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R. ZIVANOVIČ, *Yugoslavia*
Prof. dr. M. LINDAUER, *Federal Republic of Germany*
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Prof. dr. M. ROUSSEAU, *France*
E. LEYSEN, *Belgium*
Prof. G. TOWNSEND, *Canada*

THE OFFICIAL DELEGATES OF APIMONDIA'S MEMBER COUNTRIES AND A DELEGATE OF EACH PARTICIPANT COUNTRY

NATIONAL ORGANIZING COMMITTEE

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Prof. Eng. V. HARNAJ

Members:

Eng. I. BARAC
Eng. N. FOTI
Dr. I. GOMBOS
Eng. P. MARTIN
I. MOTRONEA
Dr. E. MUREȘIANU
Eng. H. NICOVESCU
Dr. S. NICOLICIN
Dr. M. POPESCU BARAN
Eng. M. ROMAS

Secretariat:

Eng. V. SAFER
Eng. N. NICOLAIDE
Eng. D. GEORGESCU
Eng. E. MIRZA

WORKING ORGANS OF THE CONGRESS

APIMONDIA STANDING TECHNICAL COMMISSIONS

COMMISSION ON BEE BIOLOGY

Chairman:

Prof. dr. M. LINDAUER, *The Federal Republic of Germany*

Members:

Prof. dr. G. A. AVETISIAN, *U.S.S.R.*
Dr. V. FILIPOVICI, *Yugoslavia*
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Dr. J. Woyke, *Poland*

Secretary:

Eng. N. FOTI, *Romania*

COMMISSION ON MELLIFEROUS FLORA AND POLLINATION

Chairman:

Prof. dr. N. M. GLUSHKOV, *U.S.S.R.*

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E. LISY, *Czechoslovakia*
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Dr. A. MAURIZIO, *Switzerland*

Secretary:

Eng. I. BARAC. *Romania*

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Chairman:

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Members:

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Dr. C. G. BUTLER, *England*
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Prof. Dr. I. TOMASHEK, *Yugoslavia*
Prof. dr. A. TOSHKOV, *Bulgaria*

Secretary:

Dr. A. POPA, *Romania*

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J. I. HAMBLETON, *U.S.A.*
J. PUHL, *Luxemburg*

Secretary:

Eng. V. SAFER, *Romania*

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Chairman:

Prof. G. TOWNSEND, *Canada*

Members:

Eng. P. HORGUELIN, *France*
J. ROOT, *U.S.A.*
Eng. G. SELLIANAKIS, *Greece*
A. G. de VINUESA, *Spain*

Secretary:

Eng. N. NICOLAIDE, *Romania*

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Eng. P. MARTIN
Architect D. IOVANESCU
A. DOICIU
Architect D. DOBROTA
Eng. M. XENOCRAT
Eng. S. TIMIS
Z. VOICULESCU

JURY OF BEEKEEPING FILM COMPETITION

Dr. R. BARNES, *England*
Dr. S. CANNAMELA, *Italy*
N. F. FEDOSOV, *U.S.S.R.*
Eng. N. FOTI, *Romania*
P. HACCOUR, *Morocco*
J. HAMBLETON, *U.S.A*
A. KOCSIS, *Hungary*
Prof. Dr. J. SVOBODA, *Czechoslovakia*
Dr. J. N. TENNENT, *Scotland*
A. TROPPER, *Austria*

JURY OF BEEKEEPING LITERATURE CONTEST

Eng. I. BARAC, *Romania*
Dr. L. BORNUS, *Poland*
Dr. E. CRANE, *England*
Prof. M. HAYDAK, *U.S.A.*
Dr. A. HANSSON, *Sweden*
Dr. Z. ORÖSI PAL. *Hungary*
Prof. Dr. V. POLTEV. *U.S.S.R.*

JURY OF BEEKEEPING PHOTO, POSTER AND POSTAGE STAMP CONTEST

R. BORNECK, *France*
Dr. F. GNÄDINGER, *The Federal Republic of Germany*
Eng. P. MARTIN, *Romania*
Eng. B. MITEV, *Bulgaria*
A. ORAMAS REPETTO, *Mexico*
Dr. SCHWARTZ HANSEN, *Denmark*
R. ZIVANOVIČ, *Yugoslavia*

JURY OF BEE EQUIPMENT EXHIBITS

Dr. J. DORAN, *Ireland*
Prof. Dr. N. M. GLUSHKOV, *U.S.S.R.*
X. GRANDJEAN, *Belgium*
Eng. P. HORGUELIN, *France*
Eng. V. SAFER, *Romania*
VLADIMIR SKUT, *Poland*
Eng. G. SELLIANAKIS, *Greece*

JURY OF BEE PRODUCTS EXHIBITS AND THEIR DERIVATIVES

F. BRÜCKNER, *Austria*
Dr. M. DOUHET, *Malagasy Republic*
Dr. J. GOMBOS, *Romania*
J. POOS, *Luxembourg*
QUENAN NURI, *Albania*
Prof. G. TOWNSEND, *Canada*
A. ROSENBERG, *Norway*

JURY FOR MELLIFEROUS PLANTS, BEE BIOLOGICAL EXHIBIT MATERIAL, PRODUCTS FOR PEST AND DISEASE CONTROL.

Prof. Dr. G. A. AVETISIAN, *U.S.S.R.*
Prof. Dr. G. GIORDANI, *Italy*
Prof. Dr. M. LINDAUER, *The Federal Republic of Germany*
Dr. A. POPA, *Romania*
Prof. Dr. M. ROUSSEAU, *France*
V. VELCIEV, *Bulgaria*

APIMONDIA'S JUBILEE CONGRESS

The choice of Romania as host country of the XXth International Beekeeping Jubilee Congress of the International Federation of Beekeepers' Association (Apimondia) at the previous Congress in Prague, in 1963, was met with great satisfaction by the Romanian beekeepers eager to receive the visit of those who love bees from everywhere, to shake hands with all those who are fond of this noble and useful occupation — beekeeping.

Tasks of honour but also of great responsibility set before the National Organizing Committee, the Beekeepers' Association in the Socialist Republic of Romania and its members, for organizing in good conditions this ample event, as an unusual great number of participants — 2000 bee lovers from almost 50 countries of all the continents announced their arrival at the Jubilee Congress of Apimondia.

Bucharest, the capital of the Socialist Republic of Romania, with its merry and friendly inhabitants, its famous art, culture and historical monuments, its inviting parks surrounded like a ring by lakes sparkling in the sunlight and with a refreshing sea of flowers and green spaces, offered the participants in the Congress for their proceedings its largest and most modern hall — the Palace Hall of the Socialist Republic of Romania. Here, young people who have just been initiated into the secrets of bees' life and activity, aged beekeepers with a rich professional experience, amateur and commercial beekeepers, biologists and physicians concerned with the health of people by increasing the consumption of bee products, industrialists and tradesmen dealing in bee equipment and products, came to meet, to become friends and to join their skill and efforts towards the progress of apiculture all over the world.

Most of the official delegates of the participant countries and of the guests to the Congress arrived a few days before its opening thus having the possibility of an ampler documentation regarding the proper Congress proceedings as well as beekeeping in Romania.

SCIENTIFIC SYMPOSIUM

Prior to the official opening of the Jubilee Congress of Apimondia and according to the tradition of the preceding Congresses, other international beekeeping events were organized as well. Thus, a scientific sym-

posium was organized in Bucharest between August 20—24, 1965. In this traditional event occasioned by the Congresses of Apimondia, over 100 bee experts and scientists took part from 25 countries namely : *Austria, Albania, the South African Republic, the United Arab Republic, Belgium, Bulgaria, Canada, Czechoslovakia, the Korean People's Democratic Republic, Switzerland, France, the German Democratic Republic, the Federal Republic of Germany, Greece, Israel, Italy, the Socialist Federative Republic of Yugoslavia, Great Britain, Morocco, Holland, Poland, Romania, Sweden, the U.S.A., Hungary, the U.S.S.R.*

The works of the scientific Symposium took place in the festivity hall of the Central Council of Trade Unions. Simultaneous translation was provided for English, French, Russian, German and Romanian.

The proceedings of the scientific Symposium were opened by *Eng. I. Barac,* director of the Central Apicultural and Sericultural Station (Romania).

Taking the floor, *Prof. Eng. V. Harnaj* (Romania), president of the Congress said, among other things, that this event called together scientists of world prestige, who had devoted themselves to the prosperity of beekeeping. "I am sure" the speaker said, "that the reports which will be presented and debated here will permit the participants to make a useful exchange of opinions and get acquainted with the late results obtained in the apicultural domain".

"In my capacity of beekeeper and researcher I take the liberty to stress the fact that the work of this Symposium will not support only the theoretical research. Like other domains of science, theory is closely connected with practice, guiding it and allowing it to develop. Hence the result of the scientific apicultural researches — the newest and most important obtained up to now and presented here — will constitute a valuable guide for the practitioner beekeeper who by assimilating them will be able to improve his work and achieve higher yields".

Then *I. Barac* took the floor and gave the report concerning the achievements in the field of bee scientific research in Romania and their contribution towards the increase in honey and beeswax production, in crops in the entomophylous cultures and to generally increasing beekeeping profitableness.

The works of the Symposium were carried on within three technical Commissions, namely : *bee biology, bee pathology and bee botany.*

Thirty-six scientific papers were presented to the working meetings of the technical Commissions tackling new problems as a result of the researches which had been made. These papers are as follows : "Morphological and Biological Characteristics of the Albanian Bee" by — *Quenan Nuri* (Albania) ; "A comparison of Tueplo Honey Yields From Four Sizes of Hive Over a Three-Year Period" by — *John D. Haynie* (U.S.A.) ; "European Foul Brood Ethiology" by — *G. Camburov* (Bulgaria), "European Foul Brood Treatment" by — *G. Camburov* (Bulgaria) ; "The Organization

of Contractual Utilization of Melliferous Bees for Pollination in order to increase Agricultural Production" by *Dr. G. Pritsch* (German Democratic Republic) ; "The Alteration of the Mobilising Activity of Honey Bees through the Removal of Factors which Orientate Direction of Longdistance (Wagtail) Flight" by *I. A. Levchenco, L. I. Frantsevich, I. I. Salimov* (U.S.S.R.) ; "Physiology of Information by Signaling in Honey Bee Colony" by *N. G. Lopatina, I. A. Nickitina, B. G. Cesnokova* (U.S.S.R.) ; "Controlled Modification of Heredity in Bee Colonies and of Sex in Queens and Drones" by *A. N. Melnicenco, N. D. Burmistrova, A. S. Trishina* (U.S.S.R.) ; "Natural Parthenogenesis of the Honey Bees" by *V. V. Treasko* (U.S.S.R.) ; "Influence of Respiratory Metabolism in Bees (Apis Mellifica L.) by *Dr. D. Skrobal* (Czechoslovakia) ; "Results of Researches on Dosing Royal Jelly in Line with the Tasks Assigned by the Decisions of the XIXth Congress Held in Prague", by *Dr. J. Svoboda* (Czechoslovakia); "The Syringe Point with Cylindrical Ending Allows Artificial Insemination without Using a Probe as well as Collecting of Sperm Directly from Seminal Vesicles of the Drones", by *Eng. Vl. Vesely* (Czechoslovakia); "Colouring in vivo of some Internal Organs of Queens by Introducing Coloured Fluids into the Oviducts" by *Dr. D. Skrobal, Eng. Vl. Vesely* (Czechoslovakia) ; "Fluorine Poisoning in Bees" by *Dr. K. Dreher* (Federal Republic of Germany) ; "Some Observations on the Black Disease" by *Dr. Liselotte Seifert* (German Democratic Republic) ; "Checking of Queens According to the Offspring (Referring to the Method of Bee Selection)" by *G. A. Avetisian* (U.S.S.R.) ; "Polish Buckwheat Honey" by *M. Rycklik, S. Fedorowska* (Poland) ; "Researches on Prognostication of Flows in Beekeeping" by *Eng. I. Cîrnu, O. Berbecel, A. Tomescu* (Romania) ; "Observations Regarding Bee Resistance to American Foul Brood" by *Dr. M. Serban, Dr. A. Popa* (Romania) ; "The Therapeutical Application of Bee-Venom by Ultrasonics" by *Dr. P. Potchinkova* (Bulgaria) ; "Therapeutic Use of Bee-Venom by Ultrasonics" by *Dr. P. Potchinkova* (Bulgaria) ; "The Results of the Bee-Venom Treatment for Rheumatic, Rheumatoid and Peripheral Nervous System Diseases" by *Dr. V. Mladenov, Dr. V. Kazandjeva* (Bulgaria) ; "New Observations Concerning the Gathering Places of Drones" by *Prof. Dr. F. Ruttner* (Federal Republic of Germany) ; "Development of "Corpora Allata" in Working Bees" *(Apis Mellifica L.)* by *Dr. O. Van Laere* (Belgium) ; "Hesitation in Using Artificial Drugs Made of Organic Substances to Prevent and Cure Bee Diseases" by *Dr. W. Bröker* (Federal Republic of Germany) ; "Honey and Sugar Diabetes" by *Dr. W. Bröker* (Federal Republic of Germany) ; "The Isle of Wight Disease" by *Dr. W. Bröker* (Federal Republic of Germany) ; "Study of Intestinal Mycotic Flora in Bees Treated with Antibiotics and Sulphamide" by *P. Mitroiu, M. Popa, M. Serban, C. I. Toma* (Romania) ; "Contributions to the Study of Physico-Chemical Structure of Honey Resulted from Bees Fed on Sugar Syrup" by *Dr. N. Popescu, Dr. G. Popa, Dr. Alex. Popa, V. Brînzac* (Romania) ; "Radioactivity of Honey from Bucharest Zone" by *N. Racoveanu, Dr. Al. Popa, El. Turcitu* (Romania) ; "The Use of 32 — Phosphorus in the Nectar-Genesis Study in some Forest Melliferous Species" by *C. Huluță, Dr. Al. Popa, Eng. I. Cîrnu* (Romania) ; "The Results of the Works of Apimondia's Standing Commi-

ssion for 1964—1965 regarding Melliferous Plants and Pollination and the Long-Term Plan of Activity of this Commission" by *Dr. N. M. Glushkov* (U.S.S.R.) ; "Influence of Temperature upon Storing Honey" by *D. P. Lavie, M. Connet* (France) ; "Disposition adopted on July 28, 1964, for the Protection of Bees against the American Foul Brood and the Acarine Disease" by *Vet. Dr. O. Feiling* (Federal Republic of Germany) ; "Problems of Acclimatation in Melliferous bee *(Apis Mellifica L.)*" by *J. Louveaux* (France) ; "The Presence of European Foul Brood Agents (benign) within the Healthy Bee Colonies" by *Al. Toshkov, G. Camburov, M. Sahanov* (Bulgaria).

The proceedings of the Bee Biology Section were carried on in two sessions on August 20, 1965. The first took place in the morning presided by *Prof. Dr. Fr. Ruttner* (Federal Republic of Germany) and the second in the afternoon presided by *Eng. N. Foti* (Romania).

The proceedings of the Bee Pathology Section lasted a day and a half : on the 21st August and in the morning of the 22nd August 1965, comprising four main divisions : microbiology presided by *Prof. Dr. M. Rousseau* (France), toxicology presided by *Dr. Al. Popa* (Romania), parasitology presided by *Prof. Dr. A. Toshkov* (Bulgaria), and virusology presided by *Dr. O. Feiling* (Federal Republic of Germany).

The proceedings of the Bee Botany Section were carried on in two sessions presided by *Eng. I. Barac* (Romania) and *Dr. A. Maurizio* (Switzerland) who presided the works of the International Commission of Bee Botany (International Union of Biological Sciences I.U.B.S.).

The extensive discussions which took place after each working session stressed the particular importance of the results of these scientific researches for the development and prosperity of beekeeping all over the world. It was underlined that this ample exchange of experience at world level opens up new prospects for the future of apiculture.

After the closing of the proceedings of the Symposium, the foreign and the Romanian experts participated, from August 23 to 24, 1965, in a series of events, visits and documentary trips. Thus, in the morning of the 23-rd August, the foreign participants who expressed their desire to take part in the celebration of this day, attended it.

In the afternoon all participants in the Symposium were taken by bus for a documentary visit to the experimental apiary of the Beekeeping Research Station at Moldoveni, Urziceni district. In the evening of the same day the guests were invited at a dinner given in their honour by the Beekeepers' Association.

The following day, the participants visited the laboratories of the Central Apicultural and Sericultural Station in Bucharest, the experimental fields and laboratories of the Station as well as its experimental apiary. The visit to the Central Apicultural and Sericultural Station ended with a luncheon offered in the honour of the guests.

On the 24-th August, in the afternoon ,the foreign guests paid a visit to the Beekeeping Complex site of the Romanian Beekeepers' Association where the last works were being made for the arrangement of the buildings and of the First International Beekeeping Exhibition Fair which was opened in the following days of August.

THE MEETING OF THE INTERIMARY EXECUTIVE COUNCIL AND THE EXTRAORDINARY SESSION OF THE GENERAL ASSEMBLY OF APIMONDIA

The Interimary Executive Council meeting and the Extraordinary General Assembly of Apimondia took place on August 25, in the morning, at 9 o'clock, in one of the halls of the Palace of the Socialist Republic of Romania.

The meeting of the Interimary Executive Council was attended by : *R. Banker* (U.S.A.), *R. Borneck* (France), *F. Brückner* (Austria), *S. Cannamela* (Italy), *N. M. Glushkov* (U.S.S.R.), *A. Hansson* (Sweden), *V. Harnaj* (Romania), *E. Leysen* (Belgium), *M. Lindauer* (Federal Republic of Germany), *R. van Rappard* (Holland) — Dean of the Honorary Members, *M. Rousseau* (France), *J. N. Tennent* (Scotland), *G. Townsend* (Canada), *R. Zivanovič* (Yugoslavia).

On this occasion, the members of Apimondia's Interimary Executive Council debated organizing problems regarding the future activity of the International Federation of Beekeepers' Associations, the changing of some articles of Apimondia's Statutes, the ratification of the applications for new member admissions, and the problem of the organization of the next International Congress of Apimondia. They came to some decisions related to the preparation of the Extraordinary General Assembly of Apimon-

During the Congress, the delegates of the member countries of Apimondia gathered in General Assemblies.

dia which was to take place the same day with the main objective to finalize the Statutes of Apimondia and to elect the first statutory organs of the International Federation of the Beekeepers Associations for the following four years.

The Extraordinary Session of the General Assembly of Apimondia took place at 11 o'clock a.m. the same day. It was attended by the honorary members of Apimondia, members of the Interimary Executive Council of Apimondia, official delegates of the member countries, guests from the countries which asked to adhere to the International Federation as well as representatives of other countries present at the Congress.

The first point on the agenda was the election of the Assembly's Chairman. Mr Van Rappard (Holland), Dean of the honorary members, was unanimously elected to chair the session.

The following points on the agenda included :

— *Adoption of the agenda.*

— *Approval of the minutes of the Prague session of August 17th, 1963.*

— *Report by the General Secretary on the former activities.*

— *Admission of new members.*

— *Report from the auditing Commission.*

— *Proposals for changing the statutes.*

Preparation for the election of the new leading bodies of Apimondia.

— *Approval of the Regulations for applying the Statutes.*

— *Election of the Chairmen of the Standing Commissions and of the Auditors by the Executive Council.*

— *Miscellanea.*

After the unanimous approval of the actions provided at points 2, 3 and 4 the General Assembly discussed the proposal made by the Interimary Executive Council regarding the admission of the following National Bee Organizations as members of the International Federation : *Albania, Argentina, Bulgaria* (Nektarcoop) (the second Association), *North Korea, Ireland, Yugoslavia* (The Union of Beekeeping Associations of Yugoslavia), *The German Democratic Republic, Malagasy Republic, Mexico, Rhodesia, Tanzania.*

All these organizations were unanimously admitted to the Federation. In this way the number of the members of Apimondia increased to 45. At the same time the number of the official delegates of the member countries with right to vote present there increased from 24 to 29. They were the following :

R. BARNES, *England*
R. BOVEY, *Switzerland*
S. CANNAMELA, *Italy*
CEAN-CE-SUN, *Korean People's Democratic Republic*
J. DORAN, *Ireland*
M. DOUHET, *Malagasy Republic*
N. M. GLUSHKOV, *U.S.S.R.*
F. GNÄDINGER, *The Federal Republic of Germany*
S. GRINBLAT, *Argentina*
J. HAMBLETON, *U.S.A.*
A. HANSSON, *Sweden*
V. HARNAJ, *Romania*
P. HORGUELIN, *France*
E. KASSEL, *Israel*
S. KOCSIS, *Hungary*
E. LEYSEN, *Belgium*
H. LÖFFELBEIN, *The Democratic Republic of Germany*
J. POOS, *Luxembourg*
R. VAN RAPPARD, *Holland*
O. ROSENBERG, *Norway*
B. SCHWARTZ-HANSEN, *Denmark*
G. SELLIANAKIS, *Greece*
V. SKUT, *Poland*
J. SVOBODA, *Czechoslovakia*
J. TENNENT, *Scotland*
G. TOWNSEND, *Canada*
A. TROPPER, *Austria*
V. VELCIEV, *Bulgaria*
R. ZIVANOVIČ, *Yugoslavia.*

Among Apimondia's member countries Mexico, Finland, Cuba, India, and Spain did not have official delegates at the Extraordinary General Assembly of Apimondia.

After the approval of the report of the auditing Commission, the modifications to the Statutes, the Regulations for applying the Statutes, the balance-sheet and budget draft, it was passed to the election by secret ballot of the leading bodies of the International Federation of Beekeepers' Associations — Apimondia — for the following 4 years. The result of the election was the following :

FOR THE EXECUTIVE COUNCIL :

President :

V. HARNAJ *(Romania)* — 28 votes

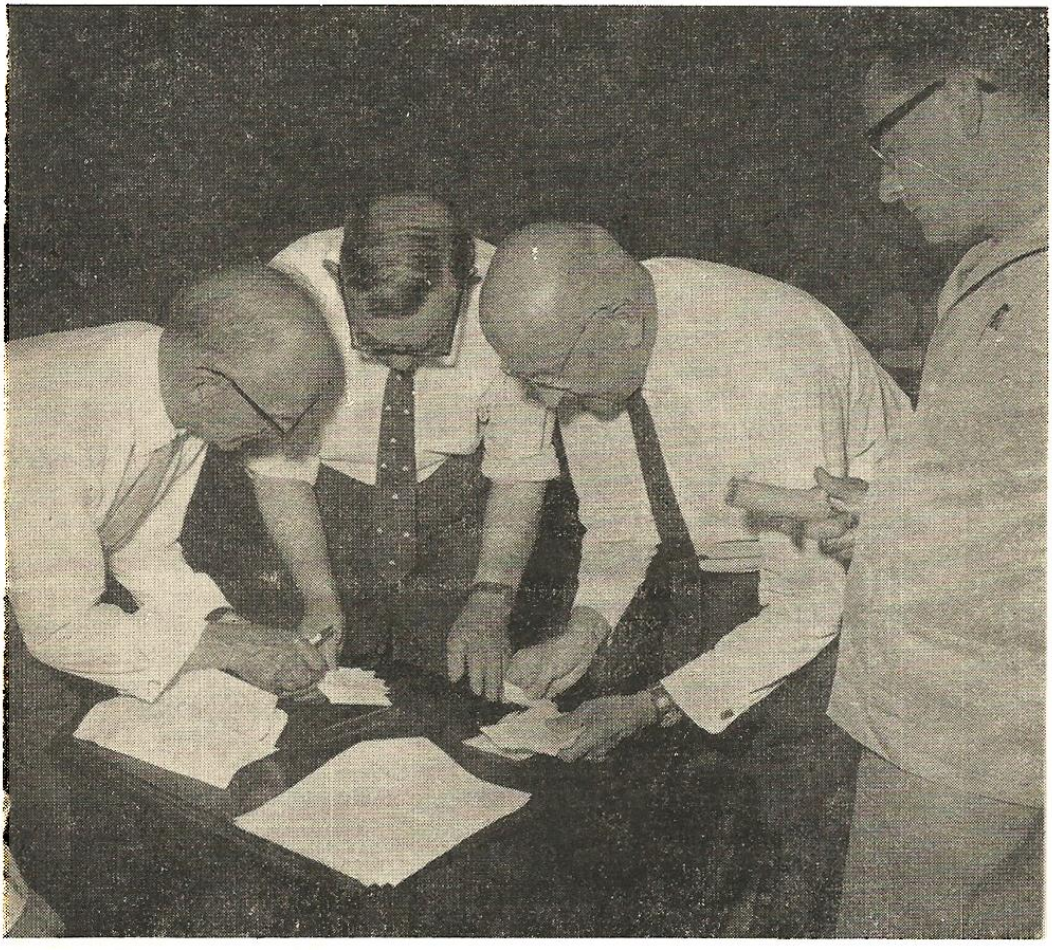
Vice-presidents :

P. HORGUELIN *(France)* — 26 votes

J. SVOBODA *(Czechoslovakia)* — 24 votes

Secretary-General :

S. CANNAMELA *(Italy)* — without one dissenting voice.



The opening of the ballot box and the counting of the secret ballots.

Mr. Van Rappard *informs of the results of voting.*

Members:

A. HANSSON *(Sweden)* — 27 votes
R. BANKER *(U.S.A.)* — 26 votes
J. TENNENT *(Scotland)* — 23 votes
R. ZIVANOVIČ *(Yugoslavia)* — 16 votes

Auditors:

S. KOCSIS *(Hungary)* — 28 votes
J. POOS *(Luxembourg)* — 28 votes
Alternate auditors:
G. SELLIANAKIS *(Greece)* — 23 votes
R. BOVEY *(Switzerland)* — 20 votes

CHAIRMEN OF THE TECHNICAL STANDING COMMISSIONS:

The Bee Economy Commission: R. BORNECK *(France)* — 26 votes
The Bee Biology Commission: FR. RUTTNER *(the Federal Republic of Germany)* — 26 votes
The Melliferous Flora and Pollination Commission: N. M. GLUSHKOV *(U.S.S.R.)* — 25 votes
The Bee Pathology Commission: M. ROUSSEAU *(France)* — 27 votes
The Bee Technology and Equipment Commission: G. TOWNSEND *(Canada)* — 26 votes.

President V. HARNAJ expressed his thanks to the participants in the Assembly and wished them full success in the future activity of Apimondia.

COMMISSION
BEE BIOLOGY

PRESENT STATE AND FUTURE DEVELOPMENT OF BEE BIOLOGY PROBLEMS

SPEECH BY PROF. Dr. M. LINDAUER, — FEDERAL REPUBLIC OF GERMANY

Chairman of the Standing Commission on Bee Biology

When the President Harnaj has asked me to present in this opening session a short survey on the researches carried out in bee biology field, I was rather anxious and wondered if in the few minutes I shall have at my disposal it would be possible for me to give an objective and complete image on this problem. I ask you therefore not to mind it if I will mention only the essential points showing the outstanding achievements during the last years as well as the approximate direction of the work in the coming years.

Prof. Dr. M. Lindauer *(Federal Republic of Germany) at the rostrum.*

1. — Owing to the classic researches carried out by the professor von Frisch half a century ago on the colour sense of our honey bee this problem became a matter of comparative physiology. These researches proved that the bee is a particularly well gifted experimental animal and even nowadays we are often surprised at the new and fundamental performances of its senses. If the bee had not opened the first path towards the unknown field of a strange world, we would not have succeeded so far in knowing anything about the colour and shape sense of insects, about their ability of seeing when moving or perceiving polarized light through the facets of eyes, about the taste, smell and touch characteristics and finally about the equilibrium directing of insects.

In Munich, in Tübingen, at the Yale University in U.S.A. as well as in Frankfurt there are research centres working in various fields of the physiology of bee senses. Details on this problem are given by the synthesis report: "Orientation and ability of communication in bees".

I take the liberty of mentioning that in connection with this matter, researches are now being carried out on two problems of present interest and great importance to the whole biology: "the sense of time" and "the process and mechanism of learning".

2. — Concomitantly with the sense physiology, problems concerning the mutual understanding within the bee colony are also arising. How do bees utilize the information that their sense organs transmit to the central nervous system in view of leading their social organization, of maintaining the harmony in their work, of regulating the caste-determination and of multiplying the population?

A select group formed by research workers of high international reputation in the beekeeping field are endeavouring to force "royal jelly" to yield up its secrets. It is getting more and more evident that these chemical substances produced by the queen mandible gland (besides the 9 oxadec — 2 enoic acid, Callow, Chapman and Paton identified by the use of gas chromatography 13 new substances) are the crucial point of the social organization: a correct behaviour towards the queen, as well as basic isotropic and gonadotropic processes are guided very ingeniously. Otherwise the anarchism of the false queen, as well as the uncoordinated activity of the workers should lead to distroying the bee colony.

These researches are also closely linked to the problematical question of the division of labour and that of the communications in bees by food exchange and dances. Towards the elucidation of this problem, Philipovic and Milojevich (Jugoslavia), Istomina and Zvetcova (Moscow), Esch (Munich) and Wenner (California) brought valuable contributions.

Anybody unversed in these problems is particularly impressed to see how this matter of the queen substance developed more and more, rousing not only the interest of beekeepers but also of scientists who paved its way so far as to make it a matter of medicine too. This problem led to the co-operation of scientific biochemists and chemists and owing to the new discoveries in this field it exceeded national borders. The working group headed by Butler from England, that of Chauvin and Miss Pain from Strassbourg and Paris or that of Lusher from Bern, and finally that of Rembold from Munich give us the possibility of new and continuous findings in the intricate field of the research history.

3. — A third essential field covers genetics and reproduction of honey bee. Especially interesting for the problems of modern biology are the valuable contributions that Mackenson and Laidlow from California and Woyke from Poland brought to bee genetics ; what Ruttner lately found out in the biology of drone reproduction is in all respects the most beautiful of all the discoveries the biology researches recorded these last years. Messrs Woyke and Ruttner will kindly report to us on these problems. It should be added that we are only too happy to have obtained the co-operation of these two reporters. We would have therefore the opportunity of learning directly these important results of their researches, as well as their projects for the future.

4. — Here are now briefly some other data on a research field which, in spite of the fact it has no direct relations to bees, is, however, edifying to understanding social organization. It is a matter of the researches carried out on primitive social insect colonies : humble bee, field wasp, common wasp, hornet a.s.o., their development stages, interesting data on the historical evolution of bee colonies. I would particularly emphasize the precious researches of Michener, Sakagami, Grassé and Plateaux-Quen, which show us how within the framework of a community nursing the brood of several females there is developing a division of labour as follows : forager animals, worker-builders, brood-nurse bees and queens laying eggs. This fact became the key stone of a high level organization community.

SYNTHESIS REPORTS

REPORT I. A. ON BEE GENETICS*

(Papers nr. 1, 3, 9, 14, 18, 19, 23, 25 and 33)

Rapporteur : **Dr. J. WOYKE**
POLAND

The presented synthesis report is a result of nine papers submitted to the Congress by 10 authors of 5 lands.

U.S.S.R. presents three papers written by 4 authors, namely G. D. Bilash and V. T. Jeltiakova, M. S. Raghin-Zade and A. J. Shekshuev.

The United Arab Republic also presents 3 papers all written by M.A. el-Banby.

The Socialist Republic of Czechoslovakia is represented by a paper written by Vl. Vesely and Y. Rozman.

From West Germany originated one paper written by a German author — W. Drecher and a Yugoslavian — Kulincevic.

One Polish paper is submitted by J. Woyke.

In the bee genetics the morphological characters of the honey bee has been studied very thoroughly. But only the inheritance of some mutations is well known. Nothing is known concerning the correlation between some morphological characters and the honey productivity of the bees. In spite of much research in queen rearing, the genetics of honey productivity was only studied briefly and many basic investigations are needed.

Fortunately the little known questions mentioned above are presented to this Congress.

Except for a paper describing Johan Gregor Mendel as a beekeeper

— one paper dealt with the difficult problem of inheritance of the colour of bees ;

— most papers concern with the question of heredity, of the morphological characters and its connection with honey productivity ;

— 2 papers describe the heredity aspect of honey productivity ;

— 1 paper is about diploid drones, sex determination and the possibility of breeding new types of bees.

MENDEL AS A BEEKEEPER

The father of modern genetics Johan Gregor Mendel was honored this year by a world wide celebration on the occasion of the centenary of one of the most important publication in biology, namely : "Experiments with plant hybrids". This work proved to be the key of the elementary pheonomena of heredity.

Mr Vesely presents now a paper, which shows that J. Mendel was as well a good and a successful beekeeper. He kept up to 50 colonies,

* Original text in English.

knew much about bees and experimented with them. He knew the difficulties with the control of natural mating and tried therefore to mate the queen in a closed space. He kept a great variety of bee races : the black bee, the Carniolan, the yellow Cyprian, Italian and even Egyptian. We must also suppose that he was interested in bees from the wider biological point of view and in connection with the genetical work. Of course Mendel did not know the fact of multiple mating, and unfortunately the colour inheritance in bees is one of the most difficult problems.

It is possible that the crossing of bee races also supported Mendel in his conclusion that his laws has a limited validity only for some organisms.

HEREDITY OF EXTERNAL CHARACTERS IN THE HONEY BEE.

A paper by el-Banby dealt with the difficult problem of colour inheritance in bees. The difficulty of clearing this question is very well known. To explain the variation of colour in crosses of yellow and black races : Roberts and Mackensen /1951/ reported that there are at least seven different *loci* for genes affecting cuticular colour of the abdomen.

El-Banby studied the heredity of abdominal coloration in crosses of yellow Egyptian honeybees with the darker coloured Carniolan.

He stated that the yellow colour of the Egyptian honeybee and the grey colour of the Carniolan honeybee depended only on one pair of alleles. The Egyptian yellow colour is dominant to the Carniolan gray colour.

The results of el-Banby do not agree with that of Roberts and Mackensen (1951) and those of Sladen (1909 and 1918), Watson (1927), Getze and Nolon (1937), who reported a variation of coloration in crosses of yellow and black races. But the results of el-Banby agree with those of Newell's (1915).

It would be advisable as well to explain the different results obtained by the different authors and to study further this problem. Perhaps the author or one of the participants could add something to this question.

MORPHOLOGICAL CHARACTERS OF THE HONEY BEE AND HONEY PRODUCTIVITY

One of the most problematical questions in the bee genetics is whether there exists any correlation between some morphological characters and honey productivity of honey bees.

To solve this problem three questions should be investigated : I/ whether the characters which may have any influence on honey productivity (like length of proboscis, body size, size of the wings and some others) are heritable? 2/ which are the characteristics which are transmitted by inheritance after crossing different lines ? 3/ which is the correlation between the heritable morphological characters and honey productivity ?

Fortunately, papers concerning all these questions are presented to this Congress.

El-Banby investigated the heritage of proboscis length, fore-wing length and the flagellum length, as factors limiting the nectar collection. He found a positive and high heredity of these characters. The breeding value of these characters correspond with its phenotypic value, and any of these characters in the honeybee population can be improved if the colonies are selected for it. It was also found positive and a significant genetic correlation between each of these characters and any of the others. This means that the selection for improving only one of the mentioned character in the parents improves at the same time all the other characters in the offspring.

The results of crossing bees possessing long extremities with those having short extremities is also described by el-Banby. He mated the long extremity Carniolan with the short extremity Egyptians. It was found, that the value for proboscis flagella, fore-wing and leg segments of the offspring is of approximately medium size between the Carniolan and Egyptian bees.

A very significant problem for practical beekeeping is the question whether there exists at all any correlation between the proboscis length and honey productivity.

According to the earlier papers of Kolesnikov (1959) and Hejtmanek (1960) there is no correlation between the proboscis length and the productivity of the honeybees. Nevertheless, this question is studied again and again.

Two papers concerning this question are presented to the Congress (one by Drescher and Kulincevic and a second by Bilash and Jeltiakova). The results of both investigations in spite of different races used and different conditions are in agreement each to the other.

Drescher and Kulincevic investigated two groups of the Carniolan bees, being the results of reciprocal crosses between "Peschetz" and "Troisek-Trifolium" lines. The least line was inbred by brother-sister mating for 10 years and selected by the criterion of proboscis length.

Within both of the groups a very high correlation was found between proboscis length and honey productivity (correlation coefficient $r_1 = 0.94$ and $r_2 = 0.91$). The increase of proboscis length by 0.1 mm is connected with an increase of honey production by 3.56 kg in the first group and by 2.26 kg in the second.

It is also interesting that there were considerable differences in efficiency of groups being a product of reciprocal crosses between two closely related lines.

Although within both of the groups, colonies with worker bees having longer proboscis produced much more honey (up to 6 time more), the most surprising result is that it was not possible to prove any correlation between proboscis, length and the honey productivity of the two different groups. The group with a smaller average length of proboscis produced more honey.

According to Drescher and Kulincevic it can be concluded that the efficiency in nectar gathering on red clover does not necessarily depend

on the average length of the proboscis. Only with families relatively identical from the heredity point of view, a longer proboscis may cause an increase in production.

Bilash and Jeltiakova investigated the same questions in Caucasian bees, Central Russia and the hybrids of the two races.

A rather significant positive correlation was noticed between the proboscis length and the honey productivity for the Caucasian bees and their hybrids with the Central Russian honey bees.

On the contrary, there was no significant correlation to be noted in the same gathering condition, between the proboscis length and the honey productivity in the bees from Central Russia.

According to the interpretation of Bilash and Jeltiakova the superiority in production was secured not by the proboscis length but by other specific qualities, which are stressed and made more evident by a longer proboscis.

As can be seen the question of proboscis length and honey productivity needs further investigation, and discussion on this problem by the participants to the Congress would be very desirable.

HEREDITY ASPECTS OF HONEY PRODUCTIVITY

The genetics of bee activity and honey gathering are described in the two next papers.

Sekshuev compared the morpho-biological characters in pure race colonies, simple hybrids and complex hybrids. In the first group the queen as well as the workers are of one race. The simple hybrid colonies, called also two way hybrids, were obtained by crossing queens of one race with drones of the other race. This resulted in colonies having pure race queens and hybrid workers. The complex hybrid colonies, called also three way hybrids, were obtained by mating a hybrid queen to drones of a third race. This resulted in colonies having both — the queen and the workers — hybrids.

The results obtained show that the queens in both types of hybrid colonies laid more eggs than those in the pure race colonies. The maximum egg laying was noted in the complex hybrid colonies headed by the hybrid queens.

The complex hybrids of three races exceed in development the local bees and the simple hybrids of two races. Before the main honey flow the total brood quantity in the simple hybrid colonies was 35—55% higher, and in the complex hybrids, 96—116% higher, than in the pure local Central Russia bees. For the complex hybrids an impetuous growth was characteristic with a relatively late development, and therefore they are recommended especially for a later honey flow.

The simple hybrids supplied 35—75% more honey than the local, and the complex hybrids twice as much as the local bees.

The wax production was also the highest in the complex hybrids and especially in those of the Italian races.

Although the complex hybrids developed very strong colonies they manifested a reduced inclination for swarming.

It can be seen, that the complex hybrids are in Central Russia much more productive than simple hybrids and the local bees. They can be recommended for checking in other areas.

Raghin-Zade investigated the reciprocal hybrids between two very different bee races, namely the mountain Caucasian and the subtropical Persian bee. Both of the hybrids groups were investigated in the mountain areas and in the subtropical areas. It should be pointed out, that the marked individual worker bees were investigated and not the whole family.

The data presented by Raghin-Zade show that the gathering activity of both the reciprocal hybrids were in different climatic conditions always similar to that of the *maternal* line.

This result is very interesting. It is easy to understand the differences in honey productivity of two reciprocal simple hybrid colonies. In cases like this only the worker bees are hybrids and the queens are of two pure different races. The differences in activity of individual reciprocal worker hybrids are much more difficult to explain. A discussion on this question, and some explanations given by the author or the participants of the Congress would be very desirable.

DIPLOID DRONES

The last paper by J. Woyke gives cytological and genetical evidence of development of drones from fertilized eggs and describes the methods of rearing the diploid drones in the colony to sexual maturity.

After close inbreeding, queens producing scattered brood were obtained. It was stated that the larva developed from all the eggs layed in the worker cells, but 50% of the very young larvae were eaten by the worker bees. The eaten larvae were drones. Cytological investigations showed that these drones developed from eggs to which entered the sperms. 32 chromosomes were found in eggs from which developed these drones, contrary to the 16 chromosomes found in eggs from which developed the haploid drones. The diploid drone larvae can be reared further outside the colony, in an incubator. They were not less viable than the haploid or female larvae.

But rearing of any drones (haploid or diploid) in an incubator is very difficult and inefficient. Therefore research was undertaken to work out a method of rearing the diploid drones in the colony, despite the fact that they are normaly eaten by the worker bees. It was shown that the workers eat the diploid drones not because they are in worker cells instead of drones cells. Some hormonal factors were stated. A critical period in the larval life was discovered. It was shown that after the diploid drone larvae were reared for the first two days in queen cells in a rearing colony or in the incubator they can be transferred to the drone cells in a colony, and, they are here reared further by the worker bees. Many adult diploid drones were reared. Genetic characters showed that both of the parents participated in their origin.

The diploid drones had much smaller testes and produced much less semen than the haploids. Based on a sex limited gene hypothesis. diploid drones with greater testes were reared. Research work is now being undertaken to inseminate the queens with the semen of the diploid drones and to test the offspring.

REPORT I. B. ON BEE RACES AND THEIR SELECTION*

(Papers Nr. 4, 15, 16, 20 and 26)

Rapporteur : Prof. Dr. **F. RUTTNER**
FEDERAL REPUBLIC OF GERMANY

Since beekeepers travel about and become acquainted with their bees, our knowledge about the geographical differences of the species *Apis mellifica* permanently increases. These differences are various ; they refer to the size of the whole body, to the length of certain parts — as for instance of the proboscis, to colour, pubescence, wing nervures, a.s.o. Frequently the distinctions are small, so that they can only be measured statistically by measuring a great number of bees. This proves that these differences apply to the most inferior systematic category and that all races of bees belong in fact to the same species — *Apis mellifica,* although it is widespread on a natural surface which stretches from Scandinavia up to the Cape of Good Hope and from the Senegal up to Hindkusch.

It becomes immediately obvious that the races of the bees differ not only in their outside aspect but also in their biological properties, hence in their economical value. That is why researches on bee races, soon aroused the advanced beekeepers' interest, in hope of finding in distant countries bees with properties enabling them to yield more and to be also easier treated. The first to persevering on this road — 100 years ago — were reverent Dzierzon in Europe and — a little while later — Frank Benton in the U.S.A.

With the bees' transplantations another problem of practical aspect became actual which plays everywhere and in the systematics a prominent part. It was necessary to find the main indices characteristic of a certain form, allowing the recognition of the bees' origin and their determination. At the beginning the only indication which was almost exclusively used was the colour of the bees — especially by differentiation of the first abdominal rings — as this indication is most striking and easier to establish.

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* Original text in German.

In the practice of bee breeding even today the colour of the bee plays a great part in the growing selection and I dare say a too great part. The Italian bee must be as yellow as possible, while the Caucasian or the Carniolan bee must be uniformly dark coloured to be considered as of pure race, that is often without taking into consideration their real economical value. It is quite a long time since it has been stated that the colour by itself is a quite incomplete indication of the bee races. The Italian for instance is hard to differentiate by its colour from the Sahara yellow bee, but their shape is quite dissimilar.

For this reason some specialists in Apiculture strived to discover other characteristics permitting an unequivocal definition of the various breeds. These characteristics cannot be established with the naked eye — as for instance in the case of the colour — but must be measured with a microscope and statistically worked out. This method — named the biometrical method — is rather tiring but offers real accurate results and is used instead of the description method which is only approximate. It has been set up by Prof. Goetze of Germany and by Prof. Alpatov of Russia.

Alpatov and Goetze obtained by their measurements a precise characterization of some already known races, as well as the determination of many new ones as for instance the Crimea bee *(Apis mellifica taurica)*, the Steppe bee of South Russia *(A.m. acervorum)*, of the Spanish bee *(A.m. iberica)*. The complete biometrical description of all existing bees' shape is however a problem of the future generations, as we still are very far from its solution. In the last few years a great number of individual researches contribute to the rounding up of the bees races' images and I shall have the honour to report to this Congress about some of these special works.

Any work of biometrical speciality with a large number of tables would rather confuse the leaders instead of enlightening them. That is why I shall give a general view upon the races according to the previous investigations already confirmed, then compare them with the present works and finally try to combine them. We can limit ourselves to Europe and the Near East, as the present papers refer to these regions.

The conditions in Central Europe are relatively easy to see. The bee originating from this region shows on a very vast field a surprising uniformity. It received various names according to the nationality of the respective beekeepers. The French brown bee, the English bee, the Alpine bee, the German bee, the dark bee, the North Russian forest bee. Later on, Skorikow showed that in the whole space between the Pyrenees and the Urals the differences concerning the size are entirely without importance. The bee is characterized by a large and broad body, a small proboscis, by long, rare hairs, cubital index under 2.0 (according to Alpatov's classification over 50%) and for historical reasons it can be considered as the original form of the European honeybee and therefore named *Apis mellifica, mellifica*. Beyond the Pyrenees a very similar bee lives which, but for its short hairs has been considered lately by Goetze, with good reasons, as a special race, named *A.m. iberica*. This bee has again surprising resemblances to the Tell black bee, upon which father

Adam drew our attention. We see then in front of us a closed chain of races, crossing from North Africa — over the Iberic Peninsula through all Central and North Europe — up to the Urals.

By regard the history of the origin of races it is very interesting to point out that all three Northern peninsulas in the Mediterranean Sea have their own bee race. The same as the Iberical bee — which we already mentioned — the Italian bee *(A.m. ligustica)*, so much appreciated all over the world, was initially limited to the Apennine Peninsula.

The area bees' distribution in the Balkan-Peninsula *(A.m. carnica)* is much wider. This name must be understood again from the historical point of view, as this bee was known only in Slovenia and Carinthia and received the name of the mountain where their first exporters lived. According to the language of this country its name is the Krain or Carinthian or Carniolan bee. Later on, it came out — according to Alpatov — that the characteristics of the Carniolan bee for instance the slender shape the long proboscis, the cubital index of 2,3—3,0 (35—45%) mostly overpassed the narrow frame of its initial denomination. The *carnica*-type is to be found all over the Danube area, East of Vienna, in the Carpathians and further to the South in the Balkan-Peninsula. Although according to our present knowledge, the name of *carnica* was too restricted, owing to the international rules of nomenclature it should preserve its priority.

What is the situation concerning the geographical boundaries of the *carnica*-race towards the dark bee from the North ? In the most western area of the *carnica*-race, in Austria, then boundaries could be clearly delimited as being formed by the main ridge of the East Alps. South and East of the Alps is the genuine area of the *carnica*-race, while North of the Alps there is the *mellifica* area. Further to the East, where the natural shelter of the high mountains is missing, this boundary is not so precise. Still, we know by the researches of Rytir and others, that a *carnica*-bee, uniform and well-marked, may be found in Slovakia and in Hungary, while in western Czechoslovakia (Bohemia) the *mellifica*-type predominates. Nothing has been done but suppositions concerning the delimitations towards East of the two races. First of all arises the question : Do the Carpathians the same as the Alps form a natural boundary between the *carnica* and *mellifica*-races ? In this case there should appear in Poland exclusively the dark bee.

Concerning the same question, we have before us a very close investigation of L. Bornus, A. Demianovicz and M. Gromusz. They made biometric researches all over Poland on a system of coordinates drawn parallely with the meridians upon 435 bee samples of 100 each. The statistical interpretation of the results brought to Poland the proof of the existence of two bee types, which clearly differentiate each-other : Type I, predominating in Central and North Poland, with *mellifica* characteristics and type II, in the South, with *carnica* characteristics. According to various mixing proportions of these two types, Poland has been divided in 5 areas of bee breeding. Some regions with special homogeneity of the race may be considered as areas of natural protection for obtaining some breeding material. It results from this investigation that

the *carnica*-race passed beyond the Carpathians and that more to the North it mixed up with the *mellifica*-race, resulting a very constant gradient of indices-modifications from South towards North.

The conditions are similar in the Soviet Union. Alpatow described already 30 years ago a forest bee *(A.m. silvarum)*, which corresponds to the *mellifica-type*, f.i.e. Bornus type I. In the South, Alpatow found a steppe bee *(A.m. acervorum)*, which showed great resemblance to the *carnica*-type. A close comparison of many Ukraina bees' characteristics with the *carnica*-race of the central area placed to our disposal by the kindness of Prof. Glushkow leads to the conclusion that from the statistical point of view no precise difference between those two types can be proved. This shows that the *carnica*-race of the Southern Soviet Union, beyond the Carpathians and further along the Black Sea coast penetrated very far towards East. In the North, the same as in Poland, a gradual transition of the forest bee towards the *mellifica*-type is in process.

It is quite satisfactory that in the Socialist Republic of Romania minute investigations have started on the morphological and biological peculiarities of bees (N. Foti, M. Lungu, P. Pelimon, I. Barac, M. Copaitici, E. Mîrza).

In all the regions of the country, there were made investigations on 189 samples, 50—110 bees per each region. The bees from the Socialist Republic of Romania are characterized by an average size of the proboscis length (6.35 mm) and the cubital index of 2,25—44,35% ; its limbs are longer than those of the northern bee race and shorter than those of the Carniolan and the Italian bee. As regards the width of the body, it is between the Italian bee and the Carniolan bee.

There are very interesting differences inside the country. The Transylvanian bees are big, and they have a longer proboscis and a higher cubital index than the Moldavian bees and especially than the Danube-plain bees, which are not much valuable.

Three groups of 15 colonies each, from Transylvania, the eastern part of the country and the Danube-plain were compared at the Apicultural Research Station.

All colonies proved to be peaceful, behaving quietly on combs and little inclined to swarming. A surprising by large number of built queen cells were found in the colonies in the swarming state and this especially in the Danube-plain bees (70—200 cells). The Transylvanian bees develop in the early spring and produce high yield as compared to other bees.

The authors study the characters and peculiarities of the bees from the Socialist Republic of Romania as compared to other known bees and propose to determine a new race, *Apis mellifica carpatica.*

From the point of view of the taxonomy of the honey bee, undoubtedly that this bee belongs also to the Carniolan bee and it has to be considered as a local form of that race — *Apis mellifica carnica (f. carpatica)*.

These findings are completed and confirmed with a close investigation made by Scherementjew, Welief, Korolew, Nerutschew, Petrow

from Vologda (North of Moscow), Gorki (East of Moscow), Bashkir (South of the Urals) and from the sub-Carpathian region.

The subcarpathian bees with a proboscis length of 6,68 mm, together with the cubital index of 44,5% (2,25) and their slander shape, represents clearly the *carnica* type. The bee of this area has an uncommon uniformity. Very interesting is the authors' indication concerning its striking resemblance in some points as the proboscis length and the cubital index with the Transcaucasian bee. On behalf of biometrical comparison of some wing veins details they arrived to the conclusion that some relationship exists between the *carnica* and the Transcaucasian bee. If the morphological resemblance of the *mellifica*-race indicates some relationship with the bees of the Iberic Peninsula and North Africa, then the *carnica*-race makes shows relations to the Near East.

The Baschkirian bees are much alike the ones from the Gorki region. They represent undoubtedly the *mellifica* type (large measurements of the body, short proboscis 6,00—6,22 mm, cubital index 51—59%). There was already much talk about the Baschikirian bee. Up to now it was kept in baskets without the man's intervention and adopted itself to the rough climate of the South Urals where severe winters last 6—7 months.

Naturally, it was to be expected that the Vologda bees should belong to the forest bee type of Central Russia, hence to the *mellifica*-race. According to the law established by the Alpatov's school concerning the increasing of the body sizes and decreasing of the proboscis — from the South toward the North of the Soviet Union — we should find in the Vologda Region a *mellifica*-type much more typical than in Bashkir. In fact the case turned the other way out. This contradiction finds its explanation in the authors' indications that the Vologda bees originate from uncontrolled matings of the Ukraine bees with the local ones.

The possible reasons of the gradual displacement of the body size from the South to the North, as well as from a low altitude to a higher one in the Soviet Union area, have already been discussed many times. Scherentzew and his associates show as causal factors the intensity of the solar radiation and the exposing time to the light, the air temperature, the air humidity and the features of the nectar plants. By taking in consideration this problem, one must take into account that this uniform displacements of the indices with constant value — in function of the geographical latitude, may be found only in regions completely uniform, as it is the case in the Soviet Union and Poland plains. There, where there are impediments to the spreading as for instance the mountains and the sea which promotes the isolation of the populations — the rule of the gliding fluctuation in function of the geographical latitude will often loose its validity. This may be seen in the Alps, as well as in the Balkans or in the Caucasus. In the Balkans this rule is even inverted and the proboscis decreases instead of increasing. These examples prove that by explaining the variability of the morphological characteristics it must be taken in consideration also other factors than the

present conditions of the environment, as for instance the bee's spreading in connection with the climatic variations in the post-ice age. On the contrary, if the morphological, biological and ecological differences are investigated, it would be possible to establish better relations between those and the present conditions of the environment.

As it was already stated, in the taxonomy of the melliferous bee, the form of the wing-veins plays an essential role. The investigations on the anomalies of the worker-bees' veins, as well as of the drones, made by Demianowicz on a large number of specimens, have some importance on account of putting into value the natural variability of the veins. After all, 28 different forms of deviations have been found. It is the question of supplementary or interrupted veins or of the deformation of the whole wing's extremity. Some anomalies appeared together on the successors of some queens or colonies, so that a genetical base of these modifications must be accepted. Some deviations appear in preference in certain bee races.

The complete study on the bee races would have for the practical apiculture a very small value if — without the differentiations of shape, colour and pubescence — a difference on the bees' economical value would not exist. These differences are often bigger and more numerous than the external differences and to be expressed more accurately in the outline of the bees belonging to one and the same exterior type. Therefore, to a certain race may be found lines having very different production properties. These differences may concern especially the wintering capacity, the rhythm and intensity of incubation, the ardour of honey gathering and the morbidity of the bees. It may be seen that the conditions of the environment — including the apiarian techniques — have direct influence precisely on these properties and that the natural selection here has an action more powerful and rapid than it would have on the cubital index. If bees of the same race leaving in different climates e.g. in the colonies of the brown race of Avignov and Vologda regions — would be compared, it will be established that some of the properties are common to both groups, so that we might speak about typical properties of the race. Concerning other properties, as for instance the survival capacity out of a long and severe winter, without suffering damages, in such case important differences will result. The beekeeper cannot be satisfied with the only indication of the race, he must know precisely what local aspects are in question. Regarding the Carniolan bee *(carnica)* from Romania, and even inside Romania our colleagues established important differences between the bees of the Carpathians and those of the steppe region. On the contrary, the differences of the external characters are so small that it is exceptionally difficult and tiring to diagnose the specially local form according to these features.

It may be presumed, generally, that the native bees better adapted to the local conditions than all the others. This supposition will corres-

pond more to the actual conditions, as the modern beekeeper shall have other expectations from his bee as from the one who utilized straw baskets 100 years ago. Besides the flora has been modifyed in many areas since the introduction of the new methods to obtain better results with a bee originating from a quite different region. The most striking example is the one of Israel, who passed suddenly from the Syrian to the Italian bee.

Nowadays, on world-wide scale there are only 3 races who play an essential role in the bees' rearing : the Italian bee, the Carniolan bee (*carnica*) and the Caucasian bee. Beside these, all possible cross-breeding between these races and others are experimented, father Adam being the one who has the widest experience in this matter.

From Bulgaria we received the results of year long comparisons made by Radov between the Bulgarian bee and Caucasian bee of Georgia. The Georgian bee is renowned all over the world by the length of its proboscis whose average is 6,96 mm whilst the Bulgarian one was 6.34. The Caucasian bee gave 30% honey and 20% wax more than the native one.

At the beginning of the flow the brood and bee quantity was bigger, whilst at the top point smaller (see the joint table) because the brood was contracted by the honey deposits. The cross-breeding of Caucasian queens with Bulgarian drones have a lower production than the pure Caucasian race, whilst the inverted cross-breeding for instance Bulgarian queens with Caucasian drones is not much different from the pure Bulgarian colonies.

Comparison of bees' strains in Bulgaria

Specification	Quantity of brood		Quantity of bees %	Production of honey %	Production of beswax %	Length of the proboscis mm
	Initial point of the harvest	Top point of the harvest				
Bulgarian bee	100	100	100	100	100	6.34
Caucasian bee (reared in Bulgaria)	109.8	81.8	109.1	131.5 155.1	121.3 121.8	6.98
Caucasian bee of Georgia	106	80.7		131.5	104.5	
Caucasian-Bulgarian drone	114.6	88.6	112.8	126.0 170.3	116.2 106.0	
Bulgarian queen Caucasian drone	102.7	—	104.6	107.7	104.4	

It is established that the reciprocal cross-breeding between the same parents give quite different results. It must be made obvious that the Caucasian bee colonies are less aggressive than the Bulgarian ones, they winter very well, they use big quantities of propolis and are inclined to robbery. This tendency must always be considered when dealing with Caucasian bees and their cross-breeding. In cases of comparison when Caucasian colonies are close to each other, the critical question one must put is if the greater harvest of one of the families was honestly obtained.

Although in the present case the cross-breeding of different races does not present any advantages towards the best initial pure races, in the future of bee rearing — besides the selection inside the race — certain directed cross-breedings will play an important role.

In the interest of constant work it is necessary to fix values on behalf of a long and careful investigation. To know really a bee we need many years and hasty decisions becoming public property provoke much confusion.

The geographical races of the melliferous bees are the result of very long natural selection. Some of them show predispositional complexes, which are of great significance to the future development of bee rearing. But these predispositional complexes can be suppressed in a very short time by the beekeepers' intervention and can never be practically regained. This represents a danger which increases nowadays with the speedy and easy means of communications, as well as with the spreading of the annual cross-breedings. Certain races may be already considered as having disappeared. Even a bee race like the dark *mellifica,* spread out on such big surfaces can be found today without being mixed in some regions of France and USSR. In a few years all these remnants may also be destroyed. The conservation in some regions of their country of all these natural races, in their original state is still of great importance to general bee rearing, for it has been established how difficult it is to keep the bees pure in the middle of a strange race and it is necessary to always utilize original material reared in the native country.

A few years ago, Avetisian proposed to Apimondia that it would be necessary to create reservations for each bee race in their respective countries. I think this proposal should be disscussed seriously and considered as one of Apimondia's tasks. But even constructing reservations is not enough. We should put them in relation with the rearing centres which will produce — under sanitary survey — queens of irreproachable origin and also will have in charge their expedition.

In this way, the beekeepers' international organization could give an efficient support to facilitate the exchange of rearing material for practical and scientific purposes.

REPORT I. C. ON BEE NUTRITION AND PHYSIOLOGY*

(Papers nr. 2, 5, 12, 17, 28 and 35)

Prof. **M. H. HAYDAK**
U. S. A.

In this summary talk I will review the researches dealing with the nutrition of the honeybee and with the influence of royal jelly on the growth and longevity of other insects.

Mitev of Bulgaria studied the influence of stimulative feeding of sugar syrup on the development of honeybee colonies prior to the honey flow. He recorded the quantity of reared brood, the swarming tendencies and the honey production. Four groups consisting of five equalized colonies each were used in the experiment which lasted three years. Each group of colonies was fed on sugar syrup or supplementary honey combs given at various time intervals. The control group received only the honey combs.

The average results showed that the maximum number of eggs, the greatest quantity of open and sealed brood were in the colonies which were given small portions of the syrup administered at one day intervals. The poorest development was in the control group.

The author considers that a better development of the colonies in groups fed on sugar syrup was due to the more intensive laying of the queens. The continuous feeding with the syrup created a condition similar to the natural honey flow, thus stimulating bees to a greater activity, the queens were fed more abundantly which resulted in an increased egg laying, and consequently, in the production of more bees. Because of this, the colonies were stronger at the beginning of the main honey flow and thus better crops of honey and wax were obtained. Such spring feeding did not induce robbing or influence swarming. It was also proven to be economically justified.

Rosenthal of Romania investigated the effect of a supplementary feeding colonies in periods of deficiency with proteins of various origin. At the beginning of his paper, he mentioned the work done in this field in Germany, Switzerland, France, Romania, USSR and U.S.A. Rosenthal studied the nutritive value of the maize and hazel pollens, of the pure combs, milk powder, yeast and their combinations. He investigated various ways of feeding these substances, the amount of food necessary *for the production of one kg of bees* and the reaction of the bees toward the food at various periods of the season.

The foods were given in a paste form (80% sugar, 20% honey, 7% protein), 500 gm per colony at the end of wintering. Hand collected maize and hazel pollens were compared with the yeast and milk

* Original text in English.

powder, and with various mixtures of these substances. There was a considerable (26% to 38%) increase in the number of reared larvae in all experimental colonies in comparison with the controls which did not receive any supplementary feeding. When pollen became available in the nature the differences between the groups diminished and then disppeared. This demonstrates the necessity of supplementary feeding only at the time of a pollen shortage.

Subsequent experiments showed that a mixture of 10% of maize pollen and 15% milk powder gave still better results. This was probably due to the complementary effect of the proteins of the pollen and milk. Supplementary feedings in autumn did not stop the natural decrease in brood rearing.

A supplementary feeding in the form of the paste is more efficient than when given as an admixture to sugar syrup. *For the production of 1 kg of bees,* it was necessary to give 2.4 kg of protein food in the form of liquid as compared to 1.25 kg in the form of paste. For the production of the same number of bees, more food is utilized in autumn than in the spring. This probably is due to the fact that a part of the protein is used for the development of the fat body and of the pharyngeal glands of the fall bees. Giving maize pollen paste to the colonies in autumn after the brood rearing stopped, brought a better development of the body and the pharyngeal glands than that in the controls.

With the start of brood rearing in February the fat body begins to regress while the pharyngeal glands become more active. There was no difference in the amount of *faeces in the recta* of the experimental and the control bees.

Another approach to increasing production of colonies is by feeding them various types of growth stimulators. Glushkov and Iakovlev of the USSR, in a series of experiments during 1963—1964 gathered new data on the positive influence exacted by the growth stimulators on bees. They used groups consisting of 6 to 14 equalized colonies each. The bees were fed *40% SPC* (oil growth stimulator) added to a liter of sugar syrup; 50% skim milk in sugar syrup; tetracycline (400,000 units); extract of 100 gm pollen to a liter syrup; control colonies were given only sugar syrup. Bees reared by the experimental colonies were heavier (2.8% to 11.3%), had longer tongues ("tunnels"), greater length of the anterior right wing, and larger *3 & 4 tergites.* The differences were statistically significant. There was also a better development of the pharyngeal glands in the colonies fed sugar — skim milk — SCP diet as well as somewhat increased longevity. The amount of brood reared by the experimental colonies was 5% to 17% greater than in the controls. The greatest number was reared in the colony receiving SCP. These colonies also provided the largest honey crop. However, when cobalt (8 mg/L) was added to the SCP. diet the brood rearing was 44.5% greater and the honey crop 70.5% larger than those in the con-

trols : The optimum SCP was 1.2 cm^3/L. The optimum for cobalt was not determined. The best development of the pharyngeal glands and the ovaries was achieved on the diet of SPC (1.2 cm^3) and cobalt (8 mg/L). An addition of such biologically active substances was also found to be economically advantageous.

The normal development and growth of honeybee colonies in the spring is often hampered by an insufficient pollen supply. To remedy this condition, beekeepers feed pollen supplement or pollen substitute. In preparing a pollen supplement air dried pollen stored at room temperature for about a year or more is used. Studies by various authors indicated that the nutritional value of pollen decreases upon storage. This is due to an interaction between protein and carbohydrate which causes the destruction of the amino acids lysine, arginine and tryptophane, such reaction can result in a reduced digestibility because of no protein.

Dietz an Haydak of the U.S.A., in 1962 & 1963, started an investigation to find out if the addition of various amino acids combinations to stored pollen will restore its nutritive value for honeybee growth and development. The pollen was collected from pollen traps, air dried and stored in tightly covered jars at room temperature. The basic ingredients of the diet consisted of pollen (25 gm), clover honey (60 gm) and water (13 gm).To this mixture, the individual L-amino acids were added in proportions given for average pollen. The resulting smooth mixture was poured into the cells of small combs which were placed into screened nuclei. About 30 gm of newly emerged bees, not over 6 hours old, were introduced into each nucleus. Water was supplied *ad libitum* beginning with the second day of the experiment. A paste made of freshly collected and air dried pollen was given to the control colonies. The bees were allowed to feed for nine days. The growth of these bees was determined by the changes in the weight and the nitrogen content of their heads and thoraces. In addition, the hypopharyngeal gland development and the mortality was ascertained.

Pollen used in the 1962 study had been stored for 13 years. It had apparently deteriorated to such an extent that fortification with various amino acids showed very little effect on the restoration of its nutritive value.

The nutritional value of the three year old pollen (1963 experiments) was restored to the quality of fresh pollen by the addition of two amino acids, L-lysine and L-argenine. Comparison over the nine day test period indicated that in general the greatest gain in dry weight and nitrogen content occurred between the third and the sixth day and a lessened effect for the last three days. The same could be said about the development of the hypopharyngeal glands which was quite closely correlated with that of the heads.

The mortality of the bees, counted at the end of nine days, was in most instances very low (2% to 11%). The highest mortality was in bees on the old pollen diet (56.5%). Apparently using old pollen in preparing pollen supplements is not justified from the nutritional point of view. However, it plays its role in attracting the nurse bees to the food.

De Groot and Maurizio demonstrated that the diet of protein alone is sufficient for normal growth of emerged bees and for the development of their hypopharyngeal glands. Haydak, Wahl and Bock showed that vitamins are necessary for the normal brood rearing. Haydak and Dietz conducted laboratory experiments to study the general role of vitamins of the B group in the nutrition of honeybees.

Colonies consisting of about 300 gm of bees not more than 6 hours old were hived in small nuclei on combs containing the paste made of the foods to be tested. Fertile queens were introduced. The nuclei were located in the flight wire screen cages in the laboratory. Four days after the experiment started the bees were given food candy placed on the top bars of the combs and water *ad libitum*. Control colonies were supplied with pollen paste and pollen candy made of honey and freshly gathered and air dried pollen collected from the traps in the bee yard.

The colonies were examined daily and the state of brood rearing was ascertained. Ten days after the first sealed cell was noticed in the colony, the number of sealed brood cells and unsealed larvae was recorded. Such count was repeated three times every 10 days afterwards.

The following diets were tested : 1/ Vitamin-free casein ; 2/ vitamin-free casein plus minerals ; 3/ vitamin-free casein+minerals+vitamins ; 4/ vitamin-free casein+minerals+vitamins+fats ; 5/ pollen.

The behavior of bees in all colonies was normal. The growth of the bees in all experimental colonies was about the same as that in the control colonies. So was the development of the hypopharyngeal glands. However, only those colonies which had vitamins and cholesterol added to their diets reared brood as did the control colonies. The number of the sealed brood cells in the experimental colonies was smaller than that in the controls and the character of the brood rearing toward the end of the experiment, was also somewhat different. The larval food in the brood cells of the colonies fed vitamin-free diets was abundant and of a normal appearance and consistency, but the larvae never reached the sealing stage. The quality of the emerging bees (expressed as their dry weight) produced by the experimental colonies rearing brood was equal to that of the controls.

Thus it was confirmed that for the growth of emerging bees and the development of their hypopharyngeal glands only an appropriate protein source is necessary. However, additional vitamins are indispensable for the brood rearing activity of honeybees.

The last of the papers reviewed is that by Okada of Japan on the effect of feeding diets containing royal jelly on the growth and longevity of some insects. These experiments were conducted for several years using silkworm, Drosophila and honeybees as test animals. The royal jelly used in this research was taken from the queen cells 48 hours after grafting by Doolittle method.

Okada supplied royal jelly to the larvae of silkworm by applying 5%, 10% and 20% water solution of royal jelly on the mulberry leaves. The larvae fed on this diet had a shorter time of development (502 days versus 529 days) were heavier (14.11 gm vs. 13.3 g) and had a greater

vitality. The adult females reared on this diet, laid more eggs (895 vs. 772) and had a longer life (13 days vs. 11 days) than the controls. The greater was the percentage of royal jelly in water solution, i.e. 5%, 10%, 20%, the more favorable were the results.

Tests with *Drosophila* (at 25°C and R.H. 60%) demonstrated that royal jelly was remarkably effective in shortening the larval development (7 days vs. 11.3 days) and in increasing the weight of both pupa (13.6 mg vs. 9.8 mg) and adults (11.1 mg vs. 8.9 mg). The resulting females lived longer (59.6 days vs. 48.9 days) and laid more eggs (39.9 vs. 29.6) than the controls.

Five day old bees kept at 32°C and R.H. 80%—90% were fed 20% solution of royal jelly in honey. The experimental bees had a greater longevity (36 days) as compared with the controls fed on honey alone (24 days).

There was no difference between the effects of the new (up to 3 months of storage) and the old (about one year storage) in a refrigerator at 2°—4°C royal jelly.

The author concluded that royal jelly was remarkably effective for some insects.

These results demonstrate the importance of the basic and applied research in solving some of the most interesting questions of bee biology.

REPORT I. D. ON BEE BIOLOGY AND PHEROMONES

(Papers No. 7, 10, 13 and 22)

Rapporteur : Eng. **N. FOTI**
ROMANIA

This report refers to the works received by the Standing Commission on Bee Biology of Apimondia in view of the 20th International Beekeeping Congress and deals with the pheromon problem and physiology of some glands of honeybee.

The Commission first appealed to Miss Pain, a conspicuous specialist in the domain from the station for apiculture and social insects researches (at Bure-sur-Yvette) to work out this report. Miss Pain for objective reasons being unable to comply with this request the secretary of the National Organizing Committee entrusted me with this difficult task.

This synthesis report covers the following 4 works :

1/ "Mandibular gland extirpation and the recognition of the queen". by H.H.W. Velthuis of the Laboratory of Comparative Physiology at the University of Utrecht (Holland).

2/ "The inhibitory effect of the dead queens — *Apis mellifica* L. dependent on time", by V. Philipovic-Moskovljeyic (Biological Institute Veterinary Faculty, University of Belgrad, Yugoslavia).

3/ "Physiological processes, inside the large intestine of the honeybee" by M. J. Jerebkin, Fellow-worker of the Apicultural Scientific Research Institute, USSR.

4/ "Some stimulators of the bees' pharyngeal glands secretion" by M. Kresak (Apiculture Institute Branch of Liptovski Gradek, Socialist Republic of Czechoslovakia).

As it resulting from the titles themselves, the first two works deal with the much debated problem of pheromons, the last two with problems specific to physiology.

With reference to the pheromon problem the latest discoveries in the domain have added a new dimension to our knowledge of the relations among the three castes of bees and the factors determining the cohesion and biological integrity of the bee colony.

As early as 1814, Huber had noted that there is something which gives worker bees notice of the presence of queen and later on Hess (1942) and other authors supposed that besides the queen smell there should be a substance inhibiting the development of ovaries. During the 1954—1960 period this problem aroused a particular interest both for research workers and practitioners, especially as a result of Butler's and J. Pain's (1954) papers, who, both about in the same time identified the queen substance (ectohormonpheromon) produced by the queen,

which inhibits the building of queen-cells and the development of ovaries in worker bees.

Subsequent researches carried out by J. Pain (1955—1960) and Barbier, Groot and Voogd (1954), Simpson (1956), Butler and Simpson established that it is the mandibular glands which secrete the pherhomon defining more accurately a series of biological qualities of this complex substance and its effects on the behaviour of bees.

From 1960 up today, this biology complex problem attracted more and more biologists. Their researches resulted in the isolation of the main components of this mandibular glands secretion, some of them being obtained even synthetically. A series of effects of these components were also obtained in the biology of bee colony. In this respect, we are referring to the researches carried out by Miss J. Pain (1961) on the number influence of captive bees on the formation of eggs within the queen ovaries, to those of Butler, Callow and Johnston (1961) concerning the isolation and the synthesis of queen substance and to those of Butler and Paton relating to the inhibition of queen rearing ; to the papers of Gary (1962) on the chemical extracts of queen, to those of J. Pain and Ruttner (1963) on the attraction of drones (by the extract of the mandibular glands) during the mating flight and finally to Callow's, Chapman's and Paton's works (1964) concerning the pherhomons of Apis mellifica and the chemical studying of the queen mandibular gland secretion. The authors show in this work that they succeeded in identifying 14 substances extracted from queen heads including mandibular glands. The 9 exodecenoic acid already identified by Butler, Callow and Johnston in 1961 is also to be counted among these substances.

Recent papers by Butler and Eliane Fayren (1964) throw some more light on problems concerning the attraction of various fractions of the mandibular glands secretion for bees and drones.

Researches now in progress, as well as those presented by the first two authors, which this report deals with, contribute to study thoroughly and to elucidate some aspects of this interesting domain of bee biology which were still indefinite.

The paper presented by H.H. Velthuis (Mandibular gland extirpation and the recognition of queen) treats of the attraction and recognition of queen by worker bees when mandibular glands are extirpated and aims at identifying the factor determining recognition of queen by bees.

Although the author makes use of the mandibular glands extirpation technique worked out by Gary and Horse (1960) his manner of approaching this problem : the appreciation of the drawing force between queen and bees, is quite different from Zmalieki's and Morse's one.

About the period of natural swarming when bees are highly sensitive to the qualitative modifications of queens, the authors extirpated the glands of egg laying queens of 18 normal bee colonies leaving them later on within their own bee colonies without taking any steps in order to prevent natural swarming.

There has been ascertained that bee colonies which were given queens whose mandibular glands were extirpated, seemed to be normal

in general ; the retinue behaviour was observed ; building emergency queen cells did not occur, nor abnormal ovarial development in worker bees was noticed.

Parallel to this experiment, the author comparatively watched in the laboratory the degree of the ovarial development in worker bees kept in touch with normal queens and queens deprived of their mandibular glands. Concomitantly he followed the attractiveness for bees of living and dead queens and separately that of the parts of their body before and after extirpating the mandibular glands.

The results of these experiments showed that no ovarial development occurred both in case of the queens without mandibular glands and in that of intact ones and the most favourable percentage related to the retinue behaviour was given by the dead queens glued to the comb and especially by their abdomen (75%).

On the basis of the results obtained, the author concluded that some chemical compound must be present within the body of the queen even after the extirpation of the mandibular glands which determines the retinue behaviour and the recognition of the queen by bees. The source of this compound might be located in the abdomen.

The work of V. Philipovic-Moskovljevic, entitled "The inhibitory effect of the dead queen dependent on time" is to be considered as continuing Pain's researches (1955).

Unlike the latter who experimented with small groups of captive bees, Philipovic used in his experiments small colonies of 500 bees which formed a nucleus provided with a frame and communicated freely with the environment. These colonies were formed of young bees just emerged from cells, being kept in direct contact with dead queens killed by freezing, one, two or three years earlier. The behaviour of the bee colonies having such an organization has been observed permanently for 3—5 months.

The effect of the dead queen presence on bees was tested on the basis of the ovaries condition of bees in the experimental colonies according to the scale recommended by Hess.

The results obtained within the 14 experiments made in the course of 3 years showed that the small bee colonies had a behaviour like that of organized communities including the retinue behaviour the queen being always surrounded by bees which touched it constantly with their antennae and proboscis.

The inhibitory effect of the dead queen changes depending upon the time. Thus the one-year dead queen inhibits ovarial development in 82% of bees accompanying it, the two-year dead one in 59% and the three-year's dead one in 37%. No change was noticed in their behaviour and attractiveness.

In case of the presence of queens dead for 2 and 3 years, functional laying workers emerge and lay a single egg in every cell of worker bees or queen just like queens in normal bee colonies.

In interpreting the results obtained, the authors accept the assertion of Pain and Butler that the queen smell is one of the components

of its pheromon influence and draws the conclusion that the queen smell diminishes as time goes on and consequently its inhibitory effect, too.

The short analysis of these two papers points to the valuable contribution of their authors to explain the relations among the bee colony's members and their cohesion.

The paper of M. V. Jerebkin : "Physiological processes inside the large intestine of honeybee (Apis mellifica L.)" treats of a problem very little debated in the speciality literature. The author looks at this problem from the following more important points of view : the catalysis source, inside the large intestine, the catalysis activity degree dependent on the age of bees, bee colony's strength, food quality, seasonal variability of the catalysis secretion as well as the role it plays in bio-chemical processes taking place inside the large intestine.

According to the investigations of the author, the catalysis source inside the large intestine originates in the rectal glands. The catalysis peak activity is noticed in one-day old bees. Then it diminishes, reaching a somewhat constant level in bees 15 to 18 days old. In summer, the catalysis activity is twice reduced as compared to that in spring and autumn. As far as the colony strength is concerned, the catalysis activity in bees belonging to a small colony is greater than that in bees of a strong colony.

Differences have also been established in catalysis activity between different bees races and under the influence of food quality.

The catalysis role inside the large intestine is to decompose the hydrogen peroxide which is produced under the influence of an enzym compound (identified by the author) oxidating glucose which is similar to that of the pharyngeal glands studied by Gauch (1940). This glucose oxidizing ferment produces and maintains the acid medium inside the large intestine which inhibits the development of microorganisms. The peroxide obtained in this way is decomposed by the catalysis produced within the rectal glands.

The last paper we received in the form of a summary called "Some stimulators of the bees' pharyngeal gland secretion" belonging to Mr. Kresack presents comparative data on the effect of some pollen substitutes or antibiotics given the bees in a mixture of sugar paste and honey as follows : sulphite dried yeast 15%, aureovit (chlorotetracycline) 1%, proteolisatinus (hydrolisatum casseini enzymaticum) 5% and a mixture of proteic concentrations, according to prescriptions of the Research Institute Liptowski Gradeck branch, 15%.

The estimation of the effect of these preparations has been performed by measuring acini dimensions in mm.

Among the used preparations it was the protein mixture which proved to be effective. In utilizing it, the average acini dimension in bees increased by 114.76% as compared to that of the witness group of bees fed on sugar syrup only (0.1497 ± 0.0188 mm), respectively 0.01817 ± 0.0201 mm).

The author also realized the seasonal variability of the glands acini dimensions which are 0.1138 ± 0.0007 mm on an average in the summer generation of bees and 1.574 ± 0.0015 mm in the autumn generation.

The paper neither mentions the number of bee colonies composing the groups nor gives any explanations as to the fact that the witness group was given sugar syrup while the experimental ones — as it results from the work — were given sugar paste mixed with honey and stimulants. No details are also given on the components of the mixture which could be useful for interpreting the results.

We consider it to be useful for the author to give us supplementary information within the discussions.

This short survey of the four papers I reviewed could perhaps not reflect sufficiently the contribution of the authors to the field and consequently I suggest that both the authors and the participants in the discussions should co-operate in order to supply the eventual gaps of this report.

At the rostrum Prof. Dr. J. Svoboda *(Czechoslovakia), Honorary Member and Vice-President of Apimondia.*

REPORT I. E. ON METHODS OF BEE MAINTENANCE *)

(Papers No. 27 and 29)

Rapporteur : Prof. Dr **G. A. AVETISIAN**
U S S R

The wintering of bee colonies and queen is of outstanding theoretical and practical interest. Favourable wintering conditions are important not only for preventing bee losses during this critical period, but also largely ensures the development and productivity of the bee colonies during the subsequent season.

In order to ensure a successful solution to the wintering problem, the characteristics of natural conditions in the different zones and the biological features of local bees must be investigated and considered.

Scientists and beekeepers alike are actualy studying the wintering of different races and species of bees under different economic and natural conditions.

Two papers presented by Romanian beekeepers are devoted to this problem. The first refers to the "wintering of bee colonies with honeydew stores and additional candy supplies". The authors of this paper, Dr. Szöverdy Francisc (farming engineer — Agricultural Cooperative Dragu — Huedin, Cluj Region) and Texe Emeric (technical secretary to the Beekeepers' Association (Cluj), have carried out their researches in the conditions existing in the Cluj region.

Wintering in this region was ensured by food supplies containing supplementary honeydew, resulting in honeydew intoxication.

In 1958, there was an abundent honeydew harvest in the 21 investigated apiaries, 36% of which were affected by diarrhoea. As a consequence thereof, by the end of the wintering period, 8% of the bee colonies died.

In other years too, the occurrence of diarrhoea and increased mortality in bee colonies caused by honeydew were recorded. Researches carried out by the above mentioned authors proved that the proportion of 30% honeydew in the wintering food stocks, caused diarrhoea.

The authors also reported that honey from coniferae (f. ex. from spruce fir, *Picea excelsa)* does not cause diarrhoea.

On controlling the hives in the Borsec, Toplița and Harghita districts (Magyar Autonomous Region), the authors found that though the bees were fed on wintering stocks (supplies) containing 40 to 45% coniferae honeydew, wintering took place normally without causing diarrhoea to bees. Beekeepers in this region are particulary satisfied when-

* Original text in Russian.

ever the coniferae honeydew flow is rich ; they let it in the hives a winter supply for the bees. Beekeepers reduce the nest and isolate it carefully from cold.

In order to prevent the noxious effects caused by the wintering supplies containing honeydew from willows and oaks, the authors begun in the autumn 1956 in the Cluj branch of the Romanian Beekeepers' Association to analyse the food supply by means of the well-known alcohol method for determining the proportion of honeydew.

When honeydew is stored in the nest of the colony, 3 to 4 kg candy shall be placed above the wintering cluster. In connection with the weather conditions, supplementary food is given in November or in December. Positive results were obtained by employing this method, which was widely applied in the apiaries of the Cluj region.

The disadvantage of this method resides in the difficulty of replacing willow tree honeydew with high quality flower honey collected form the nest before the occurrence of honeydew.

Supplementary feeding on liquid sugar syrup, late in autumn, is likewise difficult because of the poor weather conditions.

Furthermore, the transformation of sugar syrup during the autumn season exhausts the bees, demanding a supplementary sugar consumption, which leads to an increased rate of mortality.

The authors recommend the following measures to remove the deficiencies and ensure adequate wintering in bee colonies where food stocks contain honeydew.

1. The organization of nest in bee colonies must take place at the beginning of October. In the middle of the nest are introduced the frames containing a smaller quantity of honey, on its borders frames with a bigger quantity of honey, so that each bee colony possessing 7—10 booways should be ensured with 10—18 kg of foodreserve. A certain quantity of bee bread too, must be left in the hive.

2. By the end of November or the beginning of December, when the wintering cluster is constituted, two or three small 1 cm thick laths are placed above the upper parts of the central frames over which a cake of candy is thereupon set. The nests will then be made tight with 8—10 layers of paper ; the end of the paper shall be folded so as to leave on opening aperture of 1 square decimeter for ventilation. A small straw mattress shall be placed over the paper. In weak bee colonies (4—5 booways) no ventilation from above is needed.

3. The sugar cake can be prepared in two manners : a/ by boiling sugar up to 117—118°C and by moulding it in forms, 26—30 cm long, 15—20 cm wide, 3—4 cm thick, weighing 3.5 kg, b/ by mixing powdered sugar with water (8%) and later pouring it into forms. The cakes are wrapped in paper which are pierced beneath.

At the beginning, the authors used the boiling method, but later on, when the Romanian Beekeepers' Association produced the "Apisan", biostimulator sugar, the second method was adopted. For the preparation of large stock of candy cakes, the authors recommend the mechanisation of the process.

When applying the first method, the equipment of candy factories can be employed. For the second method, dough mixers are recommended.

Experiments show that supplementary feeding can be carried out even below 0°C. The authors have tested the process at a temperature of 5°C. In this case, the candy cake must be heated up to 18—20°C before introducing it into the hive.

In order to determine the efficiency of the supplementary feeding with candy, the authors made experiments in the years 1962—1965 on two groups of bee colonies kept in Dadant-Blatt hives. The first group (12 colonies) was given supplementary candy whilst the second one was not. The results obtained after the experiments are included in the Congress papers.

Table 1

Results from bee colonies' wintering with food stocks and addition of honeydew, in case of additional feeding on candy and without it.

Wintering years	Group of colonies	The number of colonies			The number of dead bees per 1 colony	% honeydew	Food consumption per winter in kg.	Efficiency of honey-commodity in kg.
		In the group	With diarrhoea	Dead				
1	2	3	4	5	6	7	8	9
1962—1963	Experiment	12	0	0	90.6	12.9	4.8	16.2
	control	42	23	3	257.4	11.3	6.2	12.5
1963—1964	Experiment	12	1	0	120.4	29.2	4.3	19.7
	control	27	13	5	375.6	30.1	5.8	15.0
1964—1965	Experiment	12	0	0	72.0	16.1	3.4	23.9
	control	18	10	1	210.1	15.7	4.2	20.0
In average	Experiment	12	0.33	0	93.4	19.1	4.2	19.9
for 3 years	control	29	15.3	3	280.3	19.6	5.4	15.8

As this work shows, bee colonies in the forest zone, Cluj region, fod during wintering with food stocks containing honeydew, suffered considerable losses. If supplementary candy is supplied the mortality is reduced to one third, the honey consumption by 22% and the honey yield increased by 26%.

Considering the paper presented by Szöverdy Francisk and Texe Emeric of positive interest, we suggest that the above mentioned recommendations must be tested on a great number of bee colonies and the data obtained must be worked up statistically.

In carrying out these researches, it is desirable likewise to determine the degree of Nosema infection, as well as the overloading of the

large intestine with excrements of bees belonging to the experimental and control group as these indices are of great importance for an adequate wintering of bee colonies.

The second paper presented by A. Toshkov is a summary account dealing with the wintering of spare queens.

For this purpose, the author employed nuclei on three vertically divided half-frames of the Dadant-Blatt type.

The colony nest within the nucleus contains 200—300 g bees and a queen. This nucleus is made of a wooden box (inside dimensions $330 \times 233 \times 115$ cm) with a removable upper cover and a bee entrance at one of the lower corners of the front wall. In one of the lower corners of the window pane, there is an orifice which corresponds to the nucleus bee entrance, ensuring the outgoing of bees. A sheet of plywood is fixed on the innerside of the frame and outer side of the pane with a view to secure good thermal insulation ; the room between this plywood sheet and the window pane is filled with insulating material (fine packing wood fibre). In this case, a hole is made in the plywood exactly in front of the orifice of the window glass in order to provide a passageway for the outgoing of bees.

During sunny and warm weather, bees belonging to the nucleus come out through this orifice and fly together with the normal colonies.

In Toshkov's experiments by the above mentioned method, 25 queens were maintained during the 1958—1965 period. The queens overwintered well and in spring they were utilized for the completion of the dequeened colonies or for the formation of early station swarms. None of the 25 colonies were reported to have suffered from diarrhoea.

According to Toshkov's data, a colony (nucleus) with a spare queen will consume during the wintering period 250—300 g sugar syrup. The method recommended by the author was elaborated only for amateur beekeepers. It can't be usefully applied to industrial apiaries.

It should be pointed out that the number of nuclei used in this experiment is low, i.e. 25 queens throughout a 7 years period. In some years no more than 5 experimental queens were utilized and during 1964—1965 only one.

No final conclusions can hence be drawn, nor can any definite recommendations be made for applying the aforesaid method.

Though the problem of wintering bee colonies and queens as well as the high bee mortality is of overwhelming importance — the scientific institutions are paying too little attention to the biology of bee colonies.

At present only scanty information is available concerning the generalization of pratical methods recommended by beekeepers on bee wintering in various natural conditions.

We therefore welcome the initiative of the above mentioned authors for their contribution to the study of this important problem.

Attempts might be made to extend these experiments on a larger scale to include biochemical processes, as well as the study of the metabolism of bees as a biological unit. These experiments must be also

tested in industrial conditions in order to verify and improve bee wintering methods. A decrease in the mortality of bees and queens during the wintering period, the maintainance of their integral physiological capacity towards spring, the reduction of the consumption during the winter rest, represent a substantial reserve guaranteeing the increase in honey production and in the reduction of the cost price. These problems call for a special attention from the part of scientists and from beekeepers in general.

REPORT I. F. ON BEE BEHAVIOUR*)

(Papers nr. 6, 11, 21, 24 and 30)

Rapporteur : Prof. Dr. **M. LINDAUER**
FEDERAL REPUBLIC OF GERMANY

Each beekeeper should know in what sort of world his bees live in. It would be of real help if he would know that a bee eye, a bee antenna perceives in comparison with the human being in a totally different manner its surroundings. Its minute brain comprehends and interprets quite differently the impressions sit comes into contact with. Each live being can retain only a small part of the impressions it is surrounded with and which will be made use of for orientation in time and space.

The human eye for example can penetrate through the electromagnetic field, which extends from 10—12 (rays y) to 2 km (radio waves) only a limited distance of 400—800 m. The bee has its own world. The distinction of colours begins at 600 m only, or orange, blue and ultraviolet at 300 m.

For the moment we will take up the subject of the bee's unusual optical, chemical and mechanical gifts, as proved by recent researches. We shall then have something to say as to how these gifts are employed as guides for intercommunicating among the bees themselves.

1. OPTICAL-SENSE GIFTS

a/ COLOUR PERCEIVING

After it was established that bees could not perceive the red colour, but were sensitive to ultraviolet or the bee's own "bee-violet". The capacity for differentiating colours was analysed by superimposing ultraviolet to organe. The particular effect on the bee of ultraviolet mixed with yellow was apparent, hence a new indication on the effect of colour (Kuhn, V. Frisch, Daumer). Details regarding the eye cell facet as a distinguisher of each colour in particular are dealt with by Burkhardt, Autrum and V. Zwahl, who by introducing micro-electrodes in each eye cell and by making use of different coloured filters, have succeeded in establishing active potentialities. From the results obtained, it is evident that by this method one can identify four different sorts of eye cells, which in turn denote four maximums of spectral sensitivity, i.e. a yellow receptor (530 mμ), different receptors for blue-green (463 mμ), for blue (425 mμ) and for ultraviolet (340 mμ). The sensitivity diagram enables us to appreciate the bee's capacity for differentiating colours and hence conclude that the eye is better equipped for perceiving ultraviolet,

* Original text in German.

less equipped for blue-green, even less for blue and in case of yellow, there is no differentiation of colour whatever. The fact that the drone possesses only three sorts of eye cells : a receptor for blue-green, blue and ultraviolet, was a great surprise. The receptor for yellow is completely absent. The drones are blinded by yellow even though they do not frequent flowers. Their greatest sensitivity appears to be in the blue-violet field at 477 mμ and this corresponds to the colour of a blue-sky-maximum.

In this manner, the perception of colour by bees is skilfully applied in the life of the working bees and drones.

b/ DUSK FLYING

The activity of the working bee is limited (aside from temperature) in the morning by sunrise and in the evening by the setting in of dusk. In the evening, while on its last collecting flights, the bee, which has its feeding grounds at great distances, must be able to appreciate the exact time the dusk sets in. If in its return flight, dark will overcome the bee, its optical senses will be greatly hampered. My pupil, Schriber, has proved that bees are able to ascertain exactly at which stage of dusk they must return to the hive. In the evening, their last flights to the artificial feeding grounds take place at approximately 2 Luxi. If two maintenance feeding grounds are kept for bees, one at approximately 50 m and the other at about 4 km, the far-out collecting bees will return to the hive far earlier than those in the near-by feeding ground. It will be observed that before ending their flight, they fly around the entrance and after establishing the exact state of the light, they will enter the hive. In the morning, the far-out and near-by collecting bees leave the hive expecting the imminent sunrise. We must consider the bee's guiding gift as being very high indeed. They have proven that they can foresee future events prospectively. Considered biologically, it is remarkable that parallel with better quality the risk in nectar collecting increases.

Such guiding gifts indicate a very precise sens of measuring time. Mr. Schriber has identified the "O" cells : if cells 0, 1, 2 and 3 are brushed over with black point, the collecting bee becomes confused and as a result interrupts their collecting far too soon. It is also to be noted that these observations fit in fine with the results published by Autrum and Metschl, i.e. that when dusk sets in the cells serve as a guiding agent for the sight organs.

2. THE PERFORMANCE OF THE CHEMICAL SENSE.

For bees, the chemical factors are similar to the optical ones. Recent microscopical studies have established the fine structure of the receptors, the electrophysiology of the olfactory sensillas and the guilding capacity of the bees' antennae in a perfumed plain.

The bee's antenna is foreseen with nine different types of sensillae ; they serve for the perception of scent and taste, humidity, temperature and CO_2. As receptors for scent, Lacher has so far been able to establish for certain only the pore "plates" (sensilla placadea). There is a lot more to be learned regarding the physiology of the remaining sensillae. Martin, has given us the first indication regarding the importance of the bee's antenna as a perceptive organ.

We can understand its guiding capacity only if we take into consideration the following factors :

1) It is mobile,

2) It is plainly visibile on the body,

3) It is structured in a pronounced bipolar fashion,

4) The scent receptacles are intimately connected to the mechanical receptacles.

The mobility and bipolarity of the exposed antennae make possible a clino-tactical (successive) and a tropo-tactical (simultaneous) adjustment in the perfumed field.

Putting into practice the results of this by-lateral cumulated knowledge an exact and rapid attainement of the proposed scope can be obtained.

Observations derived from experimental tubes in the form of Y, containing whole bodies, bees with a single antenna and bees whose antennae were tied over the bee's head, justify the following conclusions : bees submitted to any one of these operations, were still able to discover the perfumed sources but, when they were deprived of one of these guiding factors, great delays were observed in their orientation flights.

The experience conducted to establish the "cross" effect in tropotactical adjustment in the perfumed field, in doubt for decades, led to the supercrossing of the antennae. These bees had an "inverted" sense of orientation. It was established that only 3 mm between the ends of the crossed antennae were sufficient to create the false impression of inversion.

For the study of tropo-tactical adjustment, the exact weight concentration required to balance the right and left side of the body was conducted by introducing the antennae in fine glass tubes filled with perfumed oil of varied concentration. In those cases where the initial concentration was low (1 : 100 000) the required balance between left and right was 1 : 2,5 and in those cases with larger concentrations (1 : 1000) the minimum report was 1 : 10.

A strange world would be offered a bee if it were to employ both senses simultaneously, scent and touch. Forel spoke of the "tipochimical" touch, von Fritsch of the "plastic scent". Martin has himself performed several experiences in this direction.

When feeding on an artificial flower, the bee must learn by stages the different perfumes (which it actually does, if one specific sort of perfume is introduced in the flower's tube). The training will succeed

only if the antennae will be able to rithmically feel the perfumed end. The touch organ at the end of the tentacle adapted to chimo-reception, plays an important role.

That the second guiding component — topo-chimical-plastic perception of perfume — has ist own signalling value, is evident from the successes obtained when training on varied tactile models.

Other researches must further prove in exactly what manner these topo-chimical touch performances influence the sense of orientation on the bee's return flight to the hive.

3. THE PERFORMANCES OF THE SENSES OF WEIGHT.

While the anatomy and physiology of the optical and chimical senses have long been known, the senses of weight have for a long time remained undiscovered. This is easily understood, inasmuch as these are based on operating principles altogether different from man's statolithic organs. The head and abdomen are used as "stato-lithes". Inasmuch as these two organs are loosely attached to the thorax they can move in all directions on a "cushion of senses" in a scissor like movement, which will indicate the body's position in space.

Unusual heavy burdens are placed on these weight organs when the pro-direction rithmical dance is performed. In the field of gravitation it is essential that we succed in transposing the exact angle between the feeding grounds and the sun. On closer inspection errors of small importance were comitted in this operation. We are aware today that this was a question of misinterpretation, inasmuch as there do exist accepted deviations from the angular division set-up in the field of gravitation. The bees do not employ a uniformed system of 360° but an ingenious graded physiological system which fits in exactly with the increased agitation in the inclined versus the vertical position.

At the end of this communication, I will refer to certain aspects of the bee's performances which are intended to define this insect as a social being.

Istomina Zwetkowa has studied this problem with patience and perseverence and has concluded that the tasks assigned within the hive are partly dependent on individual inclination and the others on social cooperation.

A number of experiments were conducted with several pairs of bees and the results thereof were made available : Table one indicates that the two bees (No. 1 and 2) varied their tasks. Bee No. 1 became a conscientious nursing bee, bee No. 2, a very convinced cell cleaning bee. The second pair of bees reacted as follows : Bee No. 2 began its collecting activity as early as the fifth day of its existence and another, No. 8, only the 15th day.

The author explains the latter's behaviour as a result of the bee's lack of contact with the rest of the bees in the hive. This was clearly evident in the case of the removal of the queen. The joint activity of

the bees decreased, respectively (34% and 23%). Two-three days later, bee No. 1 became more active — only 1% of its time was used for resting — while bee No. 2 refused to increase its activity. It would be interesting to observe the behaviour of the hive as a whole in this state of orphanilization. In the first place one should establish how much this fact is involved in the bee-egg-laying process.

Taranov and Sedin (USSR) have studied the behaviour of scouting bees for the purpose of establishing the best means of attracting the bees within the shortest possible time to the new feeding grounds. It is insufficient to use as temptors bees captured within the feeding grounds or at their water-feeding place.

The bees should be actively tempted by making use of honey-filled frames. Other temptations employed are : perfum, colour etc. means to which the older collecting bees react favorably.

Another good source of temptation is the use of perfumed sugar syrup containers in the feeding grounds.

To conclude, we will recall a study made by Ishay (Israel), indirectly connected with the collecting bee, but of interest to both the bee-keeper and the biologist. It treats the subject of the bumble bee family biology. In Israel the bumble bee is the declared enemy of the collecting bee.

Ishay has succeeded in the artificial rearing of bumble bee families. They were kept under observation in special boxes. He should be congratulated both for his courage and patience in making these studies which brought to light interesting facts about the bumble bee biology.

The mating takes place on plain boards or any other solid object. More than one male can take part in the mating of a single female. Mating conditions are similar to those in the bee families, i.e. the queen will not tolerate another queen in its neighbourhood. If however, the queen's needle is removed, then the two rivals will tolerate each other and the working bees will accept them both. During the peak of summer and toward fall, when the younger generation mates, the fighting instincts of the females diminish and the young and old females live in harmony with each other.

The bees are the preferred victims of the bumble bee. At the beginning it collects its victims at the hive's entrance, later it penetrates into the interior and often destroys whole families, larvae and bee honey reserves as a whole.

The bees imported from foreign sources are totally exposed in Israel. The native bees have two remarkable methods for defending the hives against theft :

a) They limit their flying hours in the moring and late evening hours — the bumble bee is then totally inactive.

b) They form a powerfull chain of defense at their hive entrance. Even the most aggressive bumble bee cannot penetrate through their defensive screen.

SYNTHESIS OF THE DISCUSSIONS ON THE PAPERS PERTAINING TO THE COMMISSION ON BEE BIOLOGY

Joint chairmen of the first working meeting :

Prof. Dr. G. A. AVETISIAN, *U.S.S.R.*
Prof. M. HAYDAK, *U.S.A.*
Dr. A. HANSSON, *Sweden*
Prof. Dr. M. LINDAUER, *Federal Republic of Germany*
A. PORTUGAL, *Brazil*
CEAN-CE-SUN, *Korea*
Prof. Dr. J. SVOBODA, *Czechoslovakia*
A. TROPPER, *Austria*
Dr. J. WOYKE, *Poland*

Prof. Dr. M. HAYDAK is in the chair

After his opening the first working meeting of the Commission on Bee-Biology, Prof. Dr. M. Haydak gives the floor to Dr. J. Woyke who expounds his synthesis report on bee genetics.

Prof. dr. F. Ruttner (Federal Republic of Germany) also gives his synthesis report on bee races and their selection.

Prof. M. Haydak expresses his thanks to Dr. Woyke and Dr. F. Ruttner for their reports and opening the discussions gives the floor to Dr. Woyke who wishes to learn how it is possible to explain the fact that different results were obtained in the case of the crosses of yellow and black races. He knows that Dr. Roberts M. is present and can explain competently this problem.

The second question refers to the correlation between the proboscis length and honey production and the third matter ; how could we explain the fact that the individual activity of the hybrid bees is similar to that of the maternal offsprings.

Then the delegate of South Africa takes the floor and in moving words says among other things : "I am really very delighted with this travel coming from my distant country and covering over 10.000 miles. I am impressed by the people in Bucharest who are all wonderful, everybody being just too kind to me".

He further states that the beekeepers in Transvaal of the Republic of South Africa asked him to inform the Congress of the wax moth problem existing in their country in order to examine it and that the promissed to bring them documentary material as to what is possible to do in this connection.

Prof. Dr. M. Haydak asks some of the authors who have dealt with the problems raised by Dr. Woyke to elucidate these aspects. He thereafter gives the floor to Eng. N. Foti.

Eng. N. Foti shows that Prof. F. Ruttner in his report of speciality presented to the Congress expressed his opinion that the native bee in Romania pertains — according to morphological and biological indexes — to the spreading area of Carniolan bee.

The opinion that the bee from Romania belongs to the Carniolan race was enunciated about 30 years ago by the well-known scientist and expert in the bee race problems — the late Prof. Göetze ; in his geograms the Romanian territoriy is included in the spreading area of the Carniolan race. To his knowledge these geograms have been worked out on the basis of 3—4 samples originating from the eastern part of Romania. The work by the Central Apicultural and Sericicultural Station presented to the Congress which prof. Ruttner was willing to analyse aimed at establishing whether or not the bee from Romania is included in the Carniolan

race area. The authors of this work aimed at studying — besides and parallel to the morphological features — the biological ones which can easier be compared than the former. According to the authors' opinion of the local bee both from a morphological view point and especially concerning the biological features, between the Romanian bee and the Carniolan race, there is at least as great a difference as there is between the Italian Ligustica and the Carniolan bees. It results from the data presented that in respect of the cubital index and the corporal structure we are between the Carniolan and apis mellifica.

The meeting recesses for 15 minutes after which the proceedings of the IInd meeting are resumed.

Joint chairmen of the second meeting :

Dr. W. ROBERTS, *U.S.A.*
Dr. V. FILIPOVIC, *Yugoslavia*
Eng. N. FOTI, *Romania*
Dr. S. GRINBLAT, *Argentina*
Dr. BÖTCHER, *Federal Republic of Germany*
Prof. ORÖSI PAL ZOLTAN, *Hungary*
QUENAN NURI, *Albania*
Dr. J. N. TENNENT, *Scotland*

Prof. Dr. W. ROBERTS (U.S.A.) is in the chair

In resuming the proceedings of the Commission on Bee-Biology, Dr. W. Roberts gives the floor to Prof. M. Haydak (U.S.A.) to submit his synthesis report on bee nutrition and physiology.

Prof. M. Haydak finishing his report, Dr. Roberts announces the synthesis report on the pheromones and functions of some glands in honey bee submitted by Eng. N. Foti (Romania).

This report being read, the chairman gives the floor to Prof. Dr. G. Avetisian (U.S.S.R.) who expounds the synthesis report on the wintering of bees.

Dr. W. Roberts thereafter announces Dr. Lindauer who expounds the synthesis report on the orientation and mutual communications in bees.

As time is running it is decided that the questions and discussions be short.

Eng. V. Leandru (Romania) puts two questions to Prof. Lindauer if he established the causes which resulted in the differentiation of eye in worker bees and drones and if he made research in this respect on the wild bees living in forest.

Dr. Roberts gives the floor to Prof. Dr. M. Lindauer to answer these questions.

With regard to the first matter, Prof. Dr. M. Lindauer states that the problem is as complex as possible and in order not to slip to hypotheses he gives it in charge of other expert colleagues.

As to the second question concerning the forest bees, he emphasized that he has carried out researches in this respect and ascertained that the behaviour of forest bees do not differ from that of normal bee colonies.

Then Dr. W. Roberts winds up the proceedings of the Commission on Bee Biology stressing that they have been interesting to all of the participants and the meeting has taken place in the most favourable conditions.

COMMISSION ON MELLIFEROUS FLORA AND POLLINATION

PRESENT STATE AND FUTURE DEVELOPMENT OF MELLIFEROUS FLORA AND POLLINATION PROBLEMS

SPEECH BY Prof. Dr. **N. M. GLUSHKOV, USSR**

Chairman of the Standing Commission on Melliferous Flora and Pollination of Apimondia

Nowadays in the highly developed countries, apiculture loses its autonomy and becomes an integral part of agricultural production in its totality. This process takes place by the strengthening of economic connections between apiculture and the other branches of agriculture. The development of phytotechnique and zootechny usually leads to the reduction of surfaces with wild plants, used by bees as collecting source. At the same time the sowing of a series of cultivated plants serves at present, in many countries, as the main source of the bee food.

Prof. Dr. N. M. Glushkov (U.S.S.R.) *member of the Executive Council of Apimondia and chairman of the Standing Commission on Melliferous Flora and Pollination, at the rostrum.*

The extension of agricultural crops to the detriment of the surfaces occupied by entomophilous plants does not yield good results for apiculture. At the same time, in exchange for the nectar and the pollen which bees collect from cultivated plants, agriculture requires from us, apiculturists, in an ever increased measure the pollination of cultures by bees, so as to obtain large fruit and reed harvests.

The flowers pollination by bees is carried out tangentially if we may say so, namely on the occasion of the collecting by bees of nectar or pollen. But it is well-known that even in this case, not all is to the advantage of apiculture. Let us take, for instance, red clover. This culture is in great need of bee pollination, so as to obtain a great seed harvest and at the same time, the red clover nectar is hardly accessible to bees, so that generally they collect very little honey from red clover. In a series of such cases, pollination gives an additional fruit and seed harvest whose quantities are, unhappily, difficult to assess, while at the same time it brings in a small direct apiarian income, while sometimes it leads even to a decrease in the total quantity of collected honey.

The above presented facts raise before us a series of particularly important problems in connection with the increase in profitableness in our field of activity. This problem can only be successfully solved by the common efforts of the specialists and practicians from the different countries, both in the field of apiculture, as well as of other branches of agriculture. The solving of many problems may be hastened by the intense activity of our commission in the field of apiarian flora and of pollination and particularly by joining apicultural and agricultural interests, without which no important successes may be achieved.

Thus, in front of us stands the task which preoccupies us that apiaries should join much more efficiently pollination activity with a fairly high level of honey collecting, as by using the bee families in pollination, the cost price of entomophilous cultures production will be considerably affected. Therefore plant growers try to reduce the use of bees in pollination, a fact which yields negative results both in the growth of cultures, in phytotechny, as well as in apiculture.

In connexion with what was expounded above, the melliferous flora and pollination commission proposes a series of measures which, on the one hand, have in view when necessary, the solving of problems connected with the improvement of the apiarian fodder basis by way of joining the interests of our branch with those of the other branches of agriculture. On the other hand, these measures aim at raising the economic efficiency of the pollinating activity of bees.

In connexion with the improvement of the melliferous basis, the commission considers it necessary to develop in about the next three years its research activity in the following directions: 1. to study the mechanism of nectar secretion by plants, for intensifying this flower function under the influence of various reactives; 2. to determine the kinds and species of cultivated plants, characteristic for their high nectar production, and which are frequently visited by bees, a fact closely connected with selection; 3. to devise the best agrotechnical growing devices for entomophilous agricultural culture, by way of establishing

sowing terms and possibilities, choosing the best macro- and microfertilizers and other means, having always in view the growth of cultures from the point of view of nectar production.

Besides what was shown above, the commission stipulates for the accumulation of data to contribute to the drawing up of maps of melliferous resources. The measures providing for the increase in bee pollination activity efficiency should, according to us, be elaborated by way of specifying the number, profitable from the economic point of view, of medium bee colonies per surface unit of entomophilous agricultural cultures, cultures which necessitate pollination effected by bees in various ecological conditions.

Great attention should likewise be paid to problems of great perspective in using bees in view of obtaining seeds with high productivity for hybrid plants by way of repollinizing by bees kinds and species of parental plants. At the same time it is necessary that the methods for establishing the pollinating efficiency by bees for the various agricultural cultures be definitized, so that all growers (phytotechnicians) may easily realize in what measure they are pecuniarily rewarded for the pollination activity of bees.

For contributing to the realization of the research programme set forth, the commission has stipulated a series of measures of which we shall mention only some. For the period 1965—1967 the organization of three symposia is planned : in New Zealand for the problem of the pollination by bees of fodder grasses used both for sowings in field conditions and for the improvement of hayfields. In USSR — in connection with the specification of norms, profitable from the economic point of view for the bee colonies in the pollination of the various entomophilous agricultural cultures and, in the first place, of the fruit bearing ones, as well as in connection with the inventarying of melliferous resources, with the characterization of the types of nectar flows and with the typological classification of regions from the melliferous honey-yielding point of view.

The last problem is of a particularly great importance from the productive point of view ; it is probable that the exchange of opinions will give the possibility of elaborating some practical recommendations in this domain. At last, at the symposium in India, we deem necessary that the cycle of problems be analized, which are connected with the hybridization of cultures by means of repollination by bees of varieties and species of parental plants ; and likewise to discuss, proceeding from the example of this country, the means of studying the melliferous flora and of using with a higher profitableness coefficient the natural basis for bee food.

The materials for the above symposia will be published which, undoubtedly, serve the proposed aims.

It should likewise be reminded that the specialists from USSR have prepared technical guides for the various problems of fodder basis and the organization of using with a high profitableness coefficient of pollination by bees of certain entomophilous agricultural cultures. The guides elaborated on connection with these problems will be sent, after due approval, to every country. In the 3 following years, the commission will

contribute to the elaboration of some similar guides, so that these may be used in various countries for practical purposes, keeping in mind climate particularities, methods applied in agriculture and other local conditions.

Finally, I inform you with particular satisfaction that in problems with which our commission is dealing, 38 reports have been presented, which will be made known to you by the reference delegates of the Congress. The reports presented correspond to the assignments which I had the honour to present to you and which create great premises for the future research activity in the fundamental directions set out by the commission.

In connection with the reports presented to the Congress, we hope that they will give rise to discussions during which appreciations will be made about the work done and new ways will be traced for future researches in view of their deepening and widening.

We consider that the orientation of our activity about which we have spoken, together with the common efforts of the participants to the present Congress will lead without delay to the realization of favourable results and will fully contribute to the development of apiculture in its organic connection with agriculture. In this way our purpose will be fulfilled as regards international collaboration, both in the interest of the development of world economy and in the purpose of peaceful co-existence.

SYNTHESIS REPORTS

REPORT II. A. ON GENERAL CONSIDERATIONS CONCERNING NECTAR YIELD*

(Papers No. 11, 25, 26, 29 and 34)

Rapporteur : Dr. **ANA MAURIZIO**
SWITZERLAND

The presidium of today's Congress delegated me to prepare the synthesis of some papers presented to the Congress, concerning the nectar secretion.

I personally think that it would have been better for the authors to have had the opportunity to personally expound their papers to the Congress, as it is very important for the scientific co-workers to know each other better.

The papers which were distributed to me are first and foremost works of general importance. Therefore, I shall take the liberty to group together those 5 papers distributed to me as part of present knowledge about secretion and investigations on nectar. Nectar is a sweet substance secreted by certain glands of the plant, the nectaries. The nectaries can have various shapes and can be placed on any of the aerial organs of the plant. As to the frame, there are distinguished nectaries with shape and without shape.

As to the position on the plant, there are floral and extrafloral nectaries. As far as their structure and function are concerned, the floral nectaries (those placed inside the flower) and those extrafloral placed on different other organs of the plant, on leaves, carpels, stalk of the leaves, bracts, stems, are very similar one to another.

In both places of the nectaries, there is the secretion tissue made of small cells with thin walls with many fibres, being often fed by special branches of the leading fascicles. The nervures of the nectaries can be of different kinds. They determine the content in sugars of the nectar, hence they determine too the attraction of insects for the respective species of plant.

The nectaries, the most of which are connected to the blast vessels (the phloem), secrete a nectar rich in sugars that can contain up to 70% glucides ; the nectaries fed by the wooden vessels (the xilem) secrete a nectar poor in sugars, sometimes only 5% sugars, considered as water by bees.

The fibrilous juice which runs into the plant and carries the photosynthesis products, constitutes the nectar source, but it is not identical

* Original text in German.

with nectar from the chemical point of view. A proof for the fact that nectar is a genuine glandular secretion of the nectaries is the chemical composition of the fibrilous juice and that of nectar. The fibrilous juice always contains a larger quantity of nitrogen compounds or it contains sugars different from those of nectar. The nectar secretion is closely linked to the plant metabolism and its enzymatic processes. The separation of sugars is produced in so for as it can be considered as elucitated this extremely complex process, by phosphorescing. Sugars are less suitable to be conveyed and therefore sugars contained in the fibrilous juice before being secreted in the nectaries, combine with phosphates forming saccharose phosphates,under which form they are afterwards secreted. After their secretion, saccharose phosphates are again transformed in sugars on the enzymatic way.

For the nectar secretion energy is consumed and together with it oxygen of the surrounding air. A proof is that without oxygen, the nectar secretion is inhibited or totally stopped. The inhibition of secretion can take also place as a result of the intoxication of the nectaries, for instance, with potassium cyanide or other toxic substances. Therefore, the nectar secretion is closely linked to the plant metabolism, its breathing and photosynthesis.

General problems are treated in the paper announced at the Congress by O. A. Zaburalov under the heading : "The relation between breathing and nectar secretion". We know from the previous works that the nectaries breathe more intensively than the other parts of the plant.

Mr. Zaburalov in his work describes a series of experiments made on Asclepias — Seidenpflanze nectaries — for settling the influence of certain substances upon the change of the adenozintriphosphoric acid, ATF and 2—4 dinitrophenol, DNF. It was noticed first of all the relations between secretion and the different stages of breathing, namely the phosphorescing of sugars by using adenozintriphosphate, glycolisis and the formation of tiuric acid, the Krebs cycle an the hydrogen oxidation in the presence of free oxygen.

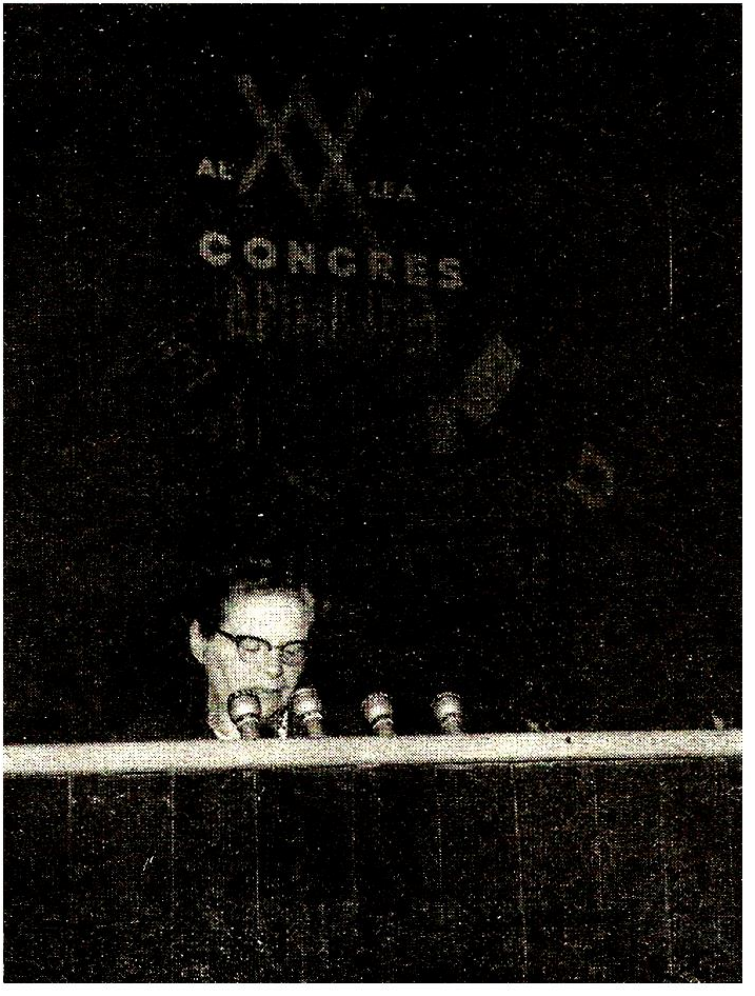
The results of this work allow the drawing of the following conclusions : 2—4 dinitrophenol inhibits the secretion of nectar and sugars, hindering the formation of the adenozinphosphoric acid, which has an influence upon breathing and phosphorescing.

By adding DNF at the beginning, it is accentuated the breathing which afterwards during the experiment it is inhibited up to total stoppage of secretion. The malonic acid inhibits up to a certain degree the nectar secretion and the breathing.

Dietilditiocarbonate exercises an influence upon the nectar secretion and modifies the breathing of nectaries. Paraminotriphenol inhibits the nectar secretion, yet having a very small influence upon breathing. The sodium fluoride inhibits both the breathing and the nectar secretion. All these phenomena are based on the inhibition of certain important enzymes for the breathing and for the sugars phosphorescing. The authors have noticed that the effect of the ATF and DNF substances

points to a close correlation between the first breathing stage, phospho rescing and the nectar secretion. The inhibiting effect of the sodium fluoride and the malonic acid shows the connection existing between the nectar secretion and glycolisis, as well as the Krebs cycle. The authors point out regarding those above, that this knowledge will eventually offer in practice the possibility to increase the nectar secretion by exercising an influence upon the breathing of the melliferous plants.

In the scientifical researches, the nectar secretion is expressed by the quantity and concentration of sugars and by the index (coefficient) of sugar calculated from these two values. The notion of the sugar index (coefficient) was created by Dr. Beutler, and it is about the quantity of sugars separated from a flower during 24 hours and expressed in mg.



Dr. A. Maurizio *(Switzerland) at the rostrum*

The methods for obtaining nectar and the plotting of the experiment results are very different with various authors, so that the results cannot be directly comparable.

Therefore, Dr. Shuell from Canada, in the capacity of chief of the working group of "nectar research" — by the International Commission for the melliferous botanics of IUBS, studied two years ago the most wide-spread methods and he made proposals for a unification of (typifying) the results obtained in the nectar investigations. According to these, in the nectar analysis it is imposed to indicate always the quantity, that is the weight of the nectar secreted, as well as its concentration in sugars depending on time and flower unity.

The proposals can be obtained from Dr. Shuell if they are of some interest.

Different factors depending partly on the plant, partly on the surrounding conditions, influence the nectar secretion.

Among the factors depending on the plant are : the structure, the position and the nervures of the nectaries, the age of flowers, position of the plant in the system and connected to it, the biological systems of the flower, as well as the genetic origine. It is well known that the big flowers with large areas of the nectaries secrete a larger quantity of nectar and sugars than the small ones. Partly it is on these that are based the differences between the nectar secretion in the di- and polyploid forms of the same species of plant. There are sensible differences among the different species and varieties of cultured regarding the nectar secretion, conditioned by genesis.

We only mention among the authors who have worked in this field: Beuther, Schöntag, Boetius, Rheil, Shuell, Percival and myself. Among the papers presented to the Congress, that of Mr. Polisciuc on "Increase of nectar secretion by selection" deals with the problem regarding the influence of the size of the flower upon the nectar secretion and the possibility of increasing the nectar quantity produced by selection. The investigations were carried out on the Phaceltatanacetifolia, using the washing method, founded on the premise that within a variety there is a wide variability regarding the nectar secretion. So, for instance, in 10 Phacelia varieties, morphologically different resulted variances of the nectar secretion between 0.33 and 0.51 mg sugars per flower, in 24 hours.

The plants secreting large quantities of nectar are characterized by big, light colour flowers. On the other hand the plants with small dark colour flowers secrete more reduced quantities of nectar and sugars. Therefore, according to this author the light colour of the flower is in relation with the higher nectar secretion. It has also resulted from the investigations that the big flowers yield a nectar quantity which overpasses by $1^1/_2$ or even more that produced by small flowers ; then that the flower size and colour, that is the nectar yield is directly transmitted to the offspring. The individuals yielding a large nectar quantity come from heavy seeds, while those with more reduced nectar secretion from seeds weighing 2.2 g per thousand, secrete up to 31% more nectar

than those coming from lighter seeds, weighing 1.82 g per thousand. The big and heavier seeds are formed on the bottom of the inflorescences, and the lighter seeds on the top of the others. This observation constitutes the basis of selection for the author, that is he succeeded in cultivating from the big seeds genetic staks of Phacelia with big flowers and abundant nectar secretion, rich in sugars.

But the quantity of nectar depends to a large extent on the surrounding factors among which : the soil and air humidity, the soil structure, manuring with fertilizers, the duration of the day and the duration of the solar irradiation. The influence of the surrounding factors upon the nectar secretion constitutes a very complex problem and the investigation of its influence is imposed to be made upon different aspects. For instance, the influence upon photosynthesis, that is upon the formation of the raw materials for the nectar yield ; the influence upon the development of the plant before and during the flowering and the influence upon secretion itself.

The influence of the surrounding factors upon the nectar secretion can be appreciated only in connection with those three factors. As fourth factor : the differences regarding the reaction of different kinds and species of plants are associated under the surrounding conditions. Generally, it can be stated that all factors which stimulate the plant development and photosynthesis exercise also a positive influence upon the nectar secretion.

Those mentioned above are valuable first and foremost for the solar radiations, the soil structure and the soil manuring with fertilizers.

A brief survey of the present knowledge in connection with this complex of problems, accompanied by a reference list, was published in 1964 by Dr. Shuell in the magazine "Annales des Abeilles", vol. 7, pp. 5—12, 1964.

Two of the papers presented to the Congress, namely that drawn up by Mrs. Szklanowska (Poland) and Mr. Montgomery (USA) deal with the influence of the surrounding factors upon the nectar secretion.

Mrs. Szklanowska made her experiments between 1955 and 1961 on the Dracocephalum moldavicum field cultures, using the harvesting method with pipette and using the varieties with blue and white flowers.

For studying the influence of the day length upon the Dracocephalum plants, the authors sowed twice per month, examining the plants into the yield of nectar and sugars.

The results obtained by the authors are the following :

The white flower variety has a higher yield of nectar and sugars than the ordinary blue flower variety, but the concentrations of sugars in nectar is more reduced. The flowers in the female stage secrete a larger quantity of nectar but with a more reduced concentration than the flowers in the male stage. The highest values of the nectar secretion, as well as the most intense watch of the flowers by bees were noticed during midday between 12 and 14 o'clock.

The authors noticed that the Dracocephalum is a plant exclusively of long day, hence in the most preferred months it secretes more nectar with a higher content in sugars. The plants developed and flowered more quickly, the flower lasting 3—10 days more in belated crops than in the early crops.

It was noticed higher indices (coefficients) of sugars in belated crops.

In the trials to manure with fertilizers, only potassium exercises a direct influence upon the nectar secretion, while nitrogen and phosphor have a secondary influence upon the nectar quantity secreted and namely by increasing the number of flowers. This paper will be soon published in French.

There are very interesting the experiments made by Mr. Montgomery on Antirrhinum majus (snap-dragon) and Medicago sativa (lucerne) as the author used for this purpose air-conditioned rooms, with the surrounding conditions controlled. To these investigations followed those of Shuell in Canada, who studied the temperature and photosynthesis influence upon the secretion of sugars and the number of flowers. For measuring the quantity of nectar, the author applied the centrifugal method, and for measuring the concentration of sugars he used a refractometer. The experimental plants were held in air-conditioned rooms at 60, 70 and 80° Fahrenheit (that is 15.5°, 21° and 26.7°C) in case of Antirrhinum and at 10°, 20° and 30°C in case of Medicago sativa. The light exposure time was of 12, 16 and 20 hours. Details about this method are found in summary. It is also mentioned that the lucerne plants belonged to the same clone thanks to which fact there could be removed to a great extent the nectar yield variations, conditioned by genesis.

The results of these investigations can be summarised as following :

The maximum nectar yields were noticed at average tempteratures for *Antirrhinum* at 70°F (21°C), and for *Medicago sativa* at 20°C. The maximum light exposure time was of 16 hours for *Antirrhinum*, and 20 hours for *Medicago sativa*. Lucerne proved to be very sensible to short light exposure time ; when it was light exposed for 12 hours at 10°C and 30°C temperature it did not flower, and at the optimum temperature of 20°C it flowered but the flowers were rather scarce.

These investigations, carefully made, showed clearly that regarding the optimum conditions for the nectar secretion there are very great differences among different genera of plants. Therefore, the results obtained on a species of plants must not be generalised and transposed to another nectar giver.

Uncareful generalisations can lead to erroneous conclusions.

The last paper distributed to me belongs to Baliecka and has the heading : "The *Melilot* and *Phacelia*" Unfortunately, this paper, very interesting in itself, cannot make a part within the general works about the nectar secretion. The experiments were made under uncontrolled field conditions, showing the nectar secretion in kilograms/hectare and probably that the production of seed and sugar was of first importance

REPORT II. B. CONCERNING INCREASES IN NECTAR YIELD*)

(Papers No. 2, 10, 16, 17, 22, 23, 27, 28, 30 and 31)

Rapporteur : Prof. Dr. **N. M. GLUSHKOV**
U. S. S. R.

In the past, apiculture had a unique aim : production of honey and beeswax. Since the land alotted to cultivated plants was extremely limited — compared with the present situation — the bees collected nectar practically only from the spontaneous vegetation. That is why apiculture had in that time no connection with other branches of agriculture, being completely independent. But this situation changed gradually, as the reciprocal relations between apiculture and agriculture developed — process which is intensively in progress, — nowadays.

This process is rather complex. On the one hand the natural honey flow land is getting smaller owing to the fact that the area of cultivated plants is increasing more and more ; these plants may not feed the bees (e.g. the cereals) or may yield but little nectar (some fodder plants or fruit trees). On the other hand some cultures (as buckwheat, sun flower and others), that often occupy immense territories, provide abundant nectar and are sometimes the principal feed of the bees. Nevertheless the proportion of tilled soil, on which bees may or may not collect nectar, is often not favorable to apiculture.

The problem is more complex if we bear in mind the principle "service for service" ; indeed modern cropping practice cannot renounce to the pollination by bees which fact requires that apiaries be conveyed also to cultures such as red clover which provides practically no nectar, ensuring at the same time an increased seed production.

These conditions induce the beekeepers to reconsider thoroughly the problem of the fodder — base. From the passive utilization of existant sources we are compelled more and more to proceed to the active creation of a fodder-base for the bees. Therefore, in this way, and seeing that available land is limited, we cannot envisage the culture of specialized melliferous plants to a large extent because it is not economical.

On the contrary, succes can be achieved only combining the interest of apiculture with that of agriculture — in general. These ways are manifold and not all of them are dealt with in the paper. I have the honour to forward to you. Thus the problem of the pollination by bees being closely connected to the productivity of the apiary, will be treated in a separate paper. We are bound to analyse an important and complex problem : how to obtain good honey flow under present day conditions, combining the interest of beekeeping with the general requirements of agriculture. The present paper is a synthesis and an analysis of ten papers, concerning the mentioned problems, in various countries. They reflect different ways of research and we have taken the

* Original text in Russian.

liberty to group them as follows : 1/ The study of the influence of ecological conditions as well as other influences on the nectar secretion of the cultivated plants. 2/ The study of the nectar productivity of various species and varieties of cultivated plants related to the present problem of selecting plants that should yield large crops being also abundant nectar producers. 3/ The possibility of establishing fodder-bases for bees by cultivation of specialized melliferous plants and having also in mind the interests of other branches of agriculture.

According to data given by Kopelkievski (1961, 1964), Pelmenev (1961), and Burmistrov (1963), certain cropping practices allow a significant increase (20—40 per cent) of nectar secretion of the cultivated plants.

Within the frame work of the problems scheduled at the Congress, four papers are presented. G. V. Kopelkievski (USSR) in the paper headed "Nectar productivity of some entomophilous plants related to various rates of available soil water and fertilizers" points out the main conditions required by buckwheat and *Phacelia* to secrete nectar ; he proves that the nectar productivity depends to a great extent, on soil humidity, on temperature and fertilizers. These conditions quite agree with the general cropping practice. Thus, for instance, the administration of complete mineral fertilizers combined with a 60—80 per cent soil humidity, ensured an average yield of 43—57 mg sugar and 204—226 grains per plant (buckwheat) whereas the control plant which received no fertilizer (and the soil humidity being only 40 cent), yield only 24 mg sugar and 77 grains. It has been observed too that a high temperature of the air stimulates the secretion of nectar in buckwheat, only when feretilizers are administered and the soil is sufficiently watered.

G. A. Buhareva (USSR) shows in the paper : "The increase of nectar productivity of some entomophilous plants by administration of microelements" and agreeing with the paper mentioned previously, the great importance of using microelements in obtaining abundant honey flow with some cultures. Thus, for example, buckwheat seeds treated with boron before their sowing recorded the following indices : the sugar rate in nectar increased by 24 per cent ; the number of bees visiting the experiment plots increased also by 24 per cent and the grain crop recorded a 16 per cent raise. The administration of microelements proved equally favorable to red clover. Thus, the extraradicular feeding of this culture resulted in an increase of the sugar amount secreted into the nectar : 53 per cent when molybdenum was used, 49 per cent with manganese and 23 per cent with zinc. This fertilizing treatment resulted in an increase of the number of bees visiting the plots (17—32 per cent) and of the seed crops (14—15 per cent). Similar results were achieved with fodder horse bean and cabbage seed plots. Here again one has obtained an increase of interrelated indices — the sugar amount in the nectar, a more active pollination by the bees and due to it, higher seed crops.

T. I. Kaziev and S. S. Seidov (USSR, Azerbaidgean) presented the paper : "The nectar productivity of the flowers of some cucurbitaceae species in Azerbaidgean". The experiments were carried out on some

varieties of cucumbers, melons and water melons of this zone. A relation was determined between the amount of secreted nectar and the number of day light hours, the working period season the way and position of the flowers on the stalk. It was shown also that the total amount of sugar in the nectar, varies within wide limits (from 20 to 64 per cent) depending on the species and varieties, on the climatic conditions and the tilling technique. The administration of organic-mineral mixtures results in increased nectar secretion, and intensified visits of the bees and higher crops. The cucumbers for example recorded a gain of 31—55 per cent (according to weight).

C. Roşca, C. Rusu and N. Chiţan (Romania) in their paper : "The influence of X-rays irradiation of sun flower seeds on the nectar secretion" show the results achieved by this Roentgen-rays treatment. The optimum irradiation range was established. Small irradiation doses (200—2000 r) exerted a slight negative influence on the ulterior nectar secretion whereas 4000—6000 r doses brought on a 31—49 per cent gain of nectar secretion and a 63—86 per cent raise of the sugar amount. 9000—12000 r doses caused an obvious decrease of these indices. It must be stressed that the optimum X-rays irradiation dose contributes also to an increase of the grain crop (4—14 per cent).

It appears that these 4 papers deserve special attention in view of establishing the amelioration methods of a forage base for apiculture, therefore not producing any economic damage to the other branches of agriculture, but respecting their interests. Discussing these problems, it is important to examine the economic aspect of the proposed measures and on the other hand the possibility of their complex application.

Let us examine now the second cycle of problems. The Apiculture Institute (USSR) has shown (Kopelkievski, 1961) that by selection, the nectar productivity of the plants can be increased, yielding thus 25—30 per cent more honey on surface unit. It was also established that out of the different entomophilous varieties, there are some which yield 30—50 per cent more nectar than other varieties of the same species of plants. (Belozerov, 1956 ; Kopelkievski, 1961, 1964 ; Burmistrov, 1963). There are four papers devoted to this problem. The first is : T. Simidciev (Bulgaria) ; "About nectar productivity of some crops in Bulgaria". The author carried out vast experiments on the productivity of ten species of seed plants, of 50 kinds of stone-fruit plants and six kinds of sunflower. He studied the duration of the flowers, the frequency of the bees visits, the quantity of the secreted nectar, the sugar rate in the nectar etc. This work permitted to determine the quantity of honey the bees may collect from the studied plants per surface unit — and to come to important conclusions concerning the extremely efficient role of the bees in pollination. Thus, for instance the author shows that pear trees nectar has a small rate of sugar ; therefore the pear trees will be rarely visited by bees and thus only slightly pollinated, if there are in the neighborhood other more attractive fruit-trees. The above mentioned should be kept in mind. when scheduling the culture plan of a fruit tree farm.

A. N. Burmistrov (USSR) analyses in his paper "The melliferous value of some sunflower kinds", the results obtained with thirty kinds of sun flower, selected in the USSR. The author shows that it is necessary to include the nectar productivity indices among the indices considered when establishing new varieties of entomophilous cultures. The obtained data proved that — in contrast to some beekeepers' opinion — the oil content and the nectar productivity of a flower and of the culture in general are directly related. That means that in the sun flower a high oil rate is accompanied by a large nectar production whereas the early kinds that yield little oil, show also a lessened nectar production.

Z. Demianovici presented a paper entitled : "Comparative study of the nectar secretion, honey productivity and production capacity of five polish colza kinds". It is shown that these kinds are considerably different as far as nectar secretion and honey productivity is concerned ; this varied every year in function of the climatic factors. I regret to say that only the summary of this paper was available to me and the final conclusions are not clearly enough outlined in it.

C. Roşca, C. Rusu and S. Fischer (Romania) presented in the paper "Data on the melliferous value of some sunflower kinds, cultivated in the Jassy region" indices on the nectar productivity. They showed to a greater extent than the three above mentioned authors, the direct connection between nectar secretion and the pollination of the sun flower by bees. The paper is interesting and it deserves to be mentioned, notwithstanding some critical remarks we shall present later on.

We must lay stress on the fact, that the analyzed paper indicates, besides the total quantity of sugar, for every sun flower kind separately the rate of glucose, fructose and saccharose, the concomittant existence of these substances being particularly attracting to the bees. Owing to that, the kinds VNIIMK and SMENA, which yield nectar containing much glucose, fructose as well as saccharose are visited 1,5 to 2 times more by bees than the other two kinds. The authors show further that the sun flower secretes most of the nectar at the beginning and at the climax of the blossoming period. Towards the end of the period the sugar concentration in nectar decreases. It is therefore recommended to move the apiaries near the sun flower fields two or three days before the flowering period and not during the first half of the blossoming period as it was customary till now. We quite agree taking the apiaries to the sun flower field at the beginning of the flowering period is very useful but we object to their bringing before the apparition of the flowers, unless a preliminary study should prove this measure to be necessary. A series of researches conducted these last years (Snyder, 1946 ; Grout, 1950 ; Roberts, 1956 ; Karma and Yickery, 1960 ; Istomina-Tvetkova and Skrebţov, 1964) proved that when an apiary was taken to certain culture before the flowering started, the bees were not able to find their way to it at the beginning (to gather nectar), most of them visiting the flowers of the adjacent fields. If the apiary is transported there only after the flower apparition, the bees are immediately attracted by them. Based on these observations we think we ought to make

more precise recommendations about the transport of the apiaries near the sun flower culture, i.e. 2—3 days before the culture begins to flower.

Synthesizing the items forwarded by the four papers concerning the second cycle of problems, we must say they are interesting indeed and of practical value. A problem worth while being discussed is the necessity to determine the new indices, which correlate a high nectar productivity of the plants. This might create favorable conditions to the selection work in the above mentioned direction.

The third cycle of problems, treated by the two other papers is that of the special melliferous cultivation which besides increasing the honey production usefully cooperates with other branches of agriculture.

The paper of A. N. Melnicenko and V. I. Rodionov (USSR) "The nectarous-fodder cultures, a precious mean to improve the forage base of Apiculture", present recommandations for varied successions of nectarous-fodder crops, the principal culture being green fodder to which highly selected melliferous plants are added. The economical value of this mixed culture determines when advanced cropping practices are employed — an abundant green fodder yield (up to 300—400 q/ha) and an average production of 20—25 kg nectar sugar per ha. Therefore the possibility increasing considerably the honey production on the farms cultivating peas, vetch, indian corn and others for green fodder, without alloting special ground to selected melliferous plants (as for instance, *Phacelia*).

A great crop of green fodder and grains is obtained, when the components of this combined culture belong to various plant families and when the mass of the principal constituent exceed by far the mass of the added plants. Under these conditions the total yield increases by 25—50% and the principal component production by 15—120 per cent.

The added melliferous plants hinder the development of the weeds in the nectarous-fodder culture, eliminating them in a proportion of 50 to 60 per cent ; they increase the mechanical resistance of the stems of the plants, preventing their lodging ; they attract the entomophagous insects which in their adult form need nectar and pollen.

G. Mcedlişvili (USSR, Georgia) presented a paper on "The possibility to ameliorate the fodder base of apiculture related to the antierosion measures taken in Georgia". The author experimented on rough territory and chose strong melliferous plants which might also prevent soil erosion and slides. To this purpose in three different zones of the republic : a/ droughty, b/ excessively humid, c/ low temperature area, he studied the honey productivity, the blooming periods, the extent and frequency rate of the bees on numerous species of plants. The most prospective melliferous plants which might develop under the ecologic conditions of the three mentioned zones and might fight soil erosion and slides, have been selected. The first one is the yellow flowered sweet clover *(Melilotus officinalis),* a biennial plant, which grows well under drought conditions as well as on drenched soils and can also stand low temperatures.

Other future melliferous plants determined as useful by the author could be developed only in one of the three zones, according to local conditions.

Coming to the end of the communication, I wish to stress once again, that all the papers are related to the work of our commission; the honey flow increase of the apiaries under various conditions, I hope that in our ensuing proceedings, we will analyse some deficiencies of the papers, and discuss the prospective development.

REPORT II. C. ON RESEARCHES CONCERNING NECTAR SECRETION OF HIGH-PRODUCTIVITY PLANTS*)

(Papers No. 7, 9, 19, 21, 24, 35 and IV/20)

Rapporteur: Dr. **J. LOUVEAUX**
FRANCE

This synthesis report has been drawn up to the request of the Apimondia's Commission for Melliferous Plants to be presented to the XXth International Beekeeping Congress of Bucharest. It brings together the following papers concerning problems in more or less close relation with the melliferous flora.

1. Veliciko Nikolov Velicikov "On strengthening of the bee colony with view to using it for the acacia flow" (Bulgaria).

2. *Beekeepers Association of Korean DPR* "Honey production at the Liphen apiarian production cooperative Diagan district, Korea".

3. Dr. Koch — "The geographic distribution of the honey-pasture in the German Democratic Republic".

4. J. Milewski and K. Zajaczkowski — "Researches for selecting the lime-tree" (Poland).

5. V. K. Pelmenev, "Factors influencing the nectar yield of the fareastern lime-tree" (USSR).

6. Bogdan — "The organization and exploitation of the melliferous basis from the north of Romania by means of migratory beekeeping in an alpine area" (Romania).

7. Traian, I. "The melliferous plants of the mountain region" (Romania).

The above stated papers appear as a heterogenous whole both as regards form and substance. Two papers *(Velicikov and Koch)* have been presented only under the aspect of very short summary works which do not allow an analysis of the work done; we are therefore under the obligation to pass them practically under silence.

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* Original text in French.

If we consider the remaining five papers, we ascertain that they appear as descriptions or observations, but by no means as experimental works. On the other hand it is hard to see the difference between them which renders difficult the compiling of the synthesis report. This work is also complicated by the fact that certain authors do not hesitate to mix, in the same report, pure geographical descriptions, economical considerations, apiarian techniques and lists of melliferous plants.

The report which we will present will therefore be more a selection than a synthesis. It is possible to perform a synthesis only by confronting data on the same subject. Here, the presented works are too dissimilar to enable us to do anything but a selection of the elements which seem to us more capable of presenting some interest to the members of this Congress. To make it clear, we are going to effect, however, a regrouping around some of the most important points of the whole analysed works.

1. OBSERVATIONS WITH RESPECT TO THE LIME-TREE

The lime-tree, whose species are mostly visited by the bees constitutes a melliferous source extremely important in great parts of northern Europe, Asia and America. It seems however that the most interesting zone is the one which extends from Germany to Korea, passing through Poland and the USSR. (European Russia and Siberia). In this huge northern area, lime-tree forests are numerous, in opposition with the situation in western and southern Europe where lime-trees are generally dispersed. The population density and perhaps the different climatic conditions (predominant continental climate) may explain the fact that mainly only central, eastern and far-eastern beekeepers and research workers are interested in lime-trees.

Milewski and Zajaczkowski point out that Poland's Council of Ministers decided to plant 100 milions trees and 60 millions shrubs in the interval 1960—1969. 15% of the new plantations will be of lime-trees. The plantation of 15 millions lime-trees asks for reflexion and this explains why the Institute for Forest Researches of Warsaw decided to initiate a preliminary study. Indeed, each species and each variety of lime-tree is distinguished from others by its growth speed, general conformation, the season and intensity of flowering, the abundance and concentration of nectar etc., so many factors which are of great importance to the foresters and beekeepers.

In order to mainly favour the reproduction of best quality trees, a number of 587 lime-trees from Warsaw's parks and avenues were used as starting material to be selected. This mass of trees represented a great number of lime-trees species and varieties. During the years 1961—1964 observations were made on hight and diameter, shape of the crown, nectar yield and the visiting of flowers by the bees. The results of these observations are interesting : inside the same species considerable growth speed differences were established. On the other hand, it was established that the higher and slenderer the crown in comparison with

its width the higher the nectar production. The date of budding and the date of the leaves falling vary largely. Likewise the beginning and the duration of flowering are subject to important variations. It results that the total period of the lime-tree blooming, considering all the species represented at Warsaw — showed according to the years, a duration of 44—50 days, or an average of 7 weeks. Besides this an index for the intensity of flowering was established, i.e. the number of flowers per crown square meter. This index enables us to compare the intensity of flowering of all species and varieties of lime-tree and it was possible to find out that this intensity varies according to the trees and to the years. The highest flowering species is *Tilia euchlora* (2619 flowers/m^2), *Tilia cordata* (1816 flowers/m^2), *Tilia platyphylla* (1230 flowers/m^2) and *Tilia tomentosa* (1100 flowers/m^2). In the *Tilia euchlora* up to 11200 flowers per square meter of crown surface were counted.

In estimating the honey yield per sq.m of crown surface the quantity greatly varied not only among the species but also between trees of the same species. Expressed in sugar per sq.m of surface, it gave an average of 28,22 grs for *Tilia cordata* and only 10,75 grs for *Tilia platyphylla*. All *Tilia* species are actively visited by the bees. It was possible to confirm the toxicity of the *Tilia tomentosa* (white lime-tree) nectar.

The Polish authors propose to multiply by grafting the most indicated trees for both production of wood and nectar yield. It was also tried to select the lime-trees with the longest flowering period as well as other late flowering trees. Relying on the obtained results, the authors consider that a 40 year old lime-tree alley of one kilometer can yield 600 kg honey.

From this interesting study, we shall retain chiefly that the lime-tree group can lead to a very useful selection ending in a net improvement of the nectar yields. The grafting method begun with the most productive trees seems worthy of our attention since it permits us to avoid genealogical selection, especially hard to apply when it concerns trees of about 40 years of age. We shall point out however that authors did not mention the undoubted very important influence of the nature of the soil and the exposure of the trees retained for selection. These ecological factors must yet play an extremely important role.

P e l m e n e v from the Pedagogical Institute of Kabarovsk studied in this turn the Far-Eastern lime-trees. He tried to establish the influence of certain ecological factors on the nectar yield of these plants. Light seems to be a rather important factor ; the number of flowers and the nectar yield per flower may vary greatly depending on the amount of light recevied by the tree crown. As is expected, ample light ensures increased production. The most interesting point of Pelmenev's study — who in other respects may be accused of some lack of precision concerning the measurement methods used — is that concerning the variation of nectar production in lime-trees depending on their age. In the case of *Tilia amuriensis,* the trees ranging from 15 to 20 years do not furnish on an average more than 26.000 flowers representing 79 grs of

honey, whilst a tree of 50 to 80 years old at the highest peak of its production gives more than 1.500.000 flowers representing 5 kg of honey. The older trees, over 100 years, blossom less. The quantity of sugar per flower reaches its maximum at the age of about 50 to 80 years after which it steadely decreases.

The nectar chromatografic analysis of the Far-Eastern lime-trees gave the following results :

	Tilia amuriensis	*Tilia mandschurica*
Glucose	31.1%	23.4%
Fructose	30.4%	25.3%
Saccharose	32.1%	45.3%
Maltose	6.3%	6.1%

The saccharose percentage increases with the flower's age, passing in 3 days from 28—43%. Centennial trees yield nectar from 2—3% richer in saccharose.

To conclude the lime-tree chapter we finally wish to add the Korean Beekeepers' Association report that in the Diagan district of Korea, lime-trees represent about 30 to 40% of the total amount of their mountain forests. They provide abundant yields. The trees concerned are the *Tilia mandschurica* and *Tilia koreana*. Their blooming begins at the end of June and lasts about twenty days. They are the region's most important beepasture and facilitate intensive migratory beekeeping for thousands of bee-colonies.

The overall observations contained in the papers which we analysed provide us with a very interesting contribution regarding our knowledge about lime-trees as melliferous plants. Generally speaking the lime-trees represent a minor source for the Central Europe beekeepers ; in the future they should know if so far they have been aware, that in Oriental Europe and in North Asia, lime-trees play an essential role and justify useful research work.

2. REGIONAL STUDIES

Besides the observations on lime-trees whose analysis we just made, it is proper to point out some regional studies containing very interesting elements. It is captivating f.i., to know the working conditions of the bees in such a distant country like North Korea.

The korean apiarian cooperative of Liphen is situated in the Diagan province in a very mountainous region, at 1000 m altitude. The country is covered with forests. The climate is very continental. The amplitude of the temperature variations is 40° ; the annual average temperature does not rise over 4°. The active period of the bees is short and does not last more than from April to September. Only during 170 days

the average temperature exceeds 10°. A quantity of 8 to 900 mm of water falls during the vegetation period. In spite of these very hard conditions beekeeping is flourishing and the Liphen Cooperative announces an annual average production of 170 kg of honey per colony, requiring from 5 to 7 successive extractions.

As we have already pointed out lime-trees constitute the main melliferous source. Another important melliferous plant is *Lespedeza cyrtobotrya*. The secondary flora includes willows, fruit-trees, clover, maples etc.

We wish to point out that the length and harshness of their winters determined the Liphen beekeepers to winter their queens in micronuclei attended to by a few hundreds of bee workers. The Liphen Cooperative stores 400 queens each year for wintering as reserves to be used in the spring for artificial swarming which starts with beginning of April when the colonies have just emerged from their wintering conditions.

We shall now pass to the common analysis of the communications made by B o g d a n and T r a i a n, both concerning the Romanian beekeeping. Bogdan describes migratory beekeeping in the alpine zone, while Traian presents a small monography of Hunedoara, a very melliferous mountainous region of central Romania.

B o g d a n especially describes the mountainous region of Vatra Dornei, which is very favourable to migratory beekeeping. The melliferous flora is constituted mainly by raspberry, *Epilobium*, white clover, dandelion etc. The most favourable period for the honey flow is between the 25th and the 30th of June, up to the end of July. A migratory beekeeping program is issued enabling many thousands of bee colonies to take advantage of these wide source which heretofore were almost totally unexploited. The flow yield is from 20 to 25 kg per colony.

The study made by Traian concerns the whole of the geographical, geological, climatic, botanic, economic and apiarian characteristics of the Hunedoara mountainous region. We are going to retain the part concerning the melliferous plants, from which we quote :

"Flora and vegetation are especially rich and diversified : agricultural cultures, meadows and orchards are to be found in depressions and valleys surrounded by oak forests and other tree varieties characteristic to the hills. From the foot of the mountains covered with pure beech-groves, sometimes interrupted by glades richly covered with flowers, hills spread towards the mountain peaks with mixed forests : beeches and Norway spruce, cover the upper parts mixed with firs and then pure resinous trees. Succeeding the sub-alpine vegetation with *Pinus mughus* and junipers, on the erosion platforms one can see large extensions of alpine planes transformed in pastures by the millenary practice of sheep pasturing". Spring maintenance flows are based on the spontaneous flora, consisting of hazelnut *(Corylus avellana)*, the cornel-tree *(Cornus mas)*, various species of willows *(Salix alba, S. fragilis, S. viminalis)*, the poplar *(Populus alba)*, an other species of willow *(Salix cinerea)*, the alder-tree *(Alnus glutinosa)* and various herbaceous plants of

the forest as for instance the snowdrop *(Galanthus nivalis)*, the cowslip *(Primula officinalis)*, *Pulmonaria officinalis*, the violet *(Viola odorata)*, the wild violet *(Viola canina)*, etc. The intensity of this maintenance harvest increases with the flowering of the fruit-trees as the plum-tree *(Prunus domestica)*, the nut-tree *(Juglans regia)*, the peach-tree *(Persica vulgaris)*, the apple-tree *(Malus pumila)*, the apricot-tree *(Armeniaca vulgaris)*, the cherry-tree *(Cerasus avium)*, the sourcherry-tree *(Cerasus vulgaris)*, the pear-tree *(Pirus sativa)* and others. This maintenance harvest may be transformed in favourable years in a production harvest. The duration of these harvests is about 60 days (from the 15th of March to the 15th of May).

The maintenance harvest follows then with the acacia *(Robinia pseudoacia)* overspread on reduced areas — chiefly on degraded grounds which during favourable years become the main source of the production harvest. It joins also the lime-tree *(Tilia platyphillos* and *T. tomentosa)*, the mulbery-tree *(Morus alba)*, the wild chestnut-tree *(Aesculus hippocastanum)* etc., overspread sporadically over the green spaces of the towns.

During the months June, July and August the maintenance and production harvest is realized owing to the natural pastures and meadows. The main melliferous plant are : the red clover *(Trifolium pratense)*, the viperine *(Echium vulgare)*, the enchanter's night-shade *(Cirsium lanceolatum)*, the chicory *(Cicorium inthybus)*, the dandelion *(Taraxacum officinale)*, the glouteron *(Arctium lappa)*, the wild thyme *(Thymus serpilum)*, the sage *(Salvia nemorosa)*, the red mint *(Mentha pulegium aquatica)*, the wild basil *(Brunelle vulgaris P. laciniata)*, the water trefoil *(Lotus corniculatus)*, the common vetch *(Vicia villosa, V. cracea, V. sordida)*, the sainfoin *(Onobrychis viciaefolia)*, the betoine *(Betonica officinalis)*, the wild marjoram *(Origanum vulgare)*, etc.

The melliferous flora of this zone is capable to secure according to estimations a raw production of 7000 t nectar, which represents 1/3 of the nectar production of the whole region. But the inexhausted sources of nectar are in the 5th mountainous zone which is very reach on entomophilous melliferous plants overspread in the forest region, to which adjoins those of the subalpine meadows and pastures, insuring the production harvest since June up to August.

The most important melliferous plants are overspread over denuded areas or in those which are on the way of regenerating created by the spruce or the beech-grove exploitation, in the valleys of Sebeș, Ampoi, Cugir, Sibișel, Grădiște, Boșorod, Strei, Rîul Bărbat, Jiul Românesc, Jiul Ardelean, Rîul Mare, Valea Fierului, Cerna, Bătrîna, etc. Owing to the cuttings of trees practiced all over large areas — especially on the south slopes — this grounds are invaded by the raspberry-bush *(Rubus idaeus)*, the florid willow *(Chamaenerion angustifolium)*, the bramble *(Rubus fruticosus)* the huckle-berries *(Vaccinium myrtillus)*, the forest strowberry plant *(Fragaria vesca)*, after which follows the goat willow *(Salix capraea)*, and the birch-tree *(Betula verrucosa)*, which grow in abundance.

The coniferous forests with their population of entomofauna *(Cinara piceae, C. pilicornis, C. cistata, C. viridescens, Physokermes piceae* and

Ph. hemicrypus on Norway spruce ; *Lachnus pichtal* and *Todolachnus abieticola* on silver firs, *Lachnus pineti* and *L. tomentosus* on pines) offer a rich harvest of good honey dew whose nourishing value is equal to the one of flower honey. This harvest associates usually to other harvests of this area, as f.i., the raspberry-bush, the florid willow, the meadow-pastures.

The melliferous plants which develop in the subalpine meadows and pastures are very numerous. We may quote : *Aster alpinus, Centaurea cyanus,* the dandelion *(Taraxacum officinale),* the clover *(Trifolium pratense, T. repens),* the mountains serpolet *(Thymus montanus), Teucrium montanus, Ononis hircina* and many others.

It should remain to say some words about two communications of which we only possess a short summary. *Koch* presents the results of a research which lasts since 1947 and concerns 170 observations based on the daily weighing of the hives. Unfortunately we do not have any detail on the obtained results, which probably enabled the author to establish the map of the flows in the G.D.R.

Finaly, V e l i c i k o's work concerning apiarian techniques to reinforce the production colonies with forager bees in the moment of acacia's flow. It is not the question, properly speaking, of a communication treating with the melliferous flora ; anyhow the summary put to our disposal do not allow a critical study.

REPORT II. D. ON THE VARIOUS RELATION ASPECTS BETWEEN BEE AND FLOWERS

(Papers No. 6, 18, 20 and 33)

Rapporteur : Eng. **I. BARAC**
ROMANIA

This synthesis report was drawn up on the basis of 4 papers which were presented to the Congress. Though very different in their contents, they may, however, be grouped proving once more the direct relation between bees and blossoms of the enthomophilous plants.

The papers had the following titles :

1. Dinamics of the vegetation in the Socialist Republic of Romania in the holocene and the formation of the bee-populations. (Leandru Vadim — Romania).

2. Beekeeping and ecology (N. Doniță — Romania).

3. Influence of the different sugar contents in the lucerne nectar (*Medicago sativa* L.) on the bees' activity on the lucerne flowers (Eng. S. Kropacova, S. R. Czechoslovakia).

4. Researches regarding the polliniferous value of maize in the pedoclimatic conditions of Romania (Eng. I. Cîrnu).

The first paper contains a general survey on the formation of the present bee-population in the S. R. of Romania that took place under the preponderent influence of the changes in vegetation, which occured during the last period of the Quaternary, called the holocene.

The second paper tries to underline the advantages beekeeping could have by skilfully utilizing the positive results obtained by the different branches of science and especially in ecology.

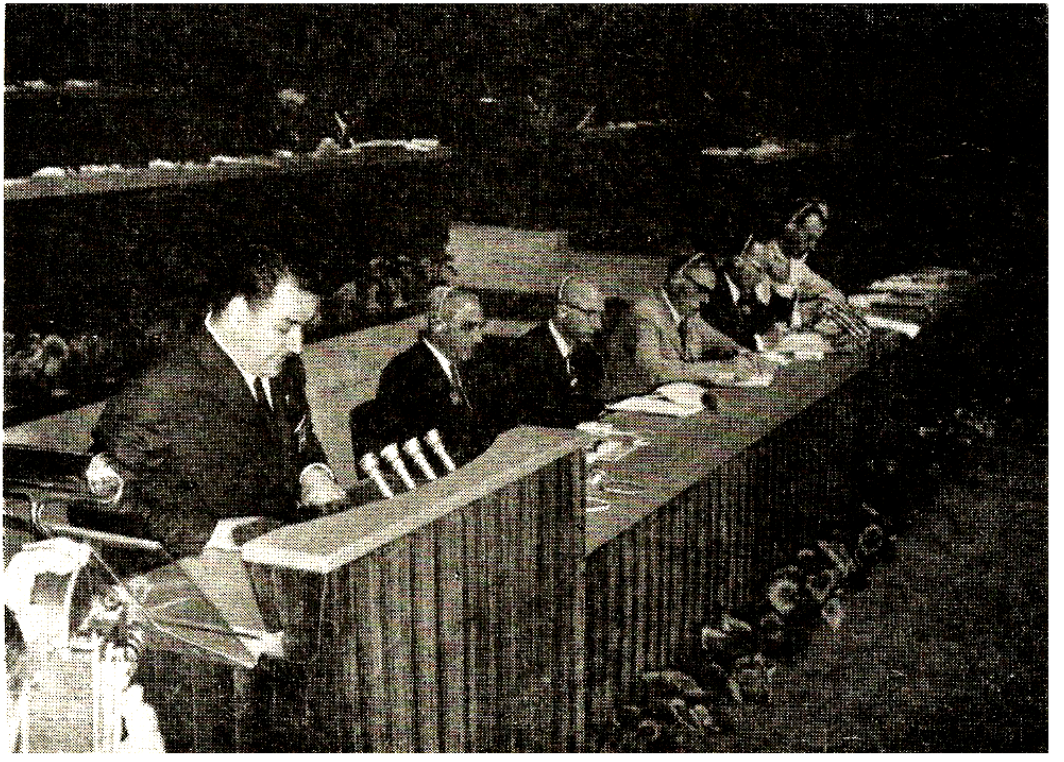
The last two papers represent real experimental works, ellaborated by applying modern technique. The former tries to determine which of the lucerne nectar sugar attracts most bees.

The latter, in studying the maize pollen makes actual the problem of the proteinic feeding of bees, so very defficient during some periods and in certain zones.

The author of the first paper uses for his study the classification drawn up by Emil Pop (1960), concerning the changes in the vegetation of Romania during the holocene.

He shows that bees reacted upon the changes in vegetation adapting themselves permanently to the new conditions.

Thus, during the "spruce fir and pine" period which lasted from the last glacial epoch until approximately 12,000 years ago, characterized by the wide spreading of the common pine-tree mixed with the



Eng. I. B a r a c *(Romania) at the rostrum.*

spruce fir, the birch, the willow and the alder trees in the hills and the low mountain zone or with the oak, lime, maple and elm trees in very small areas, bees were not widely spread due, both to the unfavourable conditions, and to the lack of sufficient melliferous resources.

In the second period, that of the spruce wood with mixed oak grove and hazel, which lasted since 12,000 years ago till 4,000 years ago, living conditions of bees became more favourable. Owing to the warmer conditions, the melliferous species of mixed groves, i.e. *Tillia, Acer* sp., *Corylus avellana,* were widely spread, reaching altitudes of 1.200 m. The rôle played by this melliferous vegetation is so much greater than of any other melliferous forest plants such as raspberry, fireweed and lawn flowers which were less spread due especially to the absence of large areas which were not covered with woods.

During this stage man's activity was reduced exclusively to hunting, influencing the forest only in the immediate neighbourhood of his dwelling place.

The continuous extension of the forests led to the development of bees which during their swarming period were not hindered in their movements, thus contributing to the maintenance of the uniformity of the bee population. The author considers that it was exactly in that period, that the bee population was born and spread over all the hilly and mountainous regions under the form of the primitive Carpathian bee which adapted itself to a maximum gathering type, at the time of lime tree blossoming. The above assertion is — according to the author — confirmed by the existence, at present, of a unique bee population all over the mountain region. However, its uniformity was not proved.

The third period — that of the "hornbeam" lasted since 4,000 till 3,000 years ago. It brought a restriction of the lime-tree and of other species of mixed oak in favour of the hornbeam in the high hill regions.

This change in the vegetation led to the decrease in number of bee colonies. In addition to hunting, man's activity comprised also shepherding and in order to enlarge the pasture areas, large woods in the mountains, hill and plain regions were distroyed. Bees also began to adapt themselves to the new conditions.

The last period, that of "beech" began 3,000 years ago and it still continues at present, representing for bees a deep change in the possibilities of food — gathering from forest trees, since the beech eliminated little by little all the mixed oak species prevailing in the mountain and regions. The melliferous value of these regions began to decrease as well. During the last 2,000 years the man's influence became greater and greater especially that on the arborescent vegetation, leading to changes in bees' features.

The author came to the conclusion that during the spruce and hazel period a uniform bee-population was formed all over the country. In the feudal period five bee-populations appeared out of this primitive bee : the steppe-bee, the Moldavian-bee, the Transilvanian-bee, the Banat-bee and the mountain bee. Out of all these the Moldavian-bee is the nearest to the primitive bee, due to the maintenance of the lime-tree all through the holocene as the main melliferous source.

The paper does not contain more exact data on bees during the various periods which were studied by the author — which might prove with more certitude the conclusion he arrived at.

Beekeepers try to obtain the maximum of profit from bees. For this purpose they are permanently improving the method of maintaining bees. In view of ensuring food to bees and respectively a high honey yield, it is very important to study vegetation and ecological conditions. The author of the second mentioned paper, considers beekeeping only as an applied ecology and that ecology can contribute to every increasing of beekeeping, owing to the results obtained by this science. Of outstanding importance for beekeeping are the research results of the ecology which studies vegetation communities (phytocoenology) determining, classifying and investigating — under various aspects — the constituents of the vegetal cover.

The author underlines that, on the basis of vegetation descriptions and communities tables drawn up by phytocoenologists, — an inventory of the melliferous species in various vegetation units with the quantities and stages development can be estabilshed. If data on the nectar yields of the respective species are available, potential nectar yields per area units can easily be calculated.

By using distribution maps of vegetation units, an assessment of the total nectar yield of a given area can be made — that which is of great importance for the beekeeper. Other data, resulting from phytocoenological research, such as: vegetation dynamics, periodic modification of the quantitative relations between species or vegetal successions, can be also used.

In conclusion, the author recommends to the practician beekeepers to make full use of the multiple results of the phytocoenologic researches, when determining the melliferous resources. It is neither reasonable nor economic that beekeepers should carry on research works in areas already investigated by phytocoenologists, but these investigations should be only completed with data concerning nectar yields.

S. Kropacova, the author of the third paper, based upon very detailed research works tried to establish which nectar sugar of lucerne blossoms (*Medicago sativa* L.) attracts bees the most. Experiments were carried out on 12 lucerne kinds, cultivated in the same way during the period from 13 to 31 July. 10 bee colonies have been brought on each hectare of lucerne.

The number of bees working on a 10 sq. m of lucerne surface was registered every day at 7, 9, 11, 13, 15 and 17 o'clock. Nectar samples the analysis of sugar by means of paper chromatography were daily extracted with micro-pippettes out of 100—200 flowers on each experimental lot. At each sample, the sugar concentration in nectar was firstly established by means of an Abbe refractometer and then by chromatography — using, as standard sample, a mixture prepared out of four sugars. The great majority of sugars was determined by means of a colorimeter on a Pulfrish photometer at 490 mm and a C 50 filter, depending on the standard sample prepared by dealkalinization.

The qualitative analysis established that all the samples contained saccharose, glucose and fructose. By totalizing all the results of the nectar analysis, the author concluded that lucerne nectar contains glucose in excess ; the contents of the other two sugars in the lucerne nectar are almost identical.

In conclusion the author shows that out of the three sugars to be found in the lucerne nectar, fructose and saccharose quantities are identical, varying at about 30 per cent, whilst glucose represents 40 per cent from the total quantity. In order to compare the quality of the nectar and the flower attractions for bees, the author established first of all, that differences in the relative sugar content in the nectar are not appearing subsequently under the influence of the enzymatic activities following the nectar collecting. The problem concerning the relation between the bees work on flowers and the different sugar contents in the lucerne nectar was solved by calculating three correlations namely, the number of bees working on lucerne was compared to the quantity of saccharose, glucose and fructose. These correlations proved that bees in search of nectar sources are also guided by the presence of certain sugars in the nectar. As to the lucerne nectar it is fructose which has a conclusive influence on the number of bees attracted by lucerne. As for other sugars the above mentioned correlations are not available.

The author, in carrying out also other experiments, concluded that the lucerne nectar contains fructose, glucose and saccharose and that only fructose exerts a decisive and positive influence over the great number of bees working on lucerne.

The changes in vegetation caused by the man's active intervention, the extension of the agricultural cultures and the practicing of a modern agriculture, entail also a number of changes in the living conditions of bees. The fourth paper, presented within this synthesis report deals with the above mentioned problems especially with those concerning the way by which man could exert a favourable influence on the activity of bees. The author emphasizes that in the gathering conditions of our country especially in the plain region — where beekeeping plays an important part in the increase of agricultural production by the pollination of entomophilous cultures, bee colonies enter the wintering period weakened, due to the lack of an autumn flow and especially to the lack of pollen. It may be considered that generally in this region the pollen deficiency prevents considerably the development of a highly productive apiculture. This deficiency cannot be completely removed except by creating pollen stores.

The author therefore based upon researches previoulsy carried out and results obtained from the apicultural practicing consideres that maize is the only plant which could remove this deficiency.

It should be also emphasized that in order to secure a gradual harvest as well as for the double-culture, the fodder maize is gradually sown. That makes it possible a gradual harvest and conditionning of pollen, presenting a great interest for beekeeping. It may therefore be asserted that in addition to its multiple employments, in zootechny and industry, maize is likewise of outstanding value for beekeeping, assur-

ing during certain periods of the apicultural season, an important pollen harvesting for the maintenance and development of bee-colonies, creating at the same time important pollen of high biological values.

Considering all these, and for a better knowledge of the maize pollen value for apiculture there were studied during 1963—1964 the following problems : the degree of attractiveness for the maize pollen of the bees and the aspects concerning the gathering biology ; the pollen yield on the blossom and the maize inflorescence panicle ; the variation of the chemical composition of maize pollen depending on the variety and pedoclimatic conditions. The author obtained the following data during the large maize culture in July : the average frequence of bee visiting was in a proportion of 23 per cent higher compared to that of September. The highest frequency was recorded particularly during the month of July between 8 and 9 o'clock, when the number of bees, per minute, exceeded by 108 per cent that which was recorded in September.

He points out certain cases when frequency and intensity of bee visting remains constant or increases between 12—13 o'clock up to 100 per cent though according to data obtained from literature the gathering of maize pollen takes place only in the morning hours. This can be explaind by the fact that bees after the fading of anthers gather the pollen from under axilla of the leaves. It was set up that maize supplies bees at discretion with the already gathered pollen. This fact is of outstanding importance for settling the polliniferous value of the maize related to its gathering and efficiency accessibility.

The pollen yield of a plant is of great interest to a great number of specialists and it is also of outstanding practical importance for beekeepers to know the quantity and quality of the pollen.

Considering the gathering conditions prevailing in the S.R. of Romania an the ever growing importance of the pollen utility in apiculture, in 1963, on the basis of a great number of determinations and measurements carried out in field and in the laboratory, it was for the first time determined the pollen yield of the blossom and of the inflorescence of the maize. From the data reported by the author it results that the average production of the maize blossom is of 1.637 mg, i.e. that for a pollen load a bee must gather the product of 8—10 maize blossoms. The average pollen yielded of a ramification is of 62,6 mg, that of an inflorescence of 1.326 g, and the pollen yield per hectare is of 22 kg average.

The nutritive value of the maize pollen is determined especially by its chemical composition and following the literature data it largely varies. In examining the data concerning the protein contents — the basic elements for the development of bee colonies — it results that all the maize pollens present a high contents of protein substances which vary from 20.38 to 28.17 per cent depending on hybrid and on pedoclimatic conditions. During the 3 years period which was studied, the average of the protein contents of maize pollen varied from 21.42 to 24.06 per cent, which represents a higher percentage as compared to other pollens of entomophilous plants.

In addition to proteins the maize pollen contains also an average of 1.42 per cent lipids, 14.25 per cent integral sugar, 3.35 per cent mineral substances and 0.63 per cent cellulose. Low percentage of cellulose present in maize pollen determines bees to prefer it to other pollens.

Based upon the researches he carried out, the author came to the conclusion, that in the pedoclimatic conditions of the S. R. of Romania the maize is the unique plant which may supply large quantities of pollen, either for the necessary apicultural stores or for other purposes.

We consider that these 4 papers, though they are different as regards their contents, succeeded however, in presenting the whole evolution of relations existing between the entomophilous plants and bees. These relations often change, becoming unfavourable to bees, thus entailing an ever needed and active intervention of man in order to secure normal living conditions for bees — enabling them to achieve their two main activities : the honey production and pollination of cultures.

REPORT II. E. ON THE EFFICIENCY OF PLANTS BY BEES POLLINATION*)

(Papers No. 1, 3, 4, 5, 12, 13, 14)

Dr. **GOSTA JULEN**
SWEDEN

1. The importance of the melliferous bee in the pollination of lucerne (Alfalfa) by V. Petkov and T. Symitchev, Institute of Agriculture V. Kolarov of Plovdiv, Bulgaria.

2. Activity of honeybees marked with radioisotops and moved to fields of lucerne (medicago sativa) by O. Haragsim and V. Vesely, Research Institute of Agriculture, Dol u Libcic, J. Sedivy and L. Taimr, Central Research Institute of Plants Production, Prague-Ruzyne, J. Dockal and J. Balcar, Institute of Experimental Botany, C.A.S. Prague-Vokovice, Czechoslovakia.

3. The influence of pollination by bees upon the physiological character of the Generation Organs and Seed Development in Red Clover (Trifolium pratense) and Horse-Bean (Vicia faba) by T. Alles and A.E. Rais, Tartus State University.

4. The aftereffects of the different pollination methods on seed quality and the intensity of photosynthesis in various varieties of fodder horse-bean by G.A. Avetisyan and A.S. Manuilova, K.A. Timiryazev Agricultural Academy, Moscow, U.S.S.R.

5. Particularities of the activity of the bees on the blossoms of pollinating apple varieties by I. M. Kurennoy, Institute of Agriculture of Stavropol.

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* Original text in English.

6. Preliminary research on the prospects of "convergent selection" in fruit growing in connection with the pollinator function of the Apis mellifica L. by M. Battaglini and M. Bernardini Battaglini, University of Perugia, Italy.

7. Efficacy of using honey bees in cotton plant pollination by N. M. Glushkov and M. F. Skrebtov, Institute for scientific researches in beekeeping.

It is a well-known fact that if in cross-pollinated species a reasonable seed yield should be obtained, transport of pollen from one plant to the pistils of other plants is necessary. This transport is made mainly by two different agents, the wind which is the case in grasses and some other species, and insects or other small animals. Large number of various types of insects are participating in this transport of pollen; the most well-known being various species of *Bombus,* the honeybee and a number of different types of wild bees from the genera *Megachile, Melitta, Eucera* and others. Up to rather recent time pollination also in agriculture and horticulture crops was left to be carried out by the insects available. In the more intensified agriculture and horticulture of today it is, however, necessary to produce highest possible yield and under such circumstances it is necessary for the cultivator to make sure that there are sufficient pollinators available in order to secure an as complete pollination as possible. In many places the number of wild pollinators have been reduced through the removal of their natal nesting places and also as a result of the use of insecticides. This has made that in many places the number of available pollinators are unsufficient for a complete pollination. The only practical possibility the cultivator has to increase the number of pollinating insects is by an increase of the population of honey bees. This has made that honey bees have become the most important pollinating insects for agriculture as well as horticulture crops. The honeybee is, however, not always a perfect pollinator of the crops and a very great number of investigations have been carried out in various parts of the world in order to find out how to utilize the honeybees as efficient as possible as pollinators. Also the seven papers which have been prepared for this session deal with different aspects on the use of honeybee as pollinator on cultivated crops.

The need for cross-pollination is not the same in all crosspollinated crops. In some species, such as for instance red clover, the self-sterility is practically complete and the cross-pollination is absolutely necessary if any seed at all should be obtained. The same is the fact with some varieties of different fruit species. As these species are multiplied vegetatively and thus each variety consists of one clone it is not sufficient to have pollen transportation from one tree to another inside the same variety but pollen must be carried over from one variety to another. In the cultivation of these species it is therefore necessary to have at least two intra-fertile varieties in the plantation.

In other species, where the self-sterility is less complete, it is possible to obtain a certain seed setting after selfing although the species normally are cross-pollinating. That is the case *e.g.* with lucerne, but already more than 30 years ago *Brink and Cooper* very clearly demon-

strated that self-pollinating was very much less efficient than cross-pollinating with regard to seed setting as well as the seed quality.

There is a continuous gradation between the species, from the complete self-sterile ones to the complete self-pollinated ones, but also in some of those species, which are regarded as self-pollinators, a cross-pollination can have a certain positive effect. Such is *e.g.* the case with tomato. Cross-pollination has here no effect on the seed setting, but results in a striking heterosis effect in the next generation.

In one of the papers prepared for this session *Glushkov and Skrebtow* have been dealing with the problem in one facultatively cross-pollinating species, namely cotton. They have in their investigations compared the results from cotton fields with a high population of honeybees with fields far-away from any bee-hives. The experiments which have been carried out during two years have included two different varieties. The fields included in the investigation have had a size of between 40 and 60 hectares. The fields with high population of honeybees have been provided with 5 and 6 1/2 bee-hive per hectare in the two experimental years, respectively. The control fields have been on a distance of at least 3 kilometres from any bee-hives. No control has been made on the wild insect population, but it is assumed that the conditions in this respect as well as with regard to other environmental conditions are the same in the various fields. Observations have been made on the working habits of the bees in the two different varieties and certain difference between the varieties have been established, probably due to differences in the composition of the nectar. Of greater interest and more important is, however, the difference between the fields with bee-hives, on one side, and those without any bee-hives, on the other. The two varieties reacted here in the same way. In both years the two varieties had a greater number of fertile capsules in the fields with bee-hives. For one variety the difference was 24 per cent and the other 16. Further the weight of the capsules were higher in the field with the high bee population as well as the weight and number of seeds. On an average for the two years the yield per hectare increased by 34 per cent thanks to the high number of pollinating insects. Thus, it is clearly demonstrated in this investigation that efficient pollination of the cotton flowers have a very strong positive effect on the yield.

It is a pity that in this investigation no observation has been made on the availability and efficieny of the wild pollinating insects in the fields without any honeybees. The low number of seeds developed in the capsules and, as the low seed weight probably is an inbreeding effect, still more the average low seed weight in these fields indicate that these seeds to a large extent have been obtained after self-pollination.

The inbreeding effect in an other facultatively cross-pollinated species, namely the horse-bean, has been more thoroughly investigated by *Avetisyan and Manuilova*. In their investigation they have not dealt with the effect on the seed setting itself but on the effect of cross-pollination and self-pollination on the development of the vegetative parts as well as on the seed setting in the next generation. The investigation includes three different varieties. The offspring of these three varieties

after self-pollination and cross-pollination was grown under equal conditions. With regard to all observed characters the material obtained after cross-pollination was superior to that obtained after selfing. In many cases this difference was established with statistical significance while in other cases the differences were rather slight. The behaviour of the different varieties is somewhat variable but the tendency to the superiority of the material obtained after cross-pollination is general. The superiority has been demonstrated in germination capacity of the seed, the growth rate, number of leaves, and size of the pods of the young plants, further the hight, the number of leaves and length of pods on the grown-up plants. The number of flowers, the nectar production, the number of pods and their weight and the seed weight was higher in material after cross-pollination. Finally, it was also found that the protein content was higher in the vegetative parts as well as in the pods and seeds of the material obtained after cross-pollination.

As already mentioned the honeybee is not always a perfect pollinator. In *e.g.* a crop like lucerne the pollination effect can be very limited in spite of a large number of honeybees visiting the field. In many investigations it has been shown that the honeybee has adapted a habit to visit the lucerne flowers from the side and draw the nectar without tripping the flowers. The problem on the effectiveness of honeybees as pollinators in lucerne has now been studied also by *Petkov and Symitchev* in an investigation carried out at the Institute of Agriculture, V. Kolarov of Plovdiv. In this investigation three treatments were compared. The first was completely isolated from all insects. In second pollination was carried out only by honeybees while visits by wild insects were prevented. The third was left completely open for all sorts of insects. The seed yield in the first treatment was only half a kilo per hectare, while in the second treatment where the honeybees made the pollination the yield was 199 kilos per hectare and in the third treatment, open for all sorts of insects, the yield was 232 kilos. No information is given on the frequency of the various types of bees visiting the field. The honeybee was the dominating species but the area surrounding the lucerne field was favourable for development of wild bees as well. In special studies on the effect of the visit of the bees it was found that of all the flowers visited by honeybees only about 1 per cent were tripped. Wild bees, on the other side, caused tripping in 50 to 100 per cent of the flowers visited. Studies on the working habits of the honeybees showed that each bee will during a full working day visit about 10.000 flowers of which about 100 will be tripped. This means that the honeybee can be an important pollinator of lucerne only if the number of bees visiting the field is very high. Comparatively low number of wild bees occuring in the field will have the same effect as several bee-hives per hectare. Although it is possible to increase the seed yield of lucerne by an increased number of bee-hives in the fields, it seems likely that still better effect should be obtained if it would be possible to considerably increase the frequency of various types of wild bees. The studies on the domestication of these types of insects going on in many places of the world

are therefore of the greatest interest for lucerne seed production in all areas, where the climatic conditions for lucerne production are good but where the population of wild pollinators is unsufficient to secure a complete pollination.

Problems connected with the honeybees as pollinators of lucerne have also been studied by *Haragsim, Vesely, Sedivy, Taimr, Dockal* and *Balcar* in the Czecho-Slovakia. They have compared the effectiveness of bee colonies, transported from an area without any lucerne cultivation to lucerne field, with that of the bees already available on the spot. They tried to find out if these foreign bees tripped the lucerne flowers to a higher extent than the others. They also studied if these bees mainly worked in the lucerne field or if they prefered to visit other species, how the distribution of them was in the field and if there is any effect of these foreign bees on the frequency of the naturally occuring bees, and finally they have investigated if there are any differences in the pollination effect of different bee races. The bee colonies to be investigated were taken from an area 20 kilometres from the actual lucerne field. Two different bee races were included, namely the race which is common in the area which was a hybrid between *Apis mellifera mellifera* and *Apis mellifera carnica* and the second race the Caucasian bee, *Apis mellifera Caucasica*. In order to make it possible to separate the different types of bees from each other the colonies of the Caucasian bee was marked with the radioisotop p^{32} while the colonies of local hybrids were marked with coloid gold, radioisotop Au^{198}.

Following results were obtained : The frequency of the foreign bees were highest close to the bee-hives and declined fairly rapidly as the distance from the bee-hives increased. The biggest distance from the bee-hives on which bees were observed was 1.000 metres and as maximum for efficient pollination a distance of 500 metres could be established. The local bees were evenly distributed over the whole field and it was not possible to demonstrate any effect on the distribution of the local bees caused by the presence of the foreign ones.

There seems to be very little difference in pollination effect by the two groups of bees. The foreign bees tripped on an average 1.21 per cent of the visited flowers while the corresponding value for the local bees were 1.24. Of the foreign bees 89.7 per cent carried pollen and 84.9 of the local ones. The difference was not significant. On the other hand it seems to be a certain difference between different races. Thus, the tripping per cent for Caucasian bees were 1.93, while the local hybrids on an average tripped 1.05 per cent of the flowers, and further 100 per cent of the Caucasian bees were pollen collectors while pollen was found only on 87 per cent of the local races. In spite of this the total effect of the Caucasian bees on the pollination in the field was lower than of the local hybrids because of the fact that the Caucasian bees had greater tendency to visit other species than lucerne.

In fruit cultivations the effect of pollination is depending not only on the number of the flowers visited by the insects. Of importance is also

that at least two intra-fertile varieties are available and that the insects visit both varieties in order to transport the pollen from one variety to the other. Studies on the pollination effectiveness in this respect in an apple orchard have been made by Professor *Kurennoy* at the Institute of Agriculture of Stavropol. In the garden used for this investigation the reciprocally pollinating trees were planted pair by pair. Bee-hives were placed in the orchard before the flowering started. By marking the bees with dye it was possible to study the movements of the individual bees. It was found that the vast majority of the bees after they have started visiting one tree continued to work in this one. There is certain difference depending on the distance between the trees. If they are planted so far apart that there are 3 or 4 metres between the branches of the two varieties the bees continue the work in the same tree during the whole flowering period, while in case the trees are planted so closely that the branches intermingle the bees start to be less specific after 2 or 3 days.

In order to find a method for more efficient pollination bee-hives were placed in orchards at different times after the flowering had started. It was found that if the insects started to visit the trees some days after the beginning of the flowering period their preference to specific trees were much less pronounced and that they in case the trees were planted close together visited the different varieties indiscriminately already after a short period.

It seems likely that the tendency of the bees to return to the same variety is depending on that there are different scents specific for different varieties and that the bees are following these scents. It would be of interest to find out if there is any possibility to disorientate the bees by some sort of scent training so that they became less specific in their selection of varieties and so that they more frequently moved from one variety to the other.

An other problem in connection with pollination of fruit trees hass been investigated by the professors *M. Battaglini* and *M .Bernardini Battaglini* at the University of Perugia. The idea in their investigation was to try to find out if through "convergent selection" some varieties have been more adapted to bee pollination than others and if these varieties are more attractive on the bees. If this is the case it would be of interest to study more thoroughly the various characters related to nectar secretion and nectar composition and to find out if any of these characters could be related to the greater attractiveness to the insects. For this purpose eight different varieties of *Prunus persica* were compared. In these varieties analyses were made on the average quantity of sugars per flower, the percentage of reducing sugar, the quantity of reducing sugar, the concentration of the sugar in nectar and the quantity of nectar per flower. In the field, observations were made on the number of insects visiting the various varieties. With regard to the insect frequency this was considerably higher in two of the eight varieties, Jacobini 21 and Morettini 5—14, while no differences could be found between the other six varieties.

It was found that the amount of nectar and sugar per flower was considerably higher in "Jacobini 21" than in the other varieties, while the corresponding values for "Morettini 5—14" were not much higher than in the remaining six varieties. There was a positive but not significant correlation between the frequency of insects and the amounts of nectar and sugar. The correlation coefficients for insect frequency and the other investigated characters were negative but non-significant.

Special studies have also been made on the duration of the visits in each flower, and it was found that in the variety Jacobini 21 the time for each visit was shorter than in other varieties.

Certain investigations have also been made on *Prunus domestica*, but here only two varieties, Shiro and Florentia, have been investigated. The insect frequency in Shiro was higher and the time for visit lower than in Florentia. No differences could be found between the two varieties with regard to the quantity of sugar per flower, and it seems therefore likely that other factors are of importance for the attraction of the insects.

Although the results so far obtained in this field are insufficient to allow any definite conclusions, they indicate that a certain variation exists between different varieties with regard to the attraction to the insects and that these differences might be caused by differences in the nectar secretion and/or the nectar composition. Further investigations of this type would be of great interest as a more complete knowledge on these factors might be of value in future breeding work.

An entirely different problem on the effectiveness of pollination has been studied by *Alles* and *Rais* at the Tartus State University. On basis of studies on the presence of different substances of hormonal and enzymatic character in the pollen grains and in the embryos the authors have investigated the possibility to increase the efficiency of the pollination and the development of the embryo after fertilization by adding similar substances to the pollen at the time for pollination. The substances used in this investigations are boric acid, vitamin B_1, heteroxin. royal jelly and gibberallin. In investigations on red clover it was found that all these different substances had a stimulating effect on the pollen germination and pollen growth. Gibberallin had a very strong effect in this respect and treatment with this substance increased the pollen germination from 60 per cent in untreated pollen to 95 per cent and the growth rate of the pollen tubes were increased almost five times. By treatment with the other substances, the growth rate was about doubled. Also the seed setting has increased after treatment with these various substances but in this case heteroxin, vitamine B_1, and royal jelly have been most efficient while gibberallin has had a very slight effect, if any. The material so far investigated is, however, too limited to make any reliable conclusions possible.

Investigations have also been made on the effect of the same substances on horse-beans. Also in this case, a certain effect on the seed setting, after the treatment with these substances, has been obtained but any definite conclusions on the effect of the different substances are not possible on the material available

As a final conclusion, based on all the papers presented for this session, I should like to point out that they clearly indicate the necessity of continuous studies on the pollinations problems. The honeybee is already in many areas and will probably be still more the dominating pollinating insect for the majority of crops, and everything possible must be done to increase the efficiency of its pollination work. For this purpose more thorough knowledge on many of the factors affecting the work of the honey-bees as pollinators must be accumulated. We must, however, not forget that the honeybee have their weaknesses as pollinators in several crops and in those it will also in the future be necessary to rely on wild insects as pollinators if reasonable seed yields should be obtained. Besides the studies of the honeybees as pollinators, it will, therefore, be highly desirable to continue the investigations on the possibilities to increase the population of wild pollinators. These insects should be given ample possibilities for their natural development and in case the populations have been reduced, action should be taken to reestablish them by artificial methods.

SYNTHESIS OF THE DISCUSSIONS ON THE PAPERS PERTAINING TO THE COMMISSION ON MELLIFEROUS FLORA AND POLLINATION

Joint chairmen of the 1st working session :

Dr. S. DEMIANOVICZ, *Poland*
Prof. Dr. N. M. GLUSHKOV, *U.S.S.R.*
E. LISY, *Czechoslovakia*
Dr. H. LÖFFELBEIN, *German Democratic Republic*
Dr. J. LOUVEAUX, *France*
Dr. L. LUNDER, *Norway*
M. MATHIAS, *Tunisia*
Dr. A. MAURIZIO, *Switzerland*
SRI SAH THULGARIA *India*

Prof. Dr. N. M. GLUSHKOV was in the chair

Prof. N. M. Glushkov opens the proceedings of the Commission on Melliferous Flora and Pollination and gives the floor to Dr. A. Maurizio for expounding the 1st synthesis report entitled "General considerations concerning nectar yield".

Then Prof. Dr. N. M. Glushkov gives the synthesis report concerning "Increases in nectar yield" after which Dr. J. Louveaux gives his synthesis report entitled "Researches on nectar secretion in high productivity plants".

After the reading of these three reports the following take the floor in the ensuing discussions :

Dr. S. Demianovicz (Poland) who suggests that the participants in the Congress should receive prior to the opening of proceedings the complete text of the synthesis reports too. The speaker suggests to unify the methods of determining nectar yield especially in trees and shrubs and he considers it would be better for the Commission which deals with nectar secretion problems to meet more often and not only at Congresses.

Dr. A. Maurizio (Switzerland) also suggests that the number of authors be eventually reduced at the next Congress. Instead each of them must be given the possibility of delivering his work. She also points out the need for those who study nectar to have the possibility of meeting more frequently apart from the Congress.

Prof. Dr. N. M. Glushkov shows that these proposals do not come within his province. For putting them into practice the Regulations of the Congresses need to be modified.

Prof. A. Demianovicz (Poland) shows that poor results similar to those mentioned in the papers synthetized by Dr. Glushkov or regarding the early removing of hives for honey flow can also be obtained when a certain rich melliferous plant as is *Calluna Vulgaris* blooms first farther from apiary. The bee colonies accustom to this place of honey flow and neglect the plants of the same species which subsequently bloom around the apiary.

Dr. Bogdan Ion (Romania) shows that bees must be removed for the raspberry flow early in the flowering period of this plant.

Dr. Gervin (Ireland) asks about the effect of fertilizers on the nectar secretion in white clover and if nectar of goosberry bushes is worth turning to good account by migratory beekeeping.

Taking the floor Dr. Glushkov and A. Maurizio show that an answer to the questions asked by Dr. Gervin cannot be given immediately in view of the fact that researches deal especially with red clover, not with white one.

After a short recess the proceedings of *the 2nd session* of the Commission on Melliferous Flora and Pollination have been resumed.

Joint chairmen of the second session :

Dr. GÖSTA JULIEN, *Sweden*
Eng. I. BARAC, *Romania*
Dr. R. BARNES, *England*
Dr. J. DORAN, *Ireland*
A. PETERSON, *Kenya*
A. ORAMAS REPETTO, *Mexico*
D. SEAL, *New Zealand*
VLADIMIR SKUT, *Poland*
TÜRKMEN HALIM, *Turkey*

Eng. I. BARAC in the chair

The last two synthesis reports given as follows : "On the various relation aspects between bee and flower" by Eng. I. Barac and "On the efficiency of plant pollination by bees" by D. Akerberg. Because Dr. Akerberg is not present at the Congress his report is given by Dr. McGregor.

In the ensuing discussions, the following take the floor : Eng. Dr. Szoverdy (Romania) who suggests that more attention should be given to the convergent selection in view of the fact that at present the pollination activities of bees are worth far more to the plant growing than the later is worth to the beekeeping. He suggests even to obtain by selection bee populations specific of certain plants.

Eng. I. Barac calls the attention of the participants in discussions to the fact that they have to refer above all to the works presented to the Congress and recommend them not to identify the Commission on Melliferous Flora and Pollination which works in the frame-work of Apimondia with the International Commission on Bee Botany from U.I.S.B.

Eng. Baga (U.S.S.R.) refers to some aspects regarding the increase in the flow sources for bees by sowing special melliferous plants. The speaker shows that commercial honey can be obtained from phacelia only if this plant is cultivated on large surfaces. "We set" he said "the task before us to draw up a more efficient plan for the mixed sowing pea with phacelia". Further on Eng. Baga shows that treatment of pea by means of toxic preparations during the blooming period does not guarantee the eradication in totality of Bruhus pest and the biologic method of controlling this pest by way of the mixed sowing — pea and phacelia — is promising.

Eng. Popescu Miron (Romania) shows that works are in progress in Romania with a view to drawing up a melliferous flora map. The Ministry of Forestry, the High Council of Agriculture and the Romanian Beekeepers' Association also contribute to the drawing up of this map which will undoubtedly be of great help to beekeeping, having as a result the scientific substantiation of the bee colonies maintenance and particularly of the migratory beekeeping practice.

Dr. Bogdan Ion (Romania) states that gooseberry and bilberry in the northern mountain region of Romania are melliferous plants.

Eng. Cîrnu Ion (Romania) gives some details of the importance of maize to apiculture showing that even when other melliferous plants exist in the same region maize is intensely visited by bees for gathering pollen.

Further on Mr. Granajean Xavier (Belgium) after presenting the main melliferous plants in Belgium and their blooming pedoclimatic characteristics, describes the experimental bee field existing in that country. It is a real garden like a chess table in shape, in which the black squares of one sq.m each are covered by a single or many species of plants according to their growth ; the white squares are covered with slabs of rock to prevent the growing of a plant over another and to permit a more comfortable walking in this experimental field. In this way one can observe in a restricted area the number of bees which visit the flowers on a sq.m, the time and period of visit on a certain flower, the first and the last visit, etc., that is as many observations as possible, which are taken down on cards settling thus the connection between the visit of flowers by bees and the atmospheric conditions, relations from cause to effect. The speaker considers it necessary for Apimondia to draw up a world map per large zones of vegetation with the main nectar sources. Apimondia also could initiate an action of determining the best meliferous plants, promoting their change among the different countries.

Dr. R. Barnes (England) asks a question relating to the best method of preserving pollen and the best pollen substitute.

Dr. Glushkov thereafter takes the floor for answering the questions asked and for drawing the conclusions on the proceedings of the Commission on Melliferous Flora and Pollination. He further expresses his thanks to the rapporteurs and readers for their efforts made in view of preparing the material for the Congress and shows that although a series of successes were recorded in the problems this Commission is dealing with there are still many others to solve. He calls the participants' attention to some aspects such as the mechanism of nectar secretion and the working out of the methods for identifying the pollination activity of bees, the specification of the economic norms of profitableness of crops pollination by bees, the study of melliferous sources and honey flow types according to the geographical features in each country. He further stresses that the solution to these problems will contribute to increasing crops production and profitableness of agriculture emphasizing that in U.S.S.R. the nectar yield in different cultures has increased in this way by 20—40 per cent.

He also points out the importance to apiculture of preserving some particularly rich melliferous plants within the frame-work of forestry operation, such as : *Tillia cordata* and *Filodendron amurensis* and in other countries such as Romania, Yugoslavia, etc. the acacia *(Robinia pseudoacacia).*

He points out that for certain countries it is a particularly actual problem to carry out some works of preventing and impeding erosion processes by preserving for this purpose forests and by growing different melliferous plants.

Another conclusion is also the fact that the exchange of experience should be enlarged as should be the popularization of scientific and practical achievements in different countries considering Apimondia can contribute and facilitate a large exchange of publications as to the problem relating to the melliferous flora and pollination of entomophilous plants.

Eng. I. Barac declares the meeting of the Commission on Melliferous Flora and Pollination adjourned.

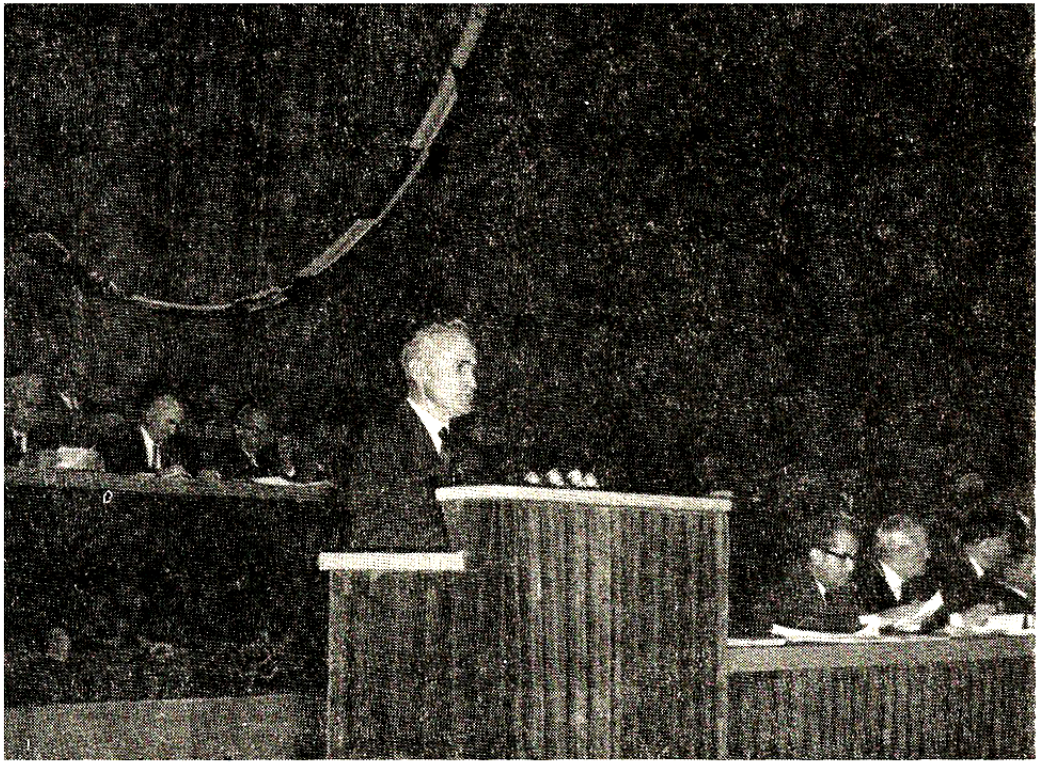
COMMISSION ON BEE PATHOLOGY
AND
SYMPOSIUM ON APITHERAPY

PRESENT STATE AND FUTURE DEVELOPMENT OF BEE PATHOLOGY PROBLEMS

SPEECH BY PROF. Dr. M. ROUSSEAU, FRANCE
Chairman of the Standing Commission on Bee Pathology of Apimondia

I don't think it necessary to underline here the part played by pathology in the activities of beekeepers. The numerous papers presented to Congress or discussed at the symposium represent a convincing proof of the importance of this problem.

Rentability of bee breeding — more than any other breeding — is based especially upon perfect sanitary conditions. This notion is well known to most beekeepers who keep a small or a large apiary in order to obtain a legitimate profit. And yet there are quite a number of bee-



Prof. Dr. M. Rousseau *(France) member of the Executive Council of Apimondia and Chairman of the Standing Commission on Bee Pathology.*

keepers who simply ignore the very existence of bee diseases. Some of these keep not without difficulties a few hives. They discover the existence of frequent cases of mortality in bees but they ascribe it to natural causes. One day, however, this mortality gains proportion and the entire apiary is destroyed, but infection is not confined to one apiary only but has spread to the neighbouring ones.

The beekeepers' ignorance of bee diseases is frequently recorded in numerous countries representing an impediment in the development of beekeeping. The first step recommended to remedy this dangerous situation would be the popularization of bee diseases by means of lectures on pathology considered as an essential measure by our commission.

Nobody should breed bees without being sufficiently trained in recognizing and treating bee diseases.

This is a principle of outstanding importance for the countries where modern apiculture is being promoted.

The extension of apiaries and increase of their yields are elements which facilitate the expansion of diseases.

The commission therefore proposes that every programme for the development of beekeeping should include the establishment of a sanitary organization aiming at :

1. Popularizing the fundamental principles of bee pathology.

2. Detecting and treating diseases with the assistance of specialists and diagnosis laboratories.

In order to facilitate the setting up of such organizations in these countries, the commission will provide information and documentary material from countries with highly developed apiculture. Draft programmes or projects are sent to the countries which apply for them. On the occasion of conferences, training courses, lectures, practical demonstrations, simple and explicit documentary material will be distributed to beekeepers for their guidance in the control of bee diseases.

Thus, the Apimondia Commission on bee pathology will be a useful guide for the practical organization of health control.

Alongside direct action, another indirect but nor less important — long — term programme will be pursued. This indirect action requires systematic research work.

For this purpose it would be important that the commission be informed of the main problems the respective countries are interested in. Those interested in a particular disease, for instance acarine disease, nosema disease or mycoses — or any other disease — may inform the commission about the situation in their country and if deemed necessary ask for our advice and cooperation. The requests will most likely call for practical and efficient treatments. Though it is undeniable that bee therapeutics has made considerable progress during the last years and all the important bee diseases can be controlled, we must admit however that certain treatments are difficult to apply. As a consequence of these difficulties, beekeepers limit the treatment both in quantity and duration up to the disappearance of the symptom. But this does not remove the danger of a latent infection to neighbouring hives ready to

recur when favourable conditions appear again. We consider therefore that the first researches to be carried out should be concerned with treatments. We therefore propose setting up a working programme dependent upon the nature of the requests and the information forwarded to us on the most urgent problems.

This programme will be sent on to institutes and specialized laboratories which are competent to carry on researches. Of course, these researches must not remain within the limits of a mere therapeutic experiments. It is imperative that certain works be pursued, such as the etiology of diseases insufficiently investigated. This applies to the study of the evolution of certain parasites and viruses. The study of viruses, for instance, neglected till now, for want of adequate facilities, is today ensured by electron-microscopes and the possibility of tissue cultures.

Thus, by this double action, the commission will be an organ of coordination and information which will enable to maintain close relations between the national groups from all countries and the various technicians and research-workers. The rôle of our commission will be largely aided by the parallel activities of the bee pathology commission of the International Office of Epizooties. The latter entrusted with the investigation of all health problems will form an extremely useful partner in accomplishing our projects. Our first concern goes to those countries which are developing their apiculture and we nourish the hope that our contribution will be efficient aiding them to obtain better results benefiting by the experience of the countries more developed in apiculture.

Following these ideas, based upon this programme, the Apimondia Commission on bee pathology will do its utmost to bring its contribution to the development of beekeeping.

SYNTHESIS REPORTS

REPORT III. A. ON BACTERIOLOGY PROBLEMS *

(Papers No. 3, 4, 13, 17, 22, 28, 29, 30 and 49) and two papers presented to the Symposium on Apytherapy

Rapporteur : Prof. Dr. **A. TOSHKOV**
BULGARIA

This report is based on 11 papers of speciality. According to their character and trend these papers can be divided into 3 groups :

First group — The pathogen agents of the foul brood with a conditioned pathogeny and ordinary microflora in the bees' brood and nest (7 papers) ;

Second group — The influence of the chemical-therapy factors upon the American foul brood agent (2 papers) ;

Third group — investigations on the specific way of appearance of some diseases in bees (2 papers).

In spite of some gaps in expression and incompletion as plan and volume, in all those 11 papers interesting analyses were made and a modern microbiological technique was used, fact which has to please everybody, since even the researches of big laboratories of the microbiological school with a vast epizootological culture deal with the study of the bee pathological problems.

Those 7 papers of the first group deal with the results from the investigations of the following problems : the pathogen agent of the American foul brood and its way of action ; the European foul brood etiology ; the European foul brood agents, the bees' microflora and the consecutive use of the antibiotics, immunity to the antibiotics of the European foul brood stimulants ; the wintering of the bee colonies suffering from the European foul brood ; the destruction of the bacteria from the bees' nest by the agent of antibiotics and the importance of this phenomenon in the European foul brood therapy.

It results from those mentioned above, that in the subjects of all the enumerated papers is felt the necessity of solving some actual and essential problems, important both for theory and actual practice of beekeeping : the etiology and antibiotherapy of the American and European foul brood.

Allow me please to tell you in short the content of each of this paper. I shall dwell especially upon the valuable practical and scientific contribution already made, upon the prospects of study of the tasks set, as well as some more essential mistakes which, in my opinion, have to be considered in our future activity.

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* Original text in Russian.

The first paper "About the Bac. Larvae Spors" Agents of the Bee Colonies Affected with the American Foul Brood" drawn up by Docent Nedealcov and professor Toshkov from the veterinary microbiology department and bee diseases, of the Veterinary Academy in Sofia-Bulgaria.

It is known that the bees affected with the American foul brood are mechanical bearers of Bac. larvae. This determines both the spreading of the infection in the bee colony and its transmission to a new centre of contagion, as well as the appearance of recurrences, even from the removal of the diseased colonies.

The previous experiments of the authors (Toshkov and Nedealcov, 1958) showed that if a part of the forager bees affected with the American foul brood would be received in a healthy bee colony, when they come back from the flow, the healthy bees will not fall ill.

This fact raised a series of interesting problems from the theoretic and practical point of view as for instance :

a/ What category of bees and to what extent can be earers of Bac. larvae ;

b/ How is produced the deliverance of the forager bees from the spores of the foul brood they carried previously ?

c/ Is it possible that a part of the bee colonies affected with the American foul brood to be used and not destroyed without running the risk to maintain and extend the disease ?

In order to answer the first two questions, the authors made experiments in vitro and in vivo on the young bees' organs (workers in the hive) and adults (which fly outside the hive) clinically ill. The specimens of bees of the second category were taken separately from the bees which went out the hive and from those which came back. The results of the biotests and investigations on culture medium gave the possibility to the authors to draw the following conclusions :

1/ The pathogen agents carried by the young bees in the colonies infected with malignant foul brood are determined especially by the infection of the honey stocks and in a lesser degree mechanically, by the infection of the buccal pocket and the legs. The digestive tube (the honey sac) is a wider and more frequent source of Bac. larvae than the exterior organs.

2/ The behaviour of the foul brood agents towards the adult bees is also determined only by the infected honey stocks of the diseased bee colony. The infection source of the bees which fly in the flow is only the digestive tube.

3/ In both categories of bees the more frequent and principal source of Bac. larvae is the digestive tube (the middle and posterior part).

4/ The bees coming back from the flow carry (not always) the Bac. larvae agents only in the middle and posterior part of the intestine. These agents are removed together with the removal of the excrements outside the hive and in this way it is interrupted the epizootical chain. Therefore, the bees infected with malignant foul brood (which fly outside the hive) can be used for curing the infected apiaries according to the method proposed by the author in 1958.

The second paper with the subject : "About the Etiology of the European Foul Brood" was drawn up by Docent Camburov from the microbiology and bee diseases department within the Veterinary Academy in Sofia, Bulgaria. The author made systematic microbiological investigations on the bee colonies infected with the European foul brood. On the ground of these investigations he drew a series of very important conclusions regarding the etiology of the European foul brood :

1/ The micro-organisms which have their importance as pathogenic agents of the European foul brood are : Bac, alvei streptococci pluton, streptococci apis (streptococci accalis var. liqua. streptococci fetum). Bac. paraalvei, Bac. orpheus and in a lesser degree Bac. eurydicae. All these micro-organisms have a lesser infecting force. By means of pure cultures of Bac. alvei, the author like other researchers succeeded in reproducing the disease. The other micro-organisms caused easier forms of disease.

2/ According to the clinical results, the European foul brood can appear under different forms which are determined both by the state of health of the bee colonies and by external factors, which influence this state, as well as by the sort of pathogen micro-organisms. In Bulgaria, in most cases, etiology is polybacterial with 2 or more germs. The infections provoked by Str. pluton, Str. apis and Bac. eurydicae are easier tolerated. It is also stressed a wider spreading of the provoked foul brood, in the last years, in Bulgaria.

3/ For further study of the European foul brood etiologic problem in turn, taking into consideration the control of this group of the brood benign infection, it is necessary to set up an international cooperation of the experts who work in this field, and first and foremost there has to be studied the ordinary microflora of the bee colonies, as well as the conditions and factors outside them which contribute to the appearance of the European foul brood.

The third paper "About the Behaviour of the European Foul Brood Agents within the Healthy Bee Colonies" drawn up by Camburov, Toshkov and Sabanov, Bulgaria. The microbiological investigations were made on the combs from the bottom of the hive, larvae, bees, honey, virgin-wax coming from the healthy bee colonies in view of searching the stimulants of the European foul brood.

In all these materials there were found the European foul brood agents (Bac. alvei, Streptococci apis, Bac. euridycae, Bac. orpheus and Bac. paraalvei) and the percentage of the positive specimens in many kinds of materials is different. The highest percentage of the positive specimens were found in the excrements inside the hive (45,5%), after which it follows the central parts of the combs (30%), the unsealed brood (22%), the young worker bees (17,64%) and the forager bees (15%).

It has to be shown that the highest percentage of the species of isolated micro-organisms belongs to Bac. alvei, the most important agent of the European foul brood met with in Bulgaria.

It is obvious from the results obtained that the presence of the pathogen agents of the foul brood in the European bee colony, represents a widely spread phenomenon. In this respect, the best results were

obtained by the authors during the investigations upon the remains of materials of the bee colonies from the western districts of Bulgaria.

From 25 colonies investigated in these districts, the European foul brood agents and first of all, Bac. alvei were discovered in 6 bee colonies, and especially in their larvae. These facts show that for the appearance of the infection besides the etiological factor there are necessary other conditions too, which are found within the bee colony and outside it. From all these as a practical conclusion it must be shown that in the fight and prophylaxis of the groups of the foul brood infection it must be stressed not so much the antibacterial means as the elimination of the factors which help their appearance.

The fourth paper about the action of the antibiotics upon the microflora inside the bees' nest is drawn up by Cherepov from the Institute of Scientific Research for Apiculture, USSR.

At the beginning, the author studied minutely the microflora on the surface of the bee body from inside the digestive tube, and the haemolymph of the workers, drones and brood, from the nectar, honey, virgin-wax, royal jelly, from the walls of the hives, the frames and the excrements inside the hive, in the healthy colonies and those affected with the European foul brood and after antibiotherapy. He noticed two forms of the disbacteriosis : 1/ disbacteriosis provoked by the presence of sporulate agents of the European foul brood within which, part of the normal microflora is replaced by that of the representatives of other groups, Proteus and different micrococci, 2/ the therapeutical disbacteriosis following the use of antibiotics.

The destruction of bacteria by means of medicines after the treatment with biomycine is characterized by the reduction of the number of streptococci, yeasts and some other species of stick like microbes.

The destruction of bacteria by means of penicillin is different from that by biomycine. The other way round to what it was expected, there are Bac. coli, Bac. mesentericus, Bac. subtilis a.s.o.

The general characteristics of those belonging to the new microflora is the reduced susceptibility to antibiotics.

The positive side of the paper is the minute and hard work for studying the ordinary microflora of bees, brood, bees' nest, as well as the changes arising in the world of microbes, after using antibiotics. Unfortunately in the paper above-mentioned nothing is mentioned about the necessity to know and control the problems of the noxious secondary influence of the antibiotics, as well as the protection of the ordinary microflora and the investigation of the means to regenerate it.

The fifth paper was presented by prof. dr. V. I. Poltev and dr. Egorova. The authors bring new data regarding the microbian species isolated by Alexandrova from larvae affected with European foul brood on media of potato agar. Alexandrova called it initially Bac. pluton, and other researchers supported the idea that it would be Bac. Euridyceae. The studies made by Poltev and Egorova show that in fact it is a new bacterial species quite different from those mentioned and which is called Lactobacterium pollinis. This species is frequently found in the healthy bee colonies.

Dr. Mihailov from the USSR is the author of the paper : "Wintering of the Bee Colonies Affected with the European Foul Brood". The observations were made in Tula region and the treatment was based on biomycine and sulphatiazole. The symptoms of disease did not disappear in all bee colonies meaning that they were not all of them cured. We think necessary that the studied of this problem be continued.

Prof. Dr. V. A. Trilenko presented an interesting paper regarding the microflora of the bee intestine. The studies made during 1960—1964 by the author bring new biochemical data.

The papers from the second and the third group of investigations of Dr. Tchervynschi and co-workers, Dr. Nemciuk (Poland), Dr. Poltev and Copanovici, Dr. Ibraghimov, as well as those presented subsequently by other researchers, which will be published "in extenso", are contributions to the study of the ethiopatogeny of the bacterial diseases of bees.

REPORT III. B. ON TOXICOLOGY PROBLEMS

(Papers No. 2, 11 and 19)

Rapporteur : Dr. **K. DREHER,**
FEDERAL REPUBLIC OF GERMANY

Initially, the bees presented only poisonings which were in connection with their natural foodgathering. It is the question of the so-called poisonings of the nectar flow by certain kinds of nectar, pollen or honey-dew. By the agricultural and industrial development of the civilized nations, however, two new sources of poisonings have appeared in the foreground, namely pesticides and industrial refuse.

It is my duty to make a statement on three papers concerning pesticides.

After the war, their production and application to plant-protection, presented a tremendous development. In a parallel direction to it, the number of bee poisonings increased, too. We have to confront a situation that pesticides have to be employed in view of preventing the destruction of useful plants by pest and to secure the nourishment of mankind. But, at the same time, it is absolutely necessary that most of the cultivated plants shall be visited by bees during the bloom for obtaining a yield as high as possible of fruits or seeds. Both factors — plant-protection and apiculture — are of a real vital importance and have to be settled by peaceful coexistence.

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* Original text in German.

There have been followed different ways in order to make possible such a coexistence of apiculture and plan-production, namely :

1. prohibitions to apply substances dangerous for bees in blooming cultures visited by the bees.

2. moving off the bees from cultures which have been treated with bee-dangerous stuffs (insecticides), by

a) a permanent or temporary emigration with the bees ;

b) a temporary confining of the bees.

3. searching of the intensity and duration of the toxic effect upon the bees.

4. Development and utilization of stuffs not dangerous to bees.

1. — From the view point of apiculture it would be ideal if, by prohibition, one might obtain that bee-dangerous pesticides would be moved off the bees. In a series of countries such prohibitions are actually in force. In Germany already in 1937, arsenical pesticides have been prohibited to be applied to blooming plants visited by bees. In 1950, this prohibition was extended, for instance, in the German Federal Republic upon all "bee dangerous" stuffs of plant-protection as far as they are applied in agriculture, horticulture and pomiculture. But this prohibition is not free of gaps. Forestry is not concerned by it. Besides this, in the event of heavy insect calamities, exceptions are permitted, provided the beekeepers were announced of the planned action to combat the insects, at least 24 hours before. Thus, the opportunity is to be offered to move off or to confine the bees. Simultaneously, the categories of dangerous stuffs are clearly precised. But finally, there is no prohibition which is not infringed by ignorance or carelesseness. Therefore, such prohibitions can, truly, reduce sensibly the number of bee-poisonings but without hampering them totally. For that reason it is necessary to look for more means and ways in order to protect bees against poisonings.

2. — Another method is that of moving the bees of those cultures that had been treated with bee-dangerous stuffs. This is realized by transporting the bees, to a new place situated at least at 5 km distance from the former, in order to avoid a flight back of the bees. This migration from the former nectar flow-region presents several inconvenients for apiculture. The transport causes supplementary work and expenses. At the same time, it is not sure whether the populations will find an equivalent bee pasture.

In order to avoid all these disadvantages, the proposal was made to confine the bees during squirting or spraying or for all the duration of the toxic effect. In the German Federal Republic, *Sachs* has worked on this problem and came to the conclusion that confining the bee-populations for a duration of 24 hours, is a harmless operation provided a cage in which the flying bees are fed in a liquid form, is hung in front of the entrance. This method was not adopted in Germany because of the fact that the cage as well as the special nourishment represent a supplementary expenditure for the beekeepers and, at the same time, the Service of Plant Protection must not be encouraged to require a too frequent confining of the bees.

Popov, Petkov and Semidciev have examined the possibilities of confining the bees taking into account the increasing application of stuffs for plant protection and the endangering of the bees especially by the treatment of lucern with Dildrin (Dieldrin) against the caterpillars of *Chloridea dipsacea*. For this experiment, 14 bee-populations were utilized, divided in two groups of equal strength of 2 populations each. The populations were in multiple storey-hives. These contained in their upper part a feeding vessel and an airing-frame with a wire-net having a mesh-width of 3×3 mm. Besides this, the airing holes at the bottom of the cupboards, were opened and in this way a sufficient ventilation was secured. Into the feeding-vessels, water was daily poured in.

The populations of the first group were allowed to fly freely during and after the spraying with Dieldrin. The second group was put to liberty immediately after spraying. The other groups were permitted to fly in intervals of a day each. The last group (the control) was confined during the general experiment which lasted for five days. The stuff is a 0.5 per cent watery solution was sprayed on the 18th of July 1963, at 8.15 a.m.

The subjects of the examination were : intensity of the visiting of the lucern during and after spraying, the number of the dead bees in the bee-hive and outside, development and production of the populations until their wintering. We do not dispose of data concerning the size of the lucern field as well as of the flights over other plants of nectar flow.

After spraying, the visiting of the lucern field decreased very much, a proof of the strong toxic effect. At the 1 st experimental group, the mortality amounted, on average, to 8422 bees for each population. At the following groups, mortality was continually decreasing till 736 bees at the control group.

The effect of Dieldrin was not only very strong but also of long duration. The behaviour of the populations and that of the poisoned bees was typical for contact insecticides.

The bees of the control group endured very well the confining though weather conditions were very unfavourable for it (Temperature between 22.2 and 26.8°C on a sunny and calm weather). The populations stayed in the sun, near the lucern field.

After ending the experiment, the populations were moved to a mint field, receiving 60 kg of sugar. The damaged populations regenerated quickly.

Consequently, the authors reach the conclusion that :

a) well prepared, the bees bear a confining of longer duration and

b) the damaged populations recover rapidly by good care and nourishment.

These facts correspond to a large extent to the experiences of Central Europe.

Nevertheless, I should like to warn as to generalizing the consequences for it is not advisable to confine the bee populations for a

longer time, without any stringent necessity, or to expose them to poisoning. The latter may be, indeed, so strong that for their regeneration, the populations might need a very long time or be totally destroyed. Besides this, the life of the queen might be sensibly shortened. Finally we have to take into consideration that in the regions with Atlantic climate of Europe, bees dispose only of reduced periods of nectar flow. When, in that time, the flight bees are lacking or confined, the honey production of the populations will be strongly reduced.

3. — All these disadvantages can be at least partially diminished by the research of the duration and intensity of the toxic effect of the bee-dangerous stuffs. Thus, in the German Federal Republic it is known since a long time, that the ester of phosphoric acid and HCH — means practically do not produce any longer bee-losses already a few days after the application of these stuffs.

Important experiments in this direction were carried out by H. Dahlmann in Hohen-Neundorf, near Berlin (G.D.R.) by examining the effect on the bee of stuffs sprayed from an airplane with active principles of DDT-HCH and the ester of phosphoric acid. At first stuffs containing DDT and HCH were sprayed, — beyond the flight period of the bees, — over potatoe — fields strongly mixed with blooming *Raphanus raphanistrum* L. Though the beeflight started fully already 40 minutes after the treatment had ended, no losses could be observed. It followed then a treatment of blooming rape (*Brassica napus* L.) with the same stuffs (10 liters per ha).

After some experiments of lesser importance gave favourable results for the bees, in 1960 a much larger area of the total rape surface, visited by 2400 bee populations, was treated from a airplane. This time too, not the least bee losses were observed. Also in the following years, there were good results concerning the effect on the plant pest and the capacity of the bees to support them.

For struggling against the leaf lice (Aphidae) on potatoes, horse beans (*Vicia faba* L.), and so on, oilspray stuffs containing the ester of the phosphoric acid had to be sprayed from airplane. Though this operation was carried out only late in the evening, beyond the normal flying time of the bees, nevertheless, the next day, one could ascertain — after the temperatures had increased above 15°C, very dangerous conditions for the bees. All bees flying towards the plants treated, were poisoned and perished after a short delay. Of this, the conclusion was reached that oilspray stuffs, containing the ester of the phosphoric acid, are not allowed to be utilized from the airplane at blooming plants visited by bees.

In the same category we have to speak of the valuable experiments carried out by Nemciuk (Warsaw) concerning the toxic effect of herbicides on bees. He fed numerous stuffs — indicated either by their chemical or commercial denomination both in the laboratory and in the open air. These feedings, for instance of the salt of the trichlorineetha-

nolanilineacid, of the buthylester of dichlorinephenoxidacetic acid, of the 2-methyl-4 chlorinephenoxidacetic acid, were not toxic in little doses, but they were in larger ones.

The moistening of bees by suspensions of some specific stuffs had untoxic effects, in exchange, moistening with watery solutions of other stuffs (f.i., trichlorineethanolaniline acid, potassium salt 2.4 of the dichlorinepropion acid) caused a mortality of 100 per cent.

These experiences are of interest because in numerous countries there are disagreements regarding the toxicity of herbicides. Based upon laboratory and field experiments, the German Federal Republic has decided that herbicides on hormone basis are not dangerous for bees. But from the practice we always hear speaking of complaints of bee-losses, caused by the spraying of blooming weeds visited by bees by means of hormone containing substances. In this connection, it seems that the following factors may be the causes of the bee-losses that, however, are inferior to those caused by insecticides dangerous for bees.

a) Collecting bees are hurt by the sprinkled solution. On their returning flight the bees are damaged by the strong smell of numerous herbicides and killed. This has been observed for several times.

b) By the updrying of the sprinkeld solution, concentrations of the active principle are reached which are exerting a toxic effect on the bees. This thesis is backed by Nemciuk's interesting experiments.

c) When the spraying tools are still containing remainders of insecticides, the application of herbicides may cause bee-losses indirectly. There, the cleaning of the sprayingtools, after each use, is absolutely necessary.

The producers of herbicides recommend their application in a certain stage of development of the weeds before blooming. But in practice, one sees that this treatment is always applied because of negligence or of exploitation reasons during the blossom and the bee-flight. Since it has been ascertained that the bees are especially endangered in all occasions when they are directly sprayed by pesticides — without any difference if these are dangerous or not for bees — all measures with a view to plant protection ought to be carried out beyond the bee-flight time, preferably in the evening.

4. The most ideal solution would be without any doubt, the development of specifical pesticides, harmless to bees. Hopeful first realizations in this field may be already ascertained. I mention the Toxophen which, however, doesn't always show the desired effect upon the pest. Or the Thiodan that, because of its great toxic effect on fish is appliable only in a limited measure. But there is also the price which must be taken into consideration. Nevertheless, the success obtained up to now justify the hope that in the future more stuffs will be manufactured convenient as well for the honeybee as for other useful insects.

REPORT III. C.
ON PARASITOLOGY PROBLEMS*)

(Papers No. 14 and 23)

Rapporteur : Prof. Dr. **JDA GIAVARINI**
ITALY

The *Braulidae* and *Philantus triangulum* are the subject of two interesting papers presented by Dukov and Alexeenko.

These insects, belonging the former to the Diptera, the latter to the Hymenoptera order. The *Braulidae* and *Philantus* are generally classified in a most vast and heterogeneous category of animals commonly known as "enemies of bees". Under this name, organisms belonging to the most different zoological classes, orders and families more or less capable of damaging to bees direcly or indirectly are brought together. However, they are not pathogenic organisms, i.e. capable of spreading infectious or injurious diseases to the adult bees or their larvae. In view of this feature, beekeepers consider them not to be very dangerous and attach no great importance to them. But they are mistaken because under certain conditions some of these "enemies" can, however, cause very important damages and consequently become dangerous to bees and apiculture in general.

It must be admitted that it is rather difficult to distinguish between the real parasitism and other association forms (commensalism etc.). Nevertheless it is possible to assert that some of the numerous enemies of bees can be considered as simple commensals and others, on the contrary as being parasites or nearly parasites, because they are predatory or live inside or on the body of bees. Moreover, some of them are particular enemies of bees whereas others are occasionally only.

There is no doubt that most of the enemies of bees — even the most dangerous — are to be found in the insect class. In every order of this class there are indeed severad species which can more or less correctly be defined "enemies of bees". At the same time the most dangerous and numerous of them belong to the Diptera, Coleoptera, Lepidoptera and Hymenoptera orders. Certain genera and species of the above mentioned orders can indeed be regarded as commensals since they feed on larvae, dead adult bees, wax, honey or pollen. There are others which, on the contrary, can with good reason be called parasites or semi-parasites.

Some species for example of *Dermestes*, some *Phoridae* (Diptera), the genere *Megaselia* and *Borophaga (Phora)* and some butterflies of the Pyralidae and Sphingidae families belong to the first category which is not of the most dreadful. Excepting the *Pyralidae Galleria melonella* and *Achroia grisella* whose larvae feed on wax and residues in the hive and sometimes can cause serious damage, the other ones generally cause damages which are not very important, with very few exceptions concerning special conditions ; their possibility of spreading infectious diseases in the bees being disregarded. Frankly speaking some of these

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* Original text in French.

insects getting into the hives, especially the less strong colonies, and passing from one hive to another, can play a very important role in spreading certain infectious diseases in bees. Because of damages — even unimportant — these insects can indirectly cause, they must be controlled by beekeepers.

Besides as asserted, there are genera and species of insects belonging to the orders mentioned above which can be regarded as parasites. They can act as parasites both in larvae and adult stage.

A great number of Diptera species are parasites in larvae stage. *Physocephala vittata, Zoodion fulvifrons, Sarcophaga surrubea, Senotainia tricuspis* etc. The larvae of this Diptera which are very numerous live within the torax and abdomen of adult bee and feed on its hemolymph and tissues. During the last years, *Senotainia tricuspis,* a fly of the Sarcophagidae family, known since 1838, was the aim of special researches. Many studies were carried out on the morphology, anatomy and biology of this insect (adult stage and larvae) : the most interesting of them refer to the living and feeding conditions of the larvae. The question, however, of how far this Dipter is dangerous and dreadful is still discussed. According to certain authors its presence in the hives does not bring about important damages, but according to others, this Dipter might cause a high mortality so that there is some talk of "death exclusively caused by *Senotainia*".

Certain species of Coleoptera belonging to the genus Meloe are always parasites in larval stage. Adults of the Meloidae family are phytophagous, whereas their larvae live in the cells of the social Hymenoptera combs and frequently feed on eggs and larvae existing therein. The *Meloe's* first larval forms, named triongulines exploit adult bees by catching strongly with their mandibles on their bodies, for being — without wasting any energy—rapidly transported towards the hive. But is seems that the *Meloe* larvae have a different behaviour towards bees. As Örosi Pal has proved, the larvae of *M. proscarabeus* and *M. cicatricosus* are, indeed, content with their being transported, damaging to bees only by the injures caused by their mandibles, whereas *M. variegatus* larva is a real parasite since it feeds on bee hemolymph.

Among adult parasites there are certain Strepsiptera and Diptera (Brachycera) species belonging to the Braulidae family ; the former are bee larva parasites and feed on hemolymph. According to Bailey, the damages caused by these parasites to the larvae, are almost insignificant as in general the larvae keep on developing and grow to adults though they sometimes present anatomical alterations. For example, the workerbee can be deprived of the necessary means of gathering pollen or possess a smaller sting. Besides, according to the same author mentioned above, the adult males live freely whereas the females permanently live caught on their host sticking their head and reproductive organs in the cuticule.

Bee parasites of the Strepsiptera order are very rare but those belonging to the Braulidae are very numerous. One can assert that there is no European or extra European country, whose beekeepers had not

had to fight against this dipter. The Braulidae do not damage directly to bees because they do not kill their host ; it is rather a matter of an indirect action because they are content with purloining a portion of food from honey and royal jelly. Because of this behaviour, the Braulidae are considered by some authors as being commensals always ready to share out food between him and his host. Other authors, however, consider them as parasites or even ectoparasites. Alexeenko and Bakay for instance deem Braulidae's presence on bees and especially on queens to be a real "parasitic disease".

There is a most rich bibliography on the Braulidae morphology, anatomy and biology, as well as on the geographical distribution of their different species known up to the present. It is Örösi Pal's special merit to have studied many years long and still does at present — these diptera. The morphological study carried out by Dukov and *Braula orientalis* found in Bulgaria and defined as such by Örösi Pal substantially contributes to enriching and completing our knowledge in this respect.

The species first known was *Braula coeca* designated in this way by Nitzsch who erroneously considered it as being eyeless. This species particularly lives and develops in Europe. Other species have been identified afterwards in different zones. Schmitz identified *Braula kohli* found by Anhart in Africa and Orösi Pal determined other three species as follows : *Braula schmitzi* found in Georgia, Turkey, Israel, Portugal, Brazil, Argentina, some regions of Asia Minor and also, according to Toumanoff — in Africa ; *Braula pretoriensis* discovered in South Africa and Brazil, and finally *Braula orientalis* which lives on bee bodies and which is to be found on the coast of the Pacific Ocean, in USSR, Egypt, Israel and — according to Dukov — also in Bulgaria.

All the Braulidae belong to the above mentioned species and lead their life in the hives. They are born there, achieve their evolution cycle, grow to adults, mate and lay eggs. These are laid on the inner capping surface and the cell walls containing honey and — as Dukov remarks — to a lesser extent — even on the empty cell walls and bottom, the cell capping containing brood and finally on the small chassis of the frames as well. The embryonic development and the life of larvae — as Dukov remarks — are rather hampered and almost impossible in the last two cases. As a matter of fact, in the first case the embryonic development of the eggs is troubled and can be stopped by the capping breaking when the bee is born and goes out of the cell ; in the second one, the Braulidae larvae born on the wooden walls of the small chassis of the frame can burrow no galleries as they usually do on cappings — in which they may become chrysalis. Being unable to excavate, the larvae are doomed to perish.

The *Braula orientalis* eggs described and measured by Dukov would differ — as to dimensions and forms — from the *Braula coeca's*. They are far bigger and can attain 0.909 mm in length and 0.548 mm in width on an average and besides would be unprovided with the 2 side out growthes characterizing the *Braula coeca's* eggs, but they possess edges at their two poles.

On the contrary, the dimensions of *Braula orientalis* larvae, chrysalises and pupae described by Dukov would be about equal to them of the *Braula coeca*.

The researches carried out by Koschef on the reactions of *Braula coeca* to the temperature, humidity and light variations are of great interest. The outer temperature — according to the above mentioned author — would have no great importance unlike what happens when it comes to the inner temperature of the hive. The Braulidae can usually be found on the bees staying at the hive parts where temperature varies from 35° to 32°C.

The most favourable humidity to the development of Braulidae varies from 50% to 62%; at a humidity surpassing the highest limit i.e. 62% they are very sensitive to the least variations of humidity (about 2.5%) but their sensitiveness to the lowest limit (50%) is very reduced.

The Braulidae avoid the air draught and have a negative phototropism. They react immediately upon a gradual diminution of the light intensity and this negative tactism tends to sensibly increase when the light intensity is very low.

As already said, the Braulidae live on the bee bodies or more accurately on their thorax where hair is thicker and bees can hardly catch them with their legs. That's the reason why they prefer the queen, but they catch on the worker bees as well. As already shown by Dukov, as well as other authors, the Braulidae prefer rather the young queens and worker bees to the older queens or the foragers. Here are the reasons of this preference. A young queen lays more eggs and consequently it is fed more abundently ;the Braulidae have in their return a more available quantity of royal jelly.

One can also understand what is the reason why they prefer rather the young workers than the foragers. The former offer — unlike the latter which go out continously — a safer shelter and besides it is the bees of the hive which provide the queen with food and receive the nectar from the foragers for storing it in the cells. Therefore, these ones can secure the Braulidae an abundant source of food (honey and royal jelly).

As long as the number of Braulidae on the thorax of a queen or a young bee does not exceed 3 to 6 individuals — which is a limit number — their presence proves nearly ineffectual but if it amounts to some dozens or exceeds a hundred as reported by certain authors, one can understand that the damages caused by the Braulidae by robbing food and irritating their hosts can be most important.

Under such conditions it is obvious that we need efficient means of controlling them.

Tobacco and naphtaline were the first means of fighting against the Braulidae. The former was used by fumigating queens and workers covered with Braulidae whereas naphtaline was poured out on the hive bottom. These means were, however inffective because they did not kill

the Diptera. Afterwards there has been used the Frow mixture since it was noticed that Braulidae were very rarely found in the hives prophilactically or curatively treated with this product.

Alexeenko and Bakai tried more than 20 products which generally proved to be efficient in combating the Braulidae but they were unfortunately noxious to bees. Only the thymol was effective in controlling this Dipter without being injurious to bees.

Kubakov and Velicikov experimented afterwards the phenothiazine action by burning it in the smoker. After having introduced this smoke into the hive, they ascertained that all the Braulidae had died, the product being not harmful to adult bees nor to brood.

Tutelea also experimented kerosene and obtained most satisfactory results. Kerosene must be sprinkeld on an empty hive bottom and walls wherein combs with bees taken from a hive infected with Braulidae are introduced.

Half an hour latter, Tutelea ascertained that the Braulidae had died and fallen on the bottom. The same treatment must be repeated 15 days later.

Dukov's laboratory researches and experiments on hives verified once more naphtaline, camphor, thymol, methyl salicylate, nitrobenzol and phenothiazine action. Here are the results of these researches : excepting the camphor, all these products are effective in controlling the Braulidae. Naphtaline, however, as the earlier authors have already established, is noxious to the bees and nitrobenzol imbues honey and becomes in consequence noxious to man.

Phenothiazine was the product which led to most satisfactory results but, according to Dukov, it would be effective only in controlling adult insects. This substance would indeed, work on the larvae and the chrysalis only temporarily since shortly after the treatment the Braulidae can begin their evolutive cycle.

If in a certain sense the Braulidae may be considered as parasites, it is hard to say the same thing as to the predatory hymenoptera and in particular, the *Philantus triangulum.* These insects should be considered — as already said — as being parasites. These Hymenoptera usually get hold of bees, paralyse them by thrusting their sting especially in the coxa of the first pair of legs and compress the abdomen of bees for obliging them to empty their honey sac containing honey ; then they transport their victim into the nest, where it will be used as food for their emerging larvae.

Philantus makes its nest in the earth where it digs ramified galleries at the end of which there are the cells containing brood. It is in these cells that it carries the paralysed bees which varies from 2 to 6 or more. The female *Philantus* will lay an egg into the ventral part of the abdomen of a victim from which shortly there will be born a small larva to be fed during its development on the bees its mother has put at its disposal.

Alexeenko's interesting report comprises his observations as to the biology of this predator of bees commonly named "bee wolf",

These researches have been carried out within the apiaries in a region of Ukraina particulary infected with this Hymenopter which every year causes very important damages to beekeeping in this region.

According to Alexeenko, *Philantus* appears there between the beginning of July and the first half of August. This is the most favourable period to its development and in consequence it is during that time that the most important damages are also recorded for hives which lose many forager-bees (15—20% and even more). Once this period passed the number of *Philantus* diminishes considerably.

As stated by this author the large development of *Philantus* takes place during the period of the highest temperature (22—26°C) and dryness. The females prefer the zones uncultivated, sandy and clayey. The nests were found round the hives at a distance varying from 150 to 500 m. No nests were found in sown ground. Alexeenko's remarks confirm those reported by other authors as to the nest construction and depth in the earth and the hunting habits of these Sphecidae who are in activity 18—19 hours per day. Mhen flying, the females buzz in a peculiar manner. Bees hearing them realize the danger and take immediately refuge in the hive. Alexeenko ascertained that during the period of maximum development of *Philantus,* bees do not go out all day long but only towards evening between 19 and 21 hours when their enemy left hunting or early in the morning when *Philantus* did not go out of its nest. Under such conditions, bees gather very small quantities of nectar and the honey production is, therefore, very much reduced.

The same author gives figures proving the very heavy damages these Sphecidae can do. In the zones comprising 3—4 galleries each with 2—3 ramifications per sqm the number per hectare of bees killed by *Philantus* amounts to 620,000 corresponding to 15 bee colonies of 40,000 bees each. In an apiary of 20—50 bee colonies where *Philantus'* nests were spread over an area of 0.5 ha this insect killed 5,100 to 6,200 forager-bees per hive corresponding to a rough average loss of 15.5—19.2% of foragers.

In view of the heavy damages caused by *Philantus* it is obvious that we need effective means in controlling it.

To speak the truth, the studies on this subject are few enough so that the researches carried out by Alexeenko are a real contribution to solve this pressing and important problem.

Here are the first means of controlling this insect : to capture and kill adult insects ; to seek the nests and destroy them. In 1938, Till introduced a mushroom *(Absidia orchidis)* into the nests which spread rapidly inside them and killer the larvae they contained.

Alexeenko tried the following products : DDT 10%, HCH powder 12% and finally machine oil containing Chlorophos and HCH 5%. These products were spread on a surface of 20 to 50 sq m round the hives and introduced by way of powder or solution into the galleries of *Philantus.*

By virtue of the results reported. Alexeenko could establish that the machine oil solution containing Chlorophos and HCH 5% is the product which led to the most satisfactory effects. The Sphecidae, indeed, going out or entering the galleries and touching the solution died on the spot.

The results of these works certainly are very interesting and contribute to the research of practical and effective means of controlling the "bee wolf".

REPORT III. D. ON TREATMENT AND DISINFECTION PROBLEMS*)

(Papers Nr. 20, 21, 26 and 33)

Rapporteur : Dr. **J. MOMMERS**
HOLLAND

I have accepted the task to give a critical review of some papers on bee diseases. I only realised what it means compressing into half the volume, included the addition of something of my own, four lectures that are each worth reading as a whole. The more since there is very little common in them.

The four papers are :

E. I. Scripnic : A new remedy and method of application for combating Acariosis in bees.

Marian Cervinski and *R. Nemchuk* : A trial treating Acarine disease by changing the environment.

L. Buza : Experiments regarding the use of certain nutritional pastes, containing drugs.

S. C. Danielean : Apparatus to desinfect honeybee combs containing germs of European foulbrood.

The common thing in the two first mentioned is that they are on Acariosis and the two following on European foulbrood. The paper of Mr. Buza besides goes on American foulbrood and Nosema. So all big four enemies menacing beekeeping all over the world, in the east as well as in the west, are present.

Buza tells that migratory beekeeping is necessary in Hungary. Specialists in bee diseases control all the colonies that are to be moved. Moving bees that have — or are suspected to have — American foulbrood is forbidden.

American foul brood occurs only incidentally in Hungary, and all the colonies that are found infected with *Bacillus larvae* are destroyed.

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* Original text in English.

Using drugs is forbidden. In connection with this — after my opinion — wise practice, I might draw your attention to a recent articole in Bee World by Morse a.o. that warns against the use of sulfa as the spores of *Bac. larvae* are resistant against this drug and infected combs etc. from apparently healthy colonies can be easily spread to other colonies and apiaries. Moreover the drug can get into the honey and be dangerous for human health.

European foulbrood is since 1958 more widespread over Hungary. Against this disease antibiotics were used with good results especially with feeding oxytetracycline (O.T.C.). This remedy not only supresses the infection but also stimulates the ovaries of the queen, just as Tomasec has shown for other antibiotics. This is very advantageous especially when used in spring because the bee colonies come weakened out of the long and rude winter.

More brood and a greater consumption of albumen however stimulates the development of *Nosema*, which is very common in Hungary as well. Using fumagillin gave good results.

I think that the use of fumagillin is still a point of discussion. After my own experiments the condition of the colonies the year before has a far greater influence on the percentage of infected bees in the colonies than the feeding of fumagillin or Nosemack.

Buza remarks that feeding sugar syrup in cold spring weather has an adverse effect. That is why he composed a feeding paste that contains powdered sugar, OTC, fumagillin, vitamins and trace-elements. The experiments have shown that OTC and fumagillin do not influence each other in an unfavourable sense. They remain efficient for 6 months.

In Hungary a feeding stuff for domestic animals called Erra contains 6% OTC. This is much cheaper than the pure OTC and therefore the paste is now composed as follows : to 15 kg of powdered sugar is added 50 g of a 6% OTC containing product and 0.5 g of fumagillin. This paste is packed in plastic bags containing 1,5 kg. The bags are placed with the open end on the top bars of the colonies. In about 14 days it is eaten. Each colony gets 3 kg.

OTC alone is not a remedy against *Nosema* but it hinders the development in some way, maybe because it stimulates egg laying and the growth of the colonies. European foulbrood did not develop in any of the OTC treated colonies.

European foulbrood is likely to occur in Soviet Union and especially in the republic Armenia where Danielean works.

Feeding remedies alone is not sufficient in combating this disease but sanitary and prophylactic measures should be taken as well. Severely attacked colonies should be removed to new or disinfected hives and the combs melted down, although many of these combs have an economic value. As the building of new combs by a colony is limited to a certain number, melting combs may have a restricting influence on colony strength and so on honey production.

As a weak infection with European foulbrood is not always observed it may happen that infected combs get between extracted combs. By giving these combs to the colonies next spring the disease is spread all over the apiary.

What we need is a good and reliable method of disinfecting combs. Ultraviolet rays are known to have a bactericidal effect. Danielean used mercury-quartz lamps (PRK-2, PRK-4, PRK-7 and the lamps BUV-30 and BUV-60P). On using these lamps the temperature of the combs rises to 78° and a ventilator has to be installed that keeps the temperature down to 33—36°. BUV lamps are easier to work with. That is why they were tried on cultures of *Bac. plutom, alvei* and *Streptoccus apis.* All these are killed when irradiated from a distance of 5 cm during 10 minutes. On artificially infected combs all bacteria were killed using this method. This was also the case in naturally infected combs. Such treated combs were given to healthy colonies and no disease developed, whereas a colony that got an untreated comb became heavily infected.

The apparatus used consists of the following parts :

An oblong aluminium reflector, four lamps : two BUV-30 and two BUV-60 on a wooden standard, covered with aluminium for a better reflection. Further a box with six accelerators, four for two BUV-60 and two for two BUV-30 lamps.

The lamps should be switched on 10—15 minutes before the disinfection work begins.

The vegetative forms of the bacteria causing European foulbrood are killed in 1 min. when irradiated from a distance of 30 cm. The spores of *Bac. alvei* however need to be treated 10 minutes from a distance of only 5 cm.

It is advised to treat every year not only the combs that are taken from the diseased colonies but also all the reserve combs.

What interests me is the cost of all this. Ultraviolet lamps are rather expensive. Most of the smaller beekeepers will not be able tu buy and use such apparatus. So there will be needed several disinfecting stations with sufficient capacity and workers, the transport costs are to be added.

Maybe all this is more economic than melting down the combs.

I hope that at the next congress we will be informed on this side of the matter.

The paper of Scripnic deals with Acarine disease in Crimea. During the last 10 years many colonies were severely damaged. The disease spreads slowly over the region.

I might draw your special attention to this statement on the damage that is done by Acarine disease. In the last years there were some publications that try to minimize the bad effect of the infection with *Acarapis woodi.* I don't agree with the authors because I saw several times the disastrous results of this disease.

In the Crimean region during the last five years 20, — 30,000 colonies were under control and samples of the bees were dissected. 580—234 diseased colonies were found.

As the main reasons for the spreading of the acariosis are mentioned : The refusal of some beekeepers to follow the quarantine measures, too late discovery of newly infected apiaries and the unsufficient results of the formerly usual treatment with a mixture of nitrobenzene and methylsalicylate.

Methylsalicylate on the top of the colonies during summer gives a recovery of 80—100%. As a result of this treatment the queen stops egg laying, brood in all stages is killed and the colonies are weakened. Methylsalicylate through the flighthole gives no result at all. A mixture with nitrobenzene during winter causes excitement and often the death of the colonies.

Now I ask myself : hadn't it be better 10 years ago to kill the diseased colonies just as Buza advises for American foulbrood ? Of course this should go together with an intensive control of all the colonies in the suspected region. I know that many of you won't agree when I answer this question in the affirmative. Nevertheless I dare say it because in the Netherlands we got very good results with this method. I think that in all cases where there is only an initial or incidental infection, killing all the affected colonies together with all the colonies in the same apiary is the best practice. It might be even cheaper than using chemicals as Feiling remarked at the congress in Madrid 1961.

As the mixture of nitrobenzenne and methylsalicylate was not satisfactory, Scripnic tried several other chemicals e.g. kelthane, phencoptan, sulfenol, tedion, aramite, endocide, radocide, aethersulfonate, paradichlorobenzene, inglon etc.

The results were compared with the methylsalicylate — nitrobenzene mixture and Folbex treatment and control colonies. The influence on mites and bees of all these stuffs was investigated, colonies were treated with them and 50 bees of the infected hives were dissected to see the results.

A few of these chemicals were used before by other workers. Aramite is known by the work of Professor Koch in Belgium and sold under the name P. K. Van Laere also from Belgium advised Kelthane as a remedy against Acariosis (1960).

I myself tried Tedion, Kelthane, Chlorbenzilate (Folbex) and a few other chemicals not in burning them but feeding them to the bees in sugar syrup. The results were, compared with Folbex in the traditional way, as good but there always remained some 1 or 2% infection even after a prolonged application.

Folbex was administered in Crimea on 2903 colonies during the months April-June. It is fully harmless for the bees and the mites were killed for 98—100%. In the months September-October, Folbex is only 25% effective and there are many queens lost.

Tedion is also quite harmless for the bees and very effective against the mites. Tedion was used for the treatment of 3551 diseased colonies in 46 apiaries. The results by application in spring or summer are 94—100%; in autumn only 60—40%. Tedion cured 3340 colonies in 43 apiaries in 1962—1964. As a result of this there was a considerable increase of colonies in this region.

Tedion is applied by burning it in the smoker at which a tube of about 20—25 cm with at the base a width of 6 × 3,5 cm is fastened. The free end can easily be introduced into the flighthole. In the evening when all the bees are inside the hive 20—30 puffs with the smoker are given. Then keep the flighthole shut for 5—8 hours. All the crevices of the hive should be filled up with clay. This treatment should be repeated ten times every other day. Tedion is made in tabloid form, containing 50% of the stuff, so that it will easily burn. Two grams are sufficient for one treatment of a hive with 10—20 frames.

Cervinski observed that on a height over 600 m above sea-level no acarine disease was present. For that reason he placed three colonies of which the bees were 100% infected with mites at this height in the spring of 1963. In the autumn only 75% of the bees contained mites. In the spring of 1964, 40% of the bees were infected and in 1965 only 17%.

Jeffree suggests that acarine disease is dependent on the climate and gives world cards on which regions are drawn where the disease is likely to occur. In the regions with a land-climate this is not the case with the exception that at higher altitudes the conditions may be more suited for *Acarapis woodi*. This is in apparent contradiction with the observations of Cervinski.

Maybe that the further investigations Cervinski intends to do on climatic and hydrographic conditions in the mountains will make it clear that in this region the conditions in the mountains are quite different from what we expect.

When I try to summarize, I might say that European foul brood may be cured by using antibiotics. The results may be much better still if the spare combs are disinfected with ultraviolet rays.

I think that a warning not to use more chemicals than is absolutely necessary is at its place. When antibiotics get into the honey it may be dangerous for human health.

As regards Acariosis there are several remedies that kill the mites entering in the tracheae. It is very difficult however to kill all the mites. We may be glad that we do not depend on one remedy because the chance that resistant mites develop is surely there. In those regions where acarine disease is so commonly present that remedies must be used I might advise to change now and then the chemical used e.g. Folbex — Tedion — Kelthane.

For countries where mountains higher than 600 m are present it might be interesting to investigate if acarine disease is present at this height and if colonies may be cured by only moving them for some time to the mountains.

REPORT III. E. ON LEGISLATION AND SANITARY VETERINARY CONTROL PROBLEMS*)

(Papers 7 and 12)

Rapporteur : Dr. **R. KOSTECKI**
POLAND

Among the prospective problems connected with bee pathology about which Dr. Rousseau, the chairman of the Standing Commission on Bee Pathology spoke there is also the draft of the new international code of the sanitary and veterinary protection of bees. As a starting point we propose to discuss this problem by analysing the three steps for fighting against bee diseases already presented by the delegates in their reports and especially by L. Adam, the President of the National Beekeeping Sanitary Federation in France.

The interest the sanitary beekeeping associations are taking in this problem of working out unique laws for apiculture is confirmed by Dr. O. Feilling's words : "Decree for controlling foul brood and infectious diseases in bees" dated 28 July 1964 and by my report on "The organization of the control of bee diseases in Poland". In France, in the German Democratic Republic and in Poland, the Board of Agriculture has already made the necessary arrangements (for example, such provisions concerning the most dangerous diseases in bees : American foul brood, European foul brood, acarine disease, have been put into operation since 1964) for some compulsory proceedings to be introduced in beekeeping practice in view of controlling the diseases mentioned above.

The arrangements are a step forward in enlarging the possibilities of a high-grade development of beekeeping which still depends in many respects on the sanitary condition of apiaries. The holders of apiaries are henceforth obliged to inform in the shortest time (within 24 hours) the veterinary surgeon of the district of any American or European foul brood and acarine disease case, and also of those suspected. At the same time they are obliged to take necessary steps to prevent the spreading of these diseases. In case the beekeepers discharges his duties and the veterinary surgeon recommends to destroy the infected apiary the former will receive a renumeration equal to 3 fourth of the value of the apiary distroyed.

The veterinary department has to pay attention in choosing the ways and method of treatment and its observance and in preparing the means of desinfection.

After these diseases are officially declared (American or European foul brood and acarine disease) a quarantine is ordered for the respective apiaries. All the transactions on bees, as well as those involving honey produce and equipment from the infected area are automatically forbidden. The fulfilment of the prohibition is enforced by sanctions. The quarantine may be suspended after the time limit, i.e. as soon as the disappearance of the infectious disease has been officially ascertained as a results of the application of the measures judiciously applied to removing the contamination of the apiary.

* Original text in German.

Starting with 1961 there has been necessary to set up in Poland within the framework of each department for veterinary hygiene, attached to the regions (voevodates), laboratories charged with the analysis of the bee diseases. A special apiculture veterinary service has been set up in this way within the frame work of the sanitary protection of beekeeping. The department of the useful insects coordinates and watches the activity of these laboratories both for the diagnosis and their scientific activity.

The problems devolving upon these laboratories are the following : they investigate as soon as possible the samples sent to them, keep permanently in touch with the veterinary surgeons of the region and district in view of organizing the control of bee diseases in the respective area and closely co-operate with the apicultural organizations in order to jointly remove the epizooties in bees. The educational activity of the laboratories is illustrated by a rich program of studies on the problems mentioned above aiming at introducing in the program of some years of study of the lectures needed for the training and improvement of a corresponding number of specialists in bee diseases, whose activity should thus cover the whole territory of the country.

Besides this, the laboratories are kept at the beekeeper's disposal attending all the serious cases requiring special knowledge. The laboratories' analyses are sent in copies both to the veterinary surgeons of regions and districts and the Institute for Scientific Researches. Based on this information and on its own, the latter worked out a yearly epizootic map for the whole country.

Within the competence of this Institute fall works of scientific research, a big propaganda campaign and the organization of lectures for the veterinary staff and beekeepers ; its also works out the educational material such as : text-books, articles of popularized science, radio lectures, documentary films, slides, etc. The beekeepers' Association in Poland comprises strong and active organizations which closely co-operates with the veterinary service. An example in this respect is the activity of these 2 bodies in view of creating a staff of specialists to control bee diseases in various zones.

At the same time, these associations are an auxiliary personnel at the disposal of the veterinary surgeons in the domain of the sanitary control of apiaries in the respectives zones of the district. The training of these specialists is carried on under the guidance of the laboratories diagnosing bee diseases which depend on the Institute for Veterinary Hygiene in the respective region. Among the problems to be solved by the specialists we quote the following : the inspection of the hives in menaced areas or those suspected of contamination at the owner's request (e.g. in view of a migratory beekeeping ; for gathering samples from the hives suspected of contamination, for carrying out the destruction of hives or the treatment under the supervision of the veterinary surgeon).

The remuneration of the specialist's work is made according to the regulations recently endorsed by the Veterinary Department. This amount, to 10 Zl. per hour to which there is added an extrapay covering the transport expenses. Migratory beekeeping is permitted on two con-

ditions : 1 — a sanitary certificate and 2 — a recommendation from the Beekeepers' Association, indicating the respective zone of gathering. The specialists of the Associations also check the health certificates of the apiaries moving in the territory within their competence. The possibility, therefore, to discover the contaminated apiaries and to prevent the spreading of the diseases in bees is in this way secured.

It is desirable that the apicultural legislation in different countries should be unified in the future. Unification measures should refer to the following problems :

1. The designation and definition of bee diseases coming under the regulations.

2. Sanitary control measures for bee colonies exportation : *a)* at point of departure ; *b*) at frontiers : *c*) at point of arrival.

Such a plan should therefore be accomplished in two stages :

The first : the establishment of organizational regulations for the sanitary control through the agency of the Beekeepers' Association in each country.

The second stage should be the elaboration and adoption of some principal provisions and their application.

In my opinion, the new international beekeeping code should have the following chapters :

1. The importance of this document and the necessity of controlling bee diseases on a world scale.

2. Measures regarding certain diseases according to their characteristic features in different countries (geographical, epizootic, economic etc.).

3. Protection of the state frontiers. According to Prof. Poltev's declaration, diseases have no frontiers. Protection of the frontiers is a task pertainig to international co-operation. It should be emphasized that the one-sided measures taken by a certain country cannot be effective. It is absolutely necessary that extremely severe measures should be applied on both sides of the frontier.

4. Sanitary Control measures for importation and exportation.

I took the floor in order to stimulate the discussion on the problem of the standardization of apicultural sanitary legislation and of its improvement. I think that the proposal to finalize this sanitary draft regulations meets with the Congress' approval, so that this matter may be discussed at the present Congress. The draft proposal which will be elaborated on the basis of these discussions is to be forwarded to the International Commission on Bee Pathology and other specialists belonging to the member countries of Apimondia. It is desirable that the material regarding this problem should be discussed by the standing Commission on Bee pathology within its next year ordinary session.

The approval and definitive adoption of this document will be then made by the International Epizootic Office.

Any country however will be able to study and adopt this document in part or on the whole, according to its specific character.

The drive of controlling bee diseases thus organized might become effective and so any state could make a valuable contribution to the raising of rentability in apiculture.

SYNTHESIS OF THE DISCUSSIONS ON THE PAPERS PERTAINING TO THE COMMISSION ON BEE PATHOLOGY

Joint Chairmen of the 1st working meeting :

Dr. R. BARNES, *England*
Dr. F. BARBIER, *Belgium*
Prof. Dr. G. GIORDANI, *Italy*
J. L. GUILFOYLE, *Australia*
Dr. R. KOSTECKI, *Poland*
Dr. P. MORUET, *France*
Dr. A. POPA, *Romania*

Dr. A. POPA (Romania) is in the chair

Prof. Dr. M. Rousseau (France) opens the lat working meeting of the Commission on Bee Pathology, pointing out that the synthesis reports will be considered under sections as follows ; bacteriology, toxicology, parasitology, treatment and hygiene, apiarian sanitary legislation.

Prof. A. Toshkov (Bulgaria) reads the synthesis report on bacteriology problems.

In the ensuing discussions, prof. Lauer Galand (U.S.A.) asks prof. A. Toshkov if the American foul brood can be transmitted by imported honey.

Prof. A. Toshkov points out that this is possible since the spores of bac. larvae can survive after a long time in honey originating from bees infected with American foul brood.

Prof. Dr. Trilenco Valentina Akimova (U.S.S.R.) taking the floor raises some very interesting problems on infectious pathology of bees. After a short historical survey of the development of world wide investigations concerning the etiologic agent of infectious diseases in bees, she refers to the difficulties the experts meet with due to an inadequate knowledge of the natural microflora of bee — colonies and to the role played by the so — called conditionally pathogenic micro-organisms. She draws the attention to the need of further study of the vectors of conditionally pathogenic agents which constitute a first rate means of spreading infectious diseases as also to the necessity of determining an early diagnosis of the diseases.

The study of morphological and serological peculiarities of all germs which are potentially capable of causing an infectious disease in bees will permit a correct classification and the utilization of an appropiate nomenclature. The speaker sets forth afterwards in short the problems which are at present investigated at her Department and which actually are centered around the veriability of pathogenic micro-organisms for bees, some bacteriophage phenomena, etc.

Dr. V. Salkoski (U.S.S.R.) in referring to the theses presented in the synthesis report, states his agreement with the studies carried out on the role the exogenous pathogenic agents play in releasing diseases. However, he stresses the necessity of studying the influence of some hereditary exogenous factors on the release of morbid phenomena. He proposes a study — through the Bee Pathology Commission — of some hereditary diseases among which some anomalies would also be included.

Dr. Al. Popa states that the presidency will propose the Commission on Bee Pathology a profound study of the problems related to the hereditary pathology which in fact is very actual in other fields of comparative pathology, too.

Mr. Ekberg (Czechoslovakia) takes up for discussion by the experts the problem of the influence of various hive stuctures on the health of bees considered under the zoo-hygienic viewpoint.

Mr. G. Heinze (German Democratic Republic) in his position as old practitioner shows that he met with many difficulties in controlling the American foul brood. He expounds the practical steps he applied by using the sulphatiazol in concentration of 0.5 g/per litre together with a complex of other concomitent measures.

Prof. Dr. A. Toshkov brings out the efficiency of the therapeutical procedure used by Mr. G. Heinze, which as a matter of fact is widely in use in other countries.

Further on Mr. Hachsell takes the floor and shows that the location of the apiaries in very humid areas predisposes bee colonies to the American foul brood.

Prof. V. I. Poltev (U.S.S.R.) expresses his agreement to the problems raised by the synthesis report and emphasizes some aspects of the scientific research work related to the etiology of infectious diseases, immunologic resistance as well as to the factors interrupting the balance between host and microbes thus favouring the apparition of the disease.

He states "I am pleased to note that the majority of the scientific works on which the synthesis report is based have been achieved by applying modern techniques of microbiology, biophysics and histochemistry and therefore the presented results had a high scientific standard".

The introduction of tissues culture for the study of pathogenic viruses in bees as well as the study of yeastform fungi has gained ground by the works carried out by Soviet, Romanian, French and other experts.

The speaker points out the contribution of the works presented to the Congress by the experts from his country. At the same time he makes proposals in connection with the tasks assigned to the Commission on Bee Pathology with a view to working out an international draft on apicultural sanitary legislation.

Dr. I. Danciu (Romania) suggests that the Commission on Bee Pathology of Apimondia make a study of the spreading aera of the American and European foul brood.

Dr. K. Dreher (Federal Republic of Germany) is given the floor to expound the synthesis report on the toxicology problems.

In the ensuing discussions Dr. P. Haccour (Marocco) taking the floor suggests that besides the aforesaid toxic products certain repulsive products should be also taken into consideration as advantageous solution from the economic point of view.

Dr. R. Bovey (Switzerland) expounds his experience in preventing bees from poisoning and emphasizes the need of promoting certain selective phyto-pharmaceutical substances and of popularizing the legislation for protecting bees.

Eng. P. Horguelin (France) imparts his vast experience in connection with the protection of bee-colonies against insecticides during the rape flow. The speaker makes an excursion into phytopathology and especially in pest biology of agricultural crops showing the optimum time for their control with the least losses to apiculture. He also emphasizes the selective value of toxaphen which gave satisfactory results in France.

Dr. K. Dreher gives answers to the problems raised during the proceedings supplementing with further details the synthesis report.

The president announces that the synthesis report under the section on parasitology, drawn up by prof. Ida Giavarini, will be given by prof. G. Giordani (Italy) the latter apologizes on behalf of the author who could not participate in the Congress because of her bad state of health.

In the ensuing discussions Eng. Leandru Vadim (Romania) asks for explanations regarding the biology of the pest "bee wolf" which has been dealt with Prof. Alexeenko's (U.S.S.R.) paper. Prof. Alexeenco takes the floor and in reply to this query gives important particulars on the biology and control of this pest.

Dr. I. Bogdan (Romania) sets forth some practical aspects concerning the control of food intoxications and of certain invasion diseases.

Mr. Y. David (Israel) brings out the damage caused by wasps to bee colonies in his country and the measures applied for its prevention.

In closing the debates, Prof. Dr. M. Rousseau takes the floor and expresses his thanks to the Joint chairmen for their competently conducting the proceedings of the first three sections, to the rapporteurs and all he participants in the discussions. After an interval there were started the proceedings of *the 2nd Meeting of Commission.*

Joint chairmen of the Second Meeting :

Prof. Dr. J. SVOBODA, *Czechoslovakia*
TH. JACHIMOWICZ, *Austria*
Dr. O. MOMMERS, *Holland*
WAFA ABDEL KHALEK, *United Arab Republic*
Prof. Dr. V. I. POLTEV, *U.S.S.R*
Prof. NEDEALCOV, *Bulgaria*
Dr. STECKE, *Federal Republic of Germany*
Dr. FEHILLING, *Federal Republic of Germany*

Dr. FEIHLLING is in the chair

The first part of the meeting is devoted to the synthesis report on the treatment problems and disinfection given by Dr. O. Mommers.

In the ensuing discussions Mr. F. A. Laverhin (U.S.S.R.) asks questions on the results and prospects for the future of controlling the acarine disease taking into account the ontogenic development of the pathogenic agent and the host.

Dr. Mommers shows that the method of biological control of the acarine disease is possible but its area is limited and in his opinion it does not result in a total healing.

Mr. Lefort des Ilouses (France) expresses his satisfaction that the influence of altitude on the healing of the acarine disease has been mentioned and considering the importance of this matter asks for supplementary details.

Mr. Stecke (Federal Republic of Germany) refers to the role of altitude in controlling acarine disease. A series of experimentally infested apiaries have been kept at an altitude of 600 m without observing a total influence on the eradication of the disease. The speaker further shows certain new aspects of the acarine disease control problem in connection with some recent discoveries concerning the parasite's ecology.

Docent Nedealcov (Bulgaria) lays before the participants the results obtained by experts in his country in the control of acarine disease and American foul brood.

Then, Dr. Feihling announces the closing of the discussions in connection with the report presented by Mr. Mommers and then gives the floor to Dr. Kostecki (Poland) who gives the synthesis report on legislation and sanitary-veterinary control.

In opening the discussions the chairman gives the floor to Prof. Dr. Alexeenko (U.S.S.R.) who points out that it could be worthwhile discussing in detail the sanitary veterinary measures for controlling acarine disease, which are being applied in Poland and which aim at destroying diseased colonies as a means of security. In his opinion based on multiple experiments on the spreading way of these two diseases, the results set forth by the rapporteur are universally valid.

Dr. W. Fritsch (German Democratic Republic) is of the opinion that the present legislation on disease prevention and control is out of date and needs to be revised. He further proceeds to expound extensively the results obtained in bee diseases control and notably in controlling the American foul brood. While he agrees with the destruction of diseased bee colonies in the case of this disease, he shows that as far as the European foul brood is concerned the measures for controlling it are much more successful.

Mr. Gratias Ntenga (Tanzania) refers to the control of European foul brood with the help of streptomycin and teramycin under the conditions of a complex of biological and hygienic measures.

Dr. Eva Crane (England) shows the necessity of making thorough studies on certain specific zones regarding the development of beekeeping. „Such regional studies" she says, "must always involve three things : 1. the local bee races and strains, 2. the flora useful to bees, 3. the honey the bees produce". "It is very good for instance to learn at the Congress of the state of affaires in relatively undocumented countries such as North Korea, Albania and Malagasy Republic".

Further, Mrs. Eva Crane gives a short account of the Bee Research Association mentioning that "it works in collaboration with scientists and beekeepers in about 90 different countries of the world. It publishes three international journals" keeping abreast its readers with the development in bee science and beekeeping.

In winding up the proceedings, Prof. Dr. M. Rousseau (France) shows that they have taken place in the most favourable conditions, their contents having a high theoretical and practical value and for all this in his capacity of chairman of the Commission he thanks all the authors and participants to the discussions and the whole attendance as well. He thereafter invites the experts to see the film "Tissue Culture in Non Vertebrates" produced by Prof. C. Vago (France).

REPORT III. F. ON HONEY, ROYAL JELLY AND POLLEN PROBLEMS*

(Papers No. 8, 42, 43, 44 and 48)

Rapporteur : Prof. Dr. **M. GAUTRELET**
FRANCE

The beneficial effects of melliferous products in therapeutics are already well known but lately they are the object of new interesting themes, which tend to illustrate their unquestionable value.

Two series of researches refer to their impact on liver ailments, one on infectious diseases, another on their efficiency in prostate ailments and finally one on adrenal glands.

1) Impact on liver ailments.

In connection with the above, two highly qualified works are mentioned : one, modestly entitled : "Preliminary researches regarding the employment of certain bee products in auxiliary therapeutics of hepatic pathology", published by our distinguished colleague Dan-Valter Stamboliu, refers to the impressing figure of 4,169 cases. We must actually congratulate this excellent practitioner highly qualified in contagious diseases, and a beekeeper himself, for his efforts demonstrating the very encouraging effects, obtained as a result of honey, pollen, virgin wax and royal jelly prescriptions not only to patients with acute liver troubles (epidemical infectious from) but also to those in the chronic stage. Undoubtedly, it is not possible to replace the ordinary medication treatment but only of introducing these elements of bee products in the patients, diet, which tend to modify cell metabolism, especially in the Krebs cycle, to the level of disturbed liver functioning.

A first group of 124 patients, a second group of 344 cases, another lot of 463, thoroughly checked, clearly indicate the basic truth of these investigations and thus the recommendation for the use of honey to both acute and chronic patients and especially the use of pollen and other bee hive products.

Identical views of great interest are held by our friends, colleagues Ialomiţeanu, Hristea, Butoianu, Călin and Lucia Oniţiu, but they are generally concerned with results obtained in administering pollen.

This valuable communication being entitled : "Pollen, as substitute-medication in liver cell affections", concerns the replacement of classic therapy in liver affections by pollen administration. In the "Prof. Victor Babeş" hospital in a number of cases, 23 grams of pollen, mixed with honey have been administered. The aminoacids and vitamins, especially of the B group contained in pollen, provide the equilibrium factors, which compensate for the deficiencies caused by liver metabolism disturbances, equilibrium hard to obtain by ordinary classic treatment.

Patients stand well a 25 g daily prescription.

* Original text in French.

If we are permitted to add our comments to the above two valuable communications, we would remind you that such considerations were sustained in Prague, two years ago, on the 15th and 17th of August and we cannot but be glad to observe that today competent clinical practitioners add their support to that thesis. We extend our sincere congratulations.

2) Two years ago in Prague, the net influence of administering honey in infectious cases due to the presence in honey and especially in royal jelly of strong antibiotics, was strongly presented. This is exactly what our eminent colleague Dr. Stoimir Mladenov — Bulgaria, confirms and whose remarkable communication is entitled "New facts concerning the curing elements in honey".

The haemolitic and golden staphylococcus, the haemolitic streptococcus and many other germs were studied and reported to the germicide properties of honey and its bacteriostatic, anti-inflammatory and anti-allergic qualities.

A number of 3200 patients bring proof to these constant effects, and it is therefore indicated that honey be prescribed in cases of infectious syndromes on a large scale, in general medicine practice.

I make no reserve in admitting these conclusions, totally seconding the opinion of my colleague Dr. Stoimir Mladenov. Permit me to add that in France, honey mixed with royal jelly is generally recommended, the latter being believed to be richer in antibiotic substances than honey. We also wish to praise the work report of our colleague from Kustendil, Bulgaria.

3) Prostate disorder, especially the adenome, is the object of an interesting study of Alin Caillas, beekeeping engineer. Based on a Swedish report, this researcher refers to the effect of pollen on prostate disorders and the product sold in Sweden, under the trade name of Cernilton, seems to have given not only promissing efects, but checked and uncontested results, in a 15 gram per day administering dose.

4) Finally, a report published by Belvefer and Gautrelet indicates that royal jelly has an uncontested action on the superrenal gland. Histological sections, especially made by Dalion from the Paris Faculty, indicate important changes in the tissues of this endocrine gland, at cortical and medullary levels.

If large doses of royal jelly are administered, especially in grave affections or in states of pronounced astenies, it is recommended that it be mixed with adrenal gland extracts. The mixtures of royal jelly and Cortine proves to be excellent in a large number of infectious and haemolitic cases.

On the basis of these very thorough reports, we can conclude that the hive's products, in either honey, pollen or royal jelly presents special interest in therapeutics. It is not contested that pharmacological medica tion has its own value, but their toxical influence seems to be parallel with their efficiency. Nothing similar happens in diets, even in large doses. This is why we conclude on the basis of the reports presented by qualified researches that is it indicated to add to present therapeutics a judicious diet based on the virtues of hive products.

REPORT III. G. ON BEE VENOM AND PROPOLIS PROBLEMS*

(Papers No. 15, 16, 34, 36, 37, 45 and 51)

Rapporteur : Prof. Dr. **N. M. ARTEMOV**
U.S.S.R.

This report is a synthesis of the data comprised in the papers presented to the Congress, dealing wiht the study of bee venom and propolis. This synthesis is made in accordance with the latest achievements of the world science.

I. BEE VENOM

Of all the bee products, the bee venom was the most largely used as a therapeutic means. Its therapeutic efficiency is now proved by minute clinical research and can no longer be doubted by anyone. The pharmaceutics industry in many countries produces starting with 1927 — therapeutic preparations from bee venom with which millions of patients were treated concomitantly with pricks by bees. Bee venom was used until now as a therapeutic means in a series of selftreatments in popular medicine without any indication given by the physician.

Owing to this fact, we have no precise image of the actual therapeutic utilization of bee venom.

Roughly speaking, the number of men and domestic animals stung by bees is particularly great and the consequence of these casual stings often require the physician's intervention. Intoxication and even lethal cases as a result of the innumerable pricks by bees as well as serious allergic reactions to bee venom are quite frequent. All this leads to the conclusion that the scientific research on bee venom and its action on the human body and animals is of great importance to human and veterinary medicine. Therefore, this problem can be solved in all respects only by the common efforts of the representatives of many branches of natural sciences and medicine. Unfortunately until now the number of the research workers of various specialities dealing with the study of the bee venom is still very far from being sufficient and not in agreement with the importance of the debated question. In this matter practice surpasses theory, and faces it with ever newer problems.

At present, the following problems and aspects of the study of bee venom seem to us to be the most important : 1. reasearch of the process of the formation of bee venom inside the body of the bee and elaboration of a method, based on the knowledge obtained, for preparing bee venom on a large scale in beekeeping ; 2. division into fractions and study of the chemical composition of bee venom ; 3. observation on the

* Original text in Russian.

resistance of the most important component elements of the bee venom towards external destructive actions in order to find the methods of processing and purifying bee venom. These methods must assure the biological and therapeutic properties of the medicines prepared on the basis of bee venom ; 4. study of the pharmacological properties of bee venom and biological and biochemical analysis of the action of bee venom on human beings ; 4. immunological characteristics of bee venom and of its component elements ; 6. clinical research of the therapeutic properties of bee venom and elaboration of the medical and biological synthetic theory concerning the therapeutic and prophylactic action of bee venom. We shall begin our synthesis with the data referring to the last of the above mentioned problems.

The clinical study of the therapeutic action of bee venom during the last hundred years led to the accumulation of a great amount of actual data which allow us to establish the indications and counter-indications concerning the application of bee venom. Based especially on the data furnished by Professor G.P. Zaitzev and his co-workers (A. A. Arkhanghelski, V. T. Poreadin), the Soviet research workers accept the following indications with regard to bee venom application : 1. rheumatic diseases (rheumatic polyarthritis), rheumatic diseases of the muscles ; 2. infectious arthritis and polyarthritis (rheumatoide) ; 3. deforming spondiloarthrosis ; 4. diseases of the peripherical nervous system (radiculitis), neuralgia, neuritis and polyneuritis etc. ; 5. trophic ulcerations and granulous wounds ; 6. vascular surgical diseases (trombophlebitis without infectious process, endarteriosis and atherosclerosis of the peripherical blood-vessels) ; 7. inflammatory infiltrations (without ulcerations) ; 8. bronchic asthma ; 9. headaches ; 10. hypertonic disease ; 11. irritations and irridocyclitis.

Among the counter-indications we mention : idiosyncrasy towards bee venom, infectious diseases and especially tuberculosis, liver and kidney diseases (especially nephritis and hematuria diseases), pancreas diseases, Adison disease, septicaemia, suppurating acute diseases, decompensation of the cardiovascular system, general exhaustion, blood and hematopoesis diseases.

These indications are well substantiated and confirmed by many other authors. At present, the clinical research which simply ascertains the therapeutic effect in the diseases mentioned above, must give way to studies aiming at answering the question of how and why bee venom exerts a favourable influence on one or the other of the diseases and how it removes one or the other of their symptoms.

We do not intend to say that the clinical observations on the therapeutic effect of bee venom could be of no use and that no works on this problem should be published. On the contrary, such observations can be a valuable contribution to completing the data accumulated until now and explaining the known facts from a new point of view. These considerations refer entirely to the work presented to the Congress by the Bulgarian research workers V. Mladenov and V. Kazandjiev ;

this work is elaborated on the basis of the experiments carried out in the balneology sanatorium of the town of Küstendil. The authors expose the result of their experiments regarding the therapeutic application of the preparation from bee venom (produced in Bulgaria) in inflammatory diseases of the peripheric nervous system (108 patients), in rheumatic and rheumatoide arthritis and deforming arthrosis (91 patients). The bee venom was introduced into the body under the form of ointment by anointing the skin or by means of the ionophoresis. The authors consider to have obtained good results in the treatment. They observed an improvement in the general condition of the patients namely the number of the erithrocytes and haemoglobin rose while the sedimentation speed of the erythrocites and the cholesterine level in blood diminished.

The conclusions which are in agreement with the data obtained by other authors, confirm them and prove the therapeutic action of the Bulgarian new preparation from bee venom. The value of this work also lies in the fact that during the experiments, bee venom was introduced into the body by means of the inophoresis which, as known, is still insufficiently studied.

Unfortunately the authors do not mention the number of patients treated with this preparation introduced by ionophoresis nor that of patients treated by the method of anointing the skin with pomade, nor do they compare the results obtained by these two methods.

Rather interesting are also the data obtained by the authors concerning the influence of bee venom on cholesterine in the blood of the patients. However, this problem can not be considered solved as long as the scientific iliterature comprises contradictory data. Therefore, accumulation of actual data about this problem must de continued. Dirr and Graeber (1936) established that the cholesterine quantity in the blood of the patients suffering from rheumatism and treated with bee venom (massage with forapine pomade) increase considerably. But the Romanian research workers (Urechea, Manta and Bumbăcescu 1937) and the Soviet ones (Erusalimehik, 1939 ; Kononenko 1955 etc) reached conclusions diametrically opposed to those of Dirr and Graeber. Special researches concerning this problem carried out by V. M. Karpitzkaia (Iaroslav 1963) showed that the modifications of cholesterine in the blood of the patients suffering from hypertonic disease treated with bee venom (Soviet ointment preparation Venapiolin) are not permanent. In some of the patients the cholesterine level in the blood increased, whereas in others it diminished. The data obtained by Mladenov and Kazandjiev point out again the ability of bee venom to reduce the cholesterine quantity in the blood. It would have been desirable for the authors to present this material expressed by figures, statistically worked out.

Of great interest is also the paper of Fr. Kuthan (Brno, The Socialist Republic of Czechoslovakia).

This work is devoted to the treatment with bee venom (Virapin preparation) of the muscle articulations and of the peripheric nervous system. On the whole, 284 patients were treated.

The positive effect of bee venom on these diseases was already known formerly. The value of this work lies in the comparison of the therapeutic action of bee venom with the corticosteroide, as well as in the fact that bee venom was used in combination with hydrocortison acetate (H.C.A.). The difference established by the author between the effect of the Verapin administered by cutaneous injections and that of the same preparation administered by intraarticular injections is also interesting.

The rheumatoid arthritis being a serious disease (86 patients) yields only wiht great difficulty to the treatment. It is only by means of the Virapin introduced by cutaneous injections that the authors succeeded in obtaining some improvement in 1/3 of patients, first shown by a decrease of pain, then by an improvement of ankylosis and finally by a very small diminution of exudation.

Taking into consideration the fact that the majority of the patients had been treated with hormones, preparations on the basis of gold and other means without any positive results, we can draw the conclusion that the treatment with bee venom may be considered effective. An astonishing result was obtained in 15 patients to whom Virapin was directly administered in the rheumatic nodules. A complete healing or a sensible improvement of the nodules was stated in all of them excepting one.

Improvement was obtained in the case of half of the patients suffering from osteo-arthritis only due to Virapin ; only in one fifth the treatment gave no results. The therapeutic action of the Virapin had a lesser effect than H.C.A., but more lasting than the latter. However, it is worth mentioning that the combination of these two preparations proved to be very effective.

Similar results were also obtained in the treatment of periarthritis. The best effect of bee venom was however obtained in the treatment of myalgia, fibro-myositis and other similar diseases.

The results of the experiments made by Dr. Kuthan are very interesting and of great importance. Particularly valuable is the comparison of the therapeutic action of bee venom with the of the cortico-suprarenal hormones. These results agree with the data obtained by the Soviet physician M. P. Gusheva (1962) who also studied the effect of a combined treatment of bee venom and corticosteroids.

It is a well known fact that bee venom, administered in not very great doses, activates the pituitary-suprarenal system (Weidemann and Moller, 1953, Artemov 1958, 1961 etc.). The therapeutic effect of bee venom in rheumatism, rheumatoid arthritis and other collagenoses are undoubtedly explained by the increase of the percentage of the hormones in the body of the patient.

At the 18th International Beekeeping Congress (1959), I suggested the hypothesis accounting for the effect of bee venom which relies on the interaction between mammals and bees during the process of their evolution. From this interaction resulted, on the one hand, the improv-

ing of the bee venom and stinging apparatus and on the other hand. the emergence of the mammal's capacity to react against bee venom by rallying all their forces of defence. It is known that this non specific adaptive and defence reaction, belonging to the type of the first stage of the general adaptive syndrome includes compulsorily the excitation and the intensification of the activities of the pituitary-suprarenal system.

A clinical confirmation of the last explanation is supplied by the essential work of E. M. Alesker (Leningrad 1964). In his experiments, the author successfully used bee venom in endarteritis and atherosclerosis of the limb arteries, in chronic infiltrations, trophic ulcerations and trombophlebitis, hypertonic disease, peripherical nervous system diseases, allergic diseases and especially in rheumatoid arthritis (410 patients). The author compares the effectiveness of the treatment with bee venom to other means and particularly to the steroid hormones and reaches the conclusion that in a series of cases the results of the bee venom treatment are superior to the hormonic therapy effects and that in the acute and chronic stages of the disease, the bee venom utilization is an adequate method of tratment and more effective than other means the clinic has at its disposal.

By his researches on the excretion of cetosteroids — 17 through urine, E. M. Alesker conclusively proved the existence of the stimulation of the internal secretion of the pituitary-suprarenal system in the patients treated with bee venom. This fact is also confirmed by the observations of the research worker M. P. Gusheva (1962) on the variation of the eosinophilic level in the blood of the patients treated with bee venom. Thus the assumption that the positive effect of bee venom on collagenoses and some other disease — for the healing of which the corticosteroids are indicated — depends on the excitation of the pituitary-suprarenal system of the patient, becomes very likely. As a matter of fact it is true — and here I must make a digression — that the therapeutic effect of bee venom is not limited to the excitation of this system alone. The cholinolytic peculiarities and some others of the venom also have to play an important role in producing its therapeutic effect.

2. Much to our regret, no laboratory or clinical work on the problem of the immunological properties of bee venom was presented to our Congress, though such researches are being carried out in a lot of laboratories. Among the earlier works we cannot fail to mention the researches of M. Phisalix, that of the Romanian authors A. Derevici and M. Derevici (1939), Zuruzoglu and Stalder (1936) and among the contemporary ones, the works of the Institute for Pharmacology at the Würzburg University (Habermann and others) and that of the Physiology Department at the Cairo University (Mohamed El Karemi and others). In these works, the immunological antigenic properties of various albuminoid components of the bee venom are studied. The authors also pointed out the possibility of the development of antibodies against albumin of the second electrophoresis fraction of bee venom. The first fraction was free of antibodies.

Of great interest is also the immunological analysis of the phenomenon "immunity of the beekeeper" from the bee venom and also the ability of the bee venom to produce allergic states. However, even at present we can say that the so-called "immunity of beekeeper" is a very complex phenomenon which cannot be considered only as a result of the formation of antibodies in the blood against the antigens in bee venom (Artemov, 1962).

The immunological analysis of the allergic action of bee venom is not less important. The progress in this domain is, however, very small although every year physicians from all over the world describe very serious cases of allergic reactions. Therefore greater attention will have to be paid to these problems, than was done up to now.

3. Due to the variety of the published studies it is very difficult to make a synthesis of the latest works devoted to the research of the pharmacological peculiarities of bee venom and to the biological and physiological analysis of its action on the organism. Only a few laboratories are carrying on systematic activities for studying bee venom and it is their results that we shall deal with now.

Particularly important and interesting are the researches carried out at the University of Würzburg (Neumann, Habermann and others) on the chemical and pharmacological properties of bee venom. These researches aimed at establishing a relation between the pharmacological peculiarities of bee venom and the chemical combinations of fractions entering its composition. The authors applied the electrophoresis on paper for dividing bee venom into fractions and examined the pharmacology and biochemical peculiarities of the fractions obtained. They succeeded in isolating and characterizing in detail melittine which is — from the pharmacological point of view — the most active albuminoid substance of bee venom.

The studies of the research workers from Würzburg are of a high technical level. Therefore they are widely known and enjoy with good reason a wide popularity ; hence, there is no need to give more details about them.

Our laboratory at the University of Gorki has carried on — with short interruptions — researches on bee venom for 20 years. These researches were made in various matters according to the recommandations of sanitary and apicultural bodies. But our attention has always been focussed on the problem concerning the action of the bee venom on the organism of human beings and animals as well as on the physiological analysis of this action.

These last years we studied the following problems : 1. study of the cholinolytic peculiarities of bee venom, especially on its action of paralysing ganglions ; 2. bee venom action on the neuromuscular apparatus ; 3. action on the central nervous system ; 4. action on the percentage of the albuminoid fractions in the blood and on the permeability of the blood vessels.

We were the first to ascertain the cholinolytic peculiarities of bee venom at the moment of its blocking off the transmission of the excitation from the peripheric nerve to the heart (Artemov and Soloviova, 1939) and for this reason we were interested above all in the researches of the bee venom peculiarities. We showed that bee venom is blockading the transmission of the excitation in the superior cervical sympathetic ganglion in proportion of 1 : 50,000 and reduces the lability of this ganglion in proportion of 1 : 1,000,000 and even more ; in this respect it should be added that bee venom proved to be more active than hexonium and some of the other known gangliolytic elements (Artemov, Poberejskaia and Sergheeva, 1961—1965). A short time ago, using the electrophysiological method L. L. Sergheeva (1965) studied the ganglion paralysing action of bee venom and completely confirmed our former data. The electrophysiological method used in the researches on the transmission of the nervous impulse from the motor nerve to the skeleton muscle showed that bee venom is likewise able to act in the present case on the synaptic transmission (Artemov, Gareachev, Lebedev and Stepanov, 1964), reacting to the cholinoreactive substance or working on the permeability of the synaptic membrane. It is true that the therapeutic activity of bee venom proved to be far weaker than that of blockading the ganglions. Bee venom has the same properties as the central cholinolytics. In view of this situation we set ourselves the task of studying the bee venom activity on the central nervous system (CNS) (Orlov, 1962—1965). Since, B. N. Erlov presented to the Congress a paper on this matter, I take the liberty of exposing more minutely its contents, as well as that of other works, by the same author. By using various research methods including the electrophysiological one, the author reached interesting and important conclusions especially establishing that bee venom impedes the transmission of excitation in the CNS, by sensibly increasing the latent period of the flexor reflex, and produces a sudden diminution of the ability of the CNS to totalize the impulses below the excitation threshold. Under the action of some small doses of bee venom an increase of short duration in the ability of the CNS to totalize and shorten the latent period of the reflex is observed in the first stage ; then a second much more longer stage follows when a prolongation of the latent period of the reflex and a reduction in the totalizing ability are observed.

The bee venom causes the change of the intracentral functional ties which leads to the disorder of the subordination relations between the superior and inferior centres. From the very first applications of minimum doses, bee venom exerts a great influence on the superior sections of the brain which regulates the function of the spinal cord. It exerts a blockading influence on the descending polysynaptic reticular ways. Bee venom is able to blockade especially the inhibitory influence of the cerebellum on the extenser motor-neurons of the spinal cord. Bee venom has a definite influence on the hearing generated convulsive reaction of rats. Under its influence, a reduction of the excitability of

the CNS associated with a more or less visible intensification of the inhibitive process is observed after which the convulsive reaction passes away completely or diminishes considerably. Besides, bee venom exerts a great influence on the bioelectric activity of the cortex resulting in a depression of the electroencephalogramme which must be considered as a result not only of the depressive action of bee venom on the cortex structure but also as a consequence of the bee venom activity in blockading the reticular system.

The author connects the intense activity of bee venom on the functional state of the central nervous system with the reduction by bee venom of the functional mobility or of the lability of the nervous structures conditioned by the modification at the level of the energy exchange and of the reactivity of biochemical systems.

We consider that the bee venom ability to act on the transmission of the nervous excitation in the peripheric and central cholinergic synapses is a characteristic feature inherited by bees from their ancestors which paralysed the other arthropods by stinging the ganglions of their nervous adbominal chain.

This ability is also of great importance to understand the therapeutic effect of bee venom, its relief action, its therapeutic influence in hypertonic diseases, obliterating endarthritis and other diseases.

Lately, experimental studies on bee venom in USSR are also being carried out in other laboratories. Thus the bee venom pharmacology is studied in the town of Grodno by A. V. Miron, in Harkom by professor N. S. Harcenko, N. M. Bruck, L. G. Kiricheck and others, in Odessa by A. S. Scalatskaia.

The study of the bee venom chemistry and of the stability of its components towards external action is also important both theoretically and practically. Without such researches no pure preparation from bee venom is possible. An important contribution to the study of bee venom chemistry was made by the research workers from Würzburg. They divided bee venom into fractions and studied the composition of the fractions.

To this, our laboratory can add the data obtained by bee venom ultramicroanalysis (Gronsberg, Kalinina and Fertelmeister, 1949); the study of the surface activity of bee venom (Artemov and Falitnova 1962); the construction of the device for extracting bee venom (Artemov and Soloduho 1965). Important researches relating to bee venom chemistry and also to the technique for obtaining and processing bee venom were carried out by the Czech scientists especially by O. Markovic and his co-workers (1953—1963).

I presented to the Congress a paper entitled "Bee Venom as a Produce of Apiculture" containing a short enumeration of our works dealing wiht bee venom and its peculiarities, needed to elaborate the method for preparing bee venom as raw material for pharmaceutic industry.

I studied the thermostability of the most important component parts of bee venom and emphasized that the least thermostable of all is hialuronidase followed by phospholipase A, the most thermostable being melittine. These elements are also stable towards acids, but less resistant against bases. Rather interesting is their behaviour towards oxidizers ; melittine dissociates while bee venom enzymes show a certain stability.

Bee venom possesses antibiotic properties against some pathogenic microorganisms — but not against all of them — especially acting on the development of colibacillus. However, bee venom exerts almost no influence on putrefaction flora and the putrefaction bacteria are capable of distroying quickly enough all the active albuminoid parts of the bee venom solution. Under sterile conditions, bee venom can temporarily (for 7 months — at the most) be preserved in the form of solution in well closed vials in the dark but it gradually becomes inactive probably because of the oxidation of melittine. Bee venom covered with a protecting vegetable oil coating which impedes penetration of the oxygen from the air, maintains its active ability for a few years.

Up to the present, there do not yet exist generally adopted standards for the assessement of the quality both of the raw material and of the preparations derived from bee venom. This operation is differently achieved by the various enterprises in various countries. We have likewise worked out a series of methods to determine quantitatively the active character of bee venom. We think the moment has come to work out generally adopted standards for the bee venom and its preparations which must be endorsed by the International Medical Association. We suggest that our Congress should take this initiative.

A few words relative to the problem of bee venom forming in the body of the bee. The German research workers grouped round the firm "Mack and successors" explained many important and interesting matters in this field. I have no possibility to insist upon them but I would like to point out a widely spread mistake namely that bee venom is considered as a produce of the secretion of the two "acid" and "basic" glands. The earlier authors considered with good reason that bee venom is formed only in the filiform "acid" gland. The second gland was called by Dufour (1841) the "ointing" gland as he supposed that its function was to secrete the fat substance for the ointing of the chitinous parts of the sting. This mistake appears for the first time in the works of Dewitz (1877) and Carlet (1884). By using the method of the sections in series, E. Trojan (1930) definitely demonstrated that the gland canal does not open in the sting cavity but outside it, that is to say in the room in which the sting is found and its secretion can not be confused with the secretion of the "acid" gland. This is also confirmed physiologically since the properties of the bee venom collected from the poison sac are identical with those of the bee venom removed by the extremity of the sting.

II. PROPOLIS

The use of propolis in human and veterinary medicine relies above all on its antimicrobial ability (V. P. Kivalkin, Z. H. Karimova and others). Besides its properties to stimulate regenerating processes and heal wounds, propolis also has anaesthetic properties.

The work of A. Derevici — a Romanian research worker well-known by her works on bee venom and her co-workers A. Popescu and N. Popescu — covers the researches carried out on the toxicity of bee venom and its action on the regenerating processes in some cases of burns. Its toxicity was insignificant but it exerted a stimulating action on the regenerating process after burns. Rather interesting is also the action of propolis on the bees themselves.

V. N. Hemelevskaia, V. S. Vladimirov, L. A. Baran nd V. A. Chekma (from the Institute for Oncology and Roentgenology in Kiew) studied the possibilty of applying propolis to the irradiation reactions which occur to patients suffering from cancer.

On the basis of observations performed on 173 patients, the authors reach the following conclusions : the use of propolis pomade in cases of patients subjected to a treatment by irradiation permits the prevention of reaction to the radiation of the teguments ; the propolis pomade acts favourably on the reactions to irradiation by attenuating them thus shortening duration of the treatment and contributing to a rapid cure of the ulcerated skin. The results of these works may de recommended to be widely used in medical practice.

The work of Dr. Molnar Toth is devoted to the treatment of the skin (mycosis and bacterial affection) with alcohol extract and propolis pomade. Besides, this treatment was used in a single case of psoriasis and another one of radiodermitis which occurred to the radiologist. The work has only an orientation character. Being worked out on the basis of a scanty material, the work has not the pretention of putting forward final conclusions. However, it is of a positive interest to us.

Accurate results were obtained by Z. G. Cheanshev (Veterinary Laboratory in Bashkiria) in the work dealing with the utilization of propolis for animals suffering from dermatitis of aphteous origin. The author observed a particularly favourable influence of the treatment with propolis preparations on wounds of aphteous origin, on udders and mamilla and on hoof-slit, as well as on necrotic and infectious suppurating lesions of the skin in the areolar region. The treatment was used for more than 700 cows, 600 pigs and 150 sheep. These preparations contributed to cicatrize erosions of aphteous origin and ulcerations of the first degree. This healing took place sooner than in the control animals. After 10—15' the preparations relieve the pain for a longer time thus permitting the milking of the cows, suffering from aphteous fever and preventing the development of mastitis with aphteous aetiology.

This short survey of the works presented here and devoted to the study and the use in human and veterinary medicine of bee venom and propolis, convinces us of the fact that an intense practical and scientific activity is developing in this field and that the international symposium is particularly necessary and actual. We must express our sincere thanks to the Organizing Committee of the 20th International Beekeeping Congress and its Chairman prof. V. Harnaj, as well as to Dr. J. Saine for the organization of this symposium ; it is to them that we are obliged for our meeting.

Prof. dr. V. I. Poltev, *U.S.S.R.*

SYNTHESIS OF THE DISCUSSIONS ON THE PAPERS PERTAINING TO THE SYMPOSIUM ON APITHERAPY

Joint chairmen :

Prof. Dr. V. ARTEMOV, *U.S.S.R.*
Dr. L. BUZA, *Hungary*
Prof. M. GAUTRELET, *France*
Dr. J. SAINE, *Canada*
Dr. D. CIVICĂ, *Romania*
Dr. H. THORNBERRY, *Ireland*
A. G. DE VINUESA, *Spain*
KO WATANABE, *Japan*

The proceedings of the symposium are carried on in *two stages* namely in the Congress Hall of Romania presided over by *prof. Dr. V. Artemov* and in the Hall of the Central Council of Trade Unions presided over by *Dr. J. Saine.* Prof. M. Gautrelet and prof. Dr. V. Artemov give the synthesis reports and in the ensuing discussions Dr. J. Saine takes the floor on behalf of the International Association of Apitherapy expressing his satisfaction for the splendid co-operation of this association with Apimondia. "It is a great pleasure for me" he says, "to find the warm hospitality of the Romanians and at the same time to express my admiration for the monuments I met here and which have artistic qualities proving the refinement of a cultivated people". Further on, Dr. Saine referring to the problems of apitherapy showed that "now when the hopes set on the corticotherapy are dispelled, the majority of the experts in rheumatology try with good reason to estrange themselves from the therapeutic stock-intrade used in combating arthritis and rheumatic diseases. Now it is time for them to be invited to take cognizance of the works of those physicians who have made use as far back as a century ago of the bee venom to alleviate and heal these diseases."

Dr. Saine thinks that the struggle waged by the International Association for Apitherapy permits us to hope that in a more or less near future the contemporary medicine will recognize the therapeutic value not only of the bee venom and royal jelly but also of the propolis, pollen and honey. Therefore, he considers it to be absolutely necessary for Apimondia to co-operate with all the scientists whose close research works are indispensable to this end. In this sense he invites physicians and scientists wishing to adhere to the International Association for Apitherapy to contact after the session the secretaries of the Association for receiving registration forms and a copy of the constitutive act of this Association.

Dr. Saine further addressing himself to Prof. Dr. Artemov (U.S.S.R.) expresses the gratitude the mankind owe him for his works. He also informs him that arrangements have already taken place between the International Association for Apitherapy and the Executive Committee of the World Health Organization towards the standardization not only of bee venom but also of the royal jelly. He expresses his desire for the Commission on standardization of royal jelly set up in 1963 in Prague to meet again. On this occasion one could give a detailed report on all that was discussed by the W.H.O. relating to the standardization of bee venom and royal jelly.

Further on Prof. Gautrelet (France) shows that lately he also published chemical, physical, biophysical and pharmacological norms relating to the physiological action of royal jelly and that he is ready to place this material at the disposal of those who are interested in this problem.

Wishing to publish the statistics concerning the beekeepers' resistance to the malignant affections he inquires about these statistics from other countries. He winds up with the information that in France numerous cases (250 patients) of leucaemia and Hodkin's malady were treated with royal jelly obtaining very interesting results (e.g. a well — known cinema artist suffering from lethal leucaemia and abandoned by the medical staff was treated with royal jelly thus succeeding in prolonging her life for several months). He expresses his confidence in the therapeutical efficiency of royal jelly which in contrast to the cancerostatic products is not toxic when administered in therapeutical doses. Royal jelly brings about an increase in red cells provided this is administered by dayly doses of 0,25 g for 15 days.

Dr. Dobrovoda (Czechoslovakia) draws the attention to the favourable effects of the royal jelly therapy in psychoneuroses with a somatogenic etiology. At the same time he stresses that "the false euphoria" caused by royal jelly administered to patients suffering from cardiosclerosis and atherosclerosis could hinder the application of an adequate treatment.

Dr. E. Maly (Czechoslovakia) gives supplimentary data on the success obtained by treating warts (verruca juvenilis and vulgaris) and chronic lupus eritematosus of the face with pomades containing royal jelly. He noted a healing in 70% of verruca juvenilis cases and in 83.3% of verruca vulgaris ones. He used the onguent (Vita-Apinol) which contains 1% native royal jelly. He asserts that these successes can be obtained by any beekeeper by ointing warts directly with royal jelly and that the list of the diseases which can be treated effectively with royal jelly is not yet complete.

In answering the question if he thought to use propolis in treatments, Dr. Maly states he did it in clinic and can prove its antimycotic action. For this purpose he mentions the case of a patient suffering for 5—6 years from a grave onicomycosis that is a mycosis of nails which was healed by treating it exclusively with propolis extract.

Further on Prof. Dr. Vinogradova (U.S.S.R.) takes the floor for answering the question : how can we ascertain whether or not royal jelly is proper to be used in therapeutics ? She states that she modified Brains' method which can not de applied but in a well-equipped laboratory. A colorimetric method is used by which 10 hydroxi-2-decenoic acid present only in royal jelly is rendered evident. Besides one also resorts to a microscopic examination which renders evident remainders of larvae, cauls, etc.

Dr. J. Saine points out the works published by Prof. Artemov and collaborators. At present in U.S.S.R. researches are being carried out with a view to obtaining a good preparation of bee venom collected in a jar of 200 g capacity covered with a well-stretched pellicle of pig urinary bladder well-cleaned and disinfected. Bees prick this pellicle and the bee venom is gathered in the jar in which there is apricot oil or physiological serum.

Another type of apparatus simple and original at the same time which can be made very easily by any beekeeper consists of the introduction of a ball, which in fact is a pig urinary bladder, with liquid between the frames of a bee colony. Bees irritated by this, rush upon and prick it and thus bee venom is collected in the bladder. After 10 minutes the ball is taken out and the stings drawn out as well. It is wiped with sterile gauze and operation begins again.

Prof. Kondratieva (U.S.S.R.) shows that although propolis as bee product is known from ancient times its properties are still an enigma. The study and determination of its antibiotic qualities constituted a preamble towards the study of its medical qualities. There has been used the application of propolis as external medicine to a whole series of skin diseases and in surgery, thus establishing the effective action it has on pains, itching and regeneration of cells being at the same time antiinfectious. But the preparations form propolis along with its utilization as an external medicine administered orally or by injections, proved to be effective in the intestine and stomach diseases. It is therefore necessary for its action on the organism to be elucidated.

Following the researches carried out in this respect it was found out that propolis raises the complementary and phagocytosis activity and increases the properdin contents and the gammaglobulin fraction of the serum in the blood of animals.

Thus the propolis therapy joins advantageously the antimicrobial, anaesthetic and antiinfectious features. Its internal use raises the immunologic reactivity that is stimulates the natural resistance of organism.

Dr. P. Potkinkova (Bulgaria) explains her method of administering bee venom through ultra sound (Cosimex apparatus). This treatment combines the curative action of two factors : bee venom and ultra sound and this gives better results. The treatment was applied in 165 patients suffering mainly from affections of the articular apparatus dystrophical in character. The results obtained are excellent especially in subjects suffering from periarthritis. In order to exclude the counter-indications the patient should be previously examined.

One proceeds to the analysis of urine and blood and to a radiographic examination. Phenomena of incompatibility appear rarely and revel in a local or general reaction. Two months later after the first series has finished a new one in slightly higher dose is applied.

Dr. S. Grinblat (Argentina) congratulates the professors and doctors for the contribution they made to the scientific research works and suggests their popularization.

Further on Prof. Dr. Artemov takes the floor and after an ample account of different works on bee venom gives the floor to Dr. A. Derevici (Romania) who speaks of the immunity problem and shows that the beekeepers' resistance to bee venom does not rely on antibodies but on complex mechanisms. This fact also results from the experiments on Guinea pigs which although they resisted to twice lethal doses of bee venom did not show in their serum the neutralizing properties of bee venom.

Prof. Falaschini (Italy) summarizes the biological features of the auxinic action the royal jelly has on poultry and cattle. "It can be said" he says, that administration of royal jelly in doses of 4—10 mg per die and per capita helped 3—5 day old white pure Leghorn races increase in weight, and administration of royal jelly in doses of 150 mg per die and per capita to calves of pure Frisin race did not result in any reaction whereas the same doses administered to calves of Romagnola race resulted in a weight increase by 10—12% as compared with control. In his opinion the different results obtained either in chickens or in calves depend in both cases on the different constitution of the subjects which plays an important role in this process.

Dr. Saine further gives a short account of the conclusions of his work. For the arthritis to be utterly combated — he says — we have to resort to all known means including bee venom and physical agents.

None of these ways can be considered as universal remedy for all arthritis cases. Moreover, for obtaining the healing of arthritis, it is not sufficient to be an expert in rheumatology but also a master of all medical disciplines. It is also necessary to know to make use of all physical, chemical, biological, psychical means and still others which the contemporary medicine places at our disposal. Without mastering these medical disciplines and all the therapeutical agents the results can be but moderate.

Then Dr. Saine thanks the participants for the fruitful discussions they have had and declares the proceedings of the symposium on Apitherapy closed.

COMMISSION
ON
BEE ECONOMY

*PRESENT STATE AND FUTURE DEVELOPMENT OF BEE ECONOMY PROBLEMS**

Speech by **E. LEYSEN — BELGIUM**

Chairman of the Standing Commission on Bee Economy of Apimondia

In the name of the Commission on Bee Economy I am happy to greet all the participants to the 20th International Beekeeping Jubilee Congress and in a special manner the Romanian Organizing Commitee. This Commission extends it a warm and brotherly greeting, sincerely admiring the impeccable form in which this Congress was organized for which fact we congratulate it. We also wish to thank everyone, beginning with our worthy, devoted and honorable President Prof. Eng. Harnaj and ending with his collaborators.

E. Leysen, *the delegate of Belgium.*

* Original text in French.

I should like to inform you that the Commission on Bee Economy held in Bruxelles a working-session during the month of June, lasting four days, which was also attended by the Commission's Secretary, our devoted and very competent Eng. Safer from Romania, to whom, too, we wish to extend our whole hearted thanks. The valuable advice received from the Congress'National Organizing Committee, enabled us to establish a very efficient working method, namely, by presenting to its members a synthesis report which our colleagues, Messrs. Xavier Grandjean from Belgium, R. Borneck from France, L. Bornus from Poland and McGregor from the United States, have accepted to compile from the majority of the papers presented to this Congress. The Commission for Bee Economy had 35 papers assigned to it, well documented and all important in themselves, and which were placed at the disposal of the rapporteurs mentioned above.

I should like to extend my appreciation to the rapporteurs for their contribution to the papers which are to be debated in these proceedings. I should further like to address my congratulations and appreciation to the authors from the following countries: Belgium, Bulgaria, Greece, Yugoslavia, Korea, the Malagasy Republic, Norway, Romania, the U.S.A., and the U.S.S.R.

It is well known that a country's well organized apiculture constitutes, without doubt, a real source of income contributing both to its national economy, and to the welfare of each individual. Apiculture proved to be an important branch of agriculture, as it results from the beekeepers' statements. We all desire to promote this economic branch by searching for the best means of raising it to the highest economic standards throughout the world, by firmly eliminating all the factors impeding its development, and by experimenting new techniques for improving apicultural production in all countries.

In short this is the present status of the problems referring to apicultural economy and its organization. These problems have been studied in the papers received and enumerated above.

These problems deal especially with the increased productivity of apiaries, the turning to account of honey in tropical countries, the standardizing of world honey marketing, and the guaranteeing of apicultural capital, etc.

The developing prospects of this economic branch are as follows: certain countries require an up-to-date apicultural organization; more efficient measures for the protection of apiculture against insecticides applied to agriculture and guarantee of honey qualities; others demand that apiculture be more substantially assisted by the Governements of their countries and finally others demand that apicultural capital be ensured because it is much too often curtailed.

A larger and more developed apiculture, better protected and better sustained, will produce better incomes (it has already reached the figure of 200,000 million dollars throughout the world). Our spare time will be better and more pleasantly employed, we shall have more fruit and more seeds and will also enjoy better health since our bees are won-

derful miniature laboratories transforming the flowers'nectar into a natural product, which is considered by doctors all over the world as having exceptional beneficial qualities for man's food and health.

Mr. President, ladies and gentlemen, we hope after the end of the intense and high quality work which is being accomplished and which will be carried on for another week at this Congress in Bucharest — an important event in the history of apiculture — that, our activity based on the discussion of the synthetic reports grouped on essential apicultural problems, and on the exchange of views between the most competent personalities in this field from all over the world, will bear fruitful results.

We hope to be able to find most efficient means for the protection of the bees against insecticides, fungicides and herbicides and also to secure the development on the largest possible scale of this branch in the best economic conditions, by introducing new ways and techniques in the field of mechanized and industrialized equipment.

In eliminating our present difficulties we can foresee a brighter future and a less clouded sky — which together with a modern apiary will turn the beekeeper into a happier man among his beloved bees.

May I wish you complete success in the proceedings begun today.

SYNTHESIS REPORTS

REPORT IV. A. ON THE BEEKEEPING CAPITAL*

(Papers No. 1 and 12)

Rapporteur : **R. BORNECK**
FRANCE

In his ample paper, presenting numerous precise examples, Mr. R. B. Willson is trying to convince us that it is high time to unify, as far as possible, the principles of the legal provisions upon which international honey trade is based.

To begin with, in the first part of the paper submitted, the author points out presenting many examples out of sanitary and custom-house regulations of various countries, their diversity and sometimes their absurdity. It is easy to understand that world honey trade would be paralysed if these laws and regulations were implemented ad litteram. A thorough analysis makes us discover easily that the legislations on honey adulteration often include economic protection of the domestic production. But protecting honey and the consumer were not the only reasons and beekeepers of various countries succeeded in introducing such draconian clauses in laws on adulteration — sanitary or protective stipulation — that only complaisance certificates could abide by them. This prevented, especially in the past, large imports of low price honey which would have disorganized the domestic market of European countries.

Secondly, the author is right when questioning if the intrinsic value of certain tests and among others the Hydroxy-methylfurfurol is worth the expenses incurred in this respect.

In spite of the recent progress in science, it is obvious that laboratories should reach an agreement on the methods of carrying out the tests and on their indisputable interpretation.

A more intensive collaboration between various researches permitted important progress but has not yet yielded actual results. Yet it is absolutely necessary, in order to avoid trade conflicts, to define the means of achieving it on an international scale. The investigation methods, advance parallel with science and nothing can be final and our present methods will certainly seem obsolete to our grandchildren.

Coming to conclusions, Mr. R. B. Wilson thinks that it is Apimondia's task to promote a revision of the laws on honey adulteration and of international regulations concerning this produce. I think, we should all join his standpoint, but before opening the discussions on this item, I feel I must let you know the work already effected in this respect by the Codex Alimentarius Europaeus et Mondialis. Honey regulations were

* Original text in French.

elaborated and though they have not reached their final form, I think it is my duty to inform you about them, conveying at the same time our thanks to Mr. Willson for his perfect and most welcome paper.

The second paper, we have discussed in this special economic section is that of Mr. Sellianakis on the insurance of the apiarian capital.

Dealing with this question, the author gathered — with great difficulty — statistical figures from about forty countries, and we should not criticize the rough approximation of his figures concerning the number of the bee colonies. Nevertheless I wish to make some remarks on the methods used in evaluating the capital ; the disproportion between the hive stock capital and the livestock (bees) capital seems not entirely justified.

In a first stage, the author after determining the amount of the apiarian capital of the forty countries mentioned above (40 million bee hives representing 840 million USA dollars), evaluates the damages which might be caused by various risks : bee diseases, bee enemies, calamities and accidents. This would represent loss of 29 cents per hive

The insurance premium, covering all these risks is discussed ; the premium would be about 50 cents per colony.

This insurance business would be committed to extant insurance companies and subsequently — and this would be Apimondia's interest — the countries, insurance agencies should merge into a single international body administered by Apimondia.

Thus a real multi-risk insurance covering could be created to ensure the bees a real social security. The author does not ignore the difficulties involved by the implementation of this interesting project and many a time he points out in his paper the main differences between the apiculture live stock and other animal production. But he seems to overlook the fact that it is doubtful whether Apimondia could obtain that the insurance of the apiarian capital be made compulsory in most of the countries.

We did not even reach this stage in what concerns human social security. The amount of the insurance premium would surely arouse vehement objections of the beekeepers, members of national associations.

The author, probably did not mention, on purpose, or did it only superficially, the misuse which the insurance of these risks might come to ; especially the disease (risk) insurance if the beekeepers are devoid of scruples. The attempts made in France by mutual organizations to insure against bee diseases regulary fell short ; the premiums had to be raised continuously and the mutual organizations finally disappeared. The control proved to be difficult and onerous.

Certain countries or regions may, on the other hand, require a different or totally different multi-risk insurance from that envisaged by Mr. Sellinakis and certain insurance companies offer to insure against certain risks, advantageously, as for instance the Compagnies d'Assurances Mutuelles Agricoles Françaises. It is not sure that these companies would accept the idea to affiliate to a central organization managed by Apimondia.

These critical observations should not make us forget that we live in the country of insurance and it would certainly be desirable that the participants to the congress present their point of view and that of the beekeepers of their countries. Those who are most interested in the project should get in touch with Mr. Sellinakis in view of a thorough study of the project and of establishing type-contracts liable to be adopted by many countries.

We are going to proceed now, Ladies and Gentlemen, to the detailed discussion of these two papers.

REPORT IV.B.ON APICULTURAL ORGANIZATION IN VARIOUS COUNTRIES, HISTORY, MONOGRAPHS *

(Papers 4, 6, 7, 8, 9, 10, 11, 13, 21 and 22)

Rapporteur : **X. GRANDJEAN**
BELGIUM

The authors of the 7 reports summarized hereafter (6 countries) describe the present *situation* of apiculture in their respective countries and the *economic aspects* concerning its national development.

After a short historical account they consider the apiarian economy from all viewpoints in order to determine possible improvements in the country itself and then to formulate *recommendations* on a world scale.

One after another, the rapporteurs mention — eventually in figures — the agents contributing to honey and wax production (climate, topography, apiarian livestock, melliferous flora, materials, local techniques, migratory beekeeping associations, co-operative societies, State support, etc.) as well as the agents which reduce the *capital* (diseases, spraying, etc.), which preserve it (insurance) and increase it (human contribution) ; they show the importance of apiarian production and circulation of its produces (honey, wax, swarms, queens, exports, imports), as well as their consumption (quality, propaganda, education), or their eventual *processing*.

Here is a very brief account of each report.

1) *Romania* — ORGANIZATION OF APICULTURE IN ROMANIA, by Engineer V. G. Safer.

Apiculture well developed : interesting melliferous flora. Owing to Government support, to the creation of a State Central Station for Apiculture and to the Romanian Beekeeper's Association, the number of colonies increased from 280,000 in 1945 and 457,000 in 1948 to 900,000 in 1965, with only 2% primitive hives in comparison with 50%, twenty years ago, and respectively 12 kg. to each hive instead of 5.

* Original text in French.

30% of the hives are in the hands of the socialist sector (grouping 1,000—1,200 colonies under the direction of a team leader wherefrom many advantages).

The Association counts 60,000 members within numerous technicians. Migratory beekeeping is well organized and well arranged — including 60% of the hives, Numerous lectures and apiarian courses are held everywhere. A great apiarian complex has been built.

Taking into consideration the determining factors of production, it can still be increased.

2) *Bulgaria.* APICULTURE AND ITS ORGANIZATION IN BULGARIA, by J u r k o v.

Improvement as a result of the use of movable-frame hives. The Government is interested in apiculture. From 262,000—300,000 colonies in 1950 (2/3 systematic hives) they reached 650,000 in 1960 (550,000 with frames) which is more than double.

15% of the hives belong to the T.K.Z.M., 61% to the co-operators and the remaining 22% to individual beekeepers.

Honey production unstable and insufficient (4 kgs. for each colony). Measures are being taken to increase it.

Royal jelly production : 580 kgs. in 1964 ; wax production 100 grs. to each hive. Inconvenients : wet spring, dry summer, spraying, etc.

Three regions : flat country (first-flow), mountains, hills. Most favourable for honey are the mountains.

The sowing of melliferous plants is compulsory for the farmers (1/2 ha. for each colony).

Migratory beekeeping (250,000 colonies) under the direction of an agronomist and a veterinary surgeon. One team-leader to 200 hives. 70% of the profist go to the beekeeper. Severe measures against diseases. The displaced hives are closed during spraying. Enemies : the redbreast, (merops apiastec).

Nectarocoop, Government enterprise, 1,500 associations under the auspices of the Central Council of apiculture, (Ministry).

In each department there is an agronomist and a veterinary of the hives in charge.

Apiculture is in advance due to State support and to the scientific magazine "Apicola".

3) *Greece.* THE INSURANCE APIARIAN CAPITAL STUDY. SCIENTIFIC ANALYSIS. PROPOSALS. bp G. S e l l i a n a k i s, General Director of the Cooperating Union of Greek Beekeepers' Associations.

The losses caused in Greece by diseases, etc. amount to 3—10% of the capital. According to an inquiry made in 40 countries similar results are recorded elsewhere as well.

Total apiarian capital in 40 countries : 40 million hives. 840,000,000 dollars = 21 dollars per hive. Losses : 20/1000 from diseases, 6/1000 from calamities, 1/1000 from accidents and enemies, say a charge

of 29/100 dollars for each hive. Premium suggested, 1/2 dollar for each hive. Recommandation : to establish in each country a *Society of Mutual Help,* followed lately by an International Insurance Organisation.

4) *Belgium.* A) THE APIARIAN ECONOMY AND ITS EVOLUTION IN VIEW OF A CONVENIENT AND INCREASED PROFITABLENESS. SOCIAL PROMOTION OF APICULTURE, SUGGESTIONS ON A WORLD-WIDE SCALE. by Xavier Grandjean.

Of 11,000 beekeepers, only 10 professionel beekeepers, 82,000 colonies, one per 23 ha, average production — 6 kgs. Honey production : 500 t. Imports 3 times as much. Price : 100 F/kilogramme.

Migratory apiculture in course of being organized.

Provincial federations include 329 sections.

Belgian Trade-Union Committee of Apiculture. Special laboratories are under way. Apicultural schools. 800 lectures. Agrarian lectures examination, organized by the Ministry of Agriculture.

Difficulties : acarine disease (in great regression), nosema disease (Fumidil B. furnished by the state free of charge), pulverisations, two stiff regulations on hives' installation. *Desirable improvements :* to increase the melliferous flora, to practise migratory apiculture, more severe regulation of honey trade, technicians to be named by the Government, promotion of Apiculture.

Recommendations :

a) All countries to have an apiarian policy based on agricultural policy.

b) To provide Apimondia with the necessary means.

c) To establish the world's apiarian status in view of drawing conclusions .

d) To unify laws and regulations.

e) To organize markets.

f) To create reserves of industrial honey for processing (mead, etc.).

g) To practise international solidarity.

B) *Small-scale beekeeping must subsist. Can it ?*

by George Ledent.

Social advantages can derive from family-beekeeping wich may yield profits.

Wishes : promotion of apiculture, to be considered as public utility. Supression of difficulties on the hives' installation, considered dangerous in places with over 5,000 inhabitants, whilst bees are seen everywhere on flowers and are harmless outside the hives.

5) APICULTURE IN MOROCCO by P. Haccour.

11 beekeepers for 5,000 modern hives. 35,000 for 450,000 primitive hives.

Various types of hives according to regions. Two races of bees (Telliana and Saharian) ; the latter is the bee of the future.

Production 1,600 t. honey (not exported). 3—4 kgs. for each primitive hive. 20 to 130 kgs. for each modern hive.

Imports : 250 t. honey. Exports : 450 t. wax.

Special flora. Fruit-tree owners use bees for the pollination. The Government sponsors apiculture. Since 1963, there is an Apiarian Research Institute in Meknes.

There are no apiarian companies, nor any equipment manufacturers. Morocco can become a supplier of queens and swarms.

6) *Madagascar* — APICULTURE IN MADAGASCAR, by M. D o u h e t, veterinary chief-inspector.

I. *The bee and the hives.*

In Madagascar, two types of climate : temperate (high tablelands) and tropical. The bee is small, black, active, tame ; its behaviour varies according to the climate. Fixed hives of various materials. There are frame hives, except for a few on the high table-lands. The ordinary hives are made of boxes (crates) ; in the tropical zone they are made of hollowed tree trunks, pottery of holes dug in land slopes.

On account of the bees' habits it is impossible to apply the system of mobile-frame hives in the tropical zone. Improvement is possible in the high table-lands (Hauts — Plateaux) by a less simplistic method.

II. *Apiarian methods and the distribution of bee production.*

Simple methods. Natural populating of primitive honey and wax harvest. Production : 40,000 t. honey, 1,100 t beeswax.

Apiculture to be further developed ; only 20% of production comes from modern hives. Honey harvest is made at different periods according to the flowering seasons. Two tables show the honey production per province and the beeswax production per exportation port.

III. *Estimation of production and feasible improvements.*

Production difficult to estimate, but on the basis of exported beeswax quantity (table from 1929 to 1962) the author estimates the exportable honey production to 27,000 tons, i. e. 1,100,000 fr., the beeswax to 1 000 t equals 1 miliard 800 milion. A great honey consumer (4 kgs), the Malagasy is a bad harvester of honey which is no more exported since 1951.

Recommendation : Improvement of flora and bees races. Bees' habits under the tropics to be taken into consideration. Diseases are unknown, therefore bees importations not advisable. It is necessary to fight bees' ennemies, to improve methods passing from the simple case (hive) to the double one (hives without frames), thus enabling a harvest of 13 kgs. per colony. Natural populating of hives is the only one possible. As for a harvest of exportable honey and beeswax, it remains the No. 1 problem, great improvements are to be achieved in this respect.

IV. *Action of the Apicultural Division.*

Created only in 1963, the Apicultural Division of the Breeding Service supports apiculture in the island, which offers great possibilities of exporting bee products.

The creation of honey extracting and wax melting centres is imperative, as well as the popularisation of an "apiculturable" hive, the multiple storey hive with stores and no frames.

There is shortage of apicultural staff in Madagascar.

After seeing these reports, for which we thank and congratulate the authors, we state that :

a) Intensive apiculture has taken a great upsurge in Romania, Bulgaria, Greece and Belgium, but Morocco (partly) and Madagascar still have primitive apiculture.

b) Some countries are favoured by wide expanses of melliferous plants (f.i. Romania : an average of 12 kgs) ; others (Belgium : average 6 kgs) are badly off as a consequence of the reduction of the crop area, wherefrom the necessity of increasing the melliferous potential in certain areas (f.i. Liège) ; Morocco and Madagascar can gather honey almost throughout the year, but average production is small (3 to 4 kgs) due to very small hives.

c) Migratory beekeeping is practised on a large scale in Romania and is being organized in Bulgaria.

d) Apiarian societies exist in the named countries, except Morocco and Madagascar, where everything is to be organized.

e) Diseases exist everywhere except in Madagascar.

f) Small-scale familial apiculture is specific to Belgium.

g) Modern technique cannot be applied in tropical countries on account of the bee's wild temper.

h) Where the State supports beekeeping, it improves rapidly (Romania, Bulgaria).

i) The apiarian capital undergoes every year, in all countries, a loss of about 10% on account of diseases, spraying, etc. (Greece).

j) Honey production is depending on the climate, the flora and the technique : wax production interests the countries where apiculture has little or not at all improved (Morocco, Madagascar).

h) The importation of industrial honey is important in Belgium : it is also imported in Morocco.

i) Bulgaria produced 580 kgs of royal jelly, in 1964.

The following desiderata are formulated by various countries :

Romania : to increase production, to utilize all determinating factors of production, wherefrom the useful rôle of the apiarian Associations.

Bulgaria : same

Greece : to create in all countries a mutual aid fund in view of compensating losses of apiarian capital.

Belgium : to obtain for honey a label of quality ; to revise or vote decisions concerning apiculture ; to promote the individual (independent) apiculture.

Morocco : to organise Moroccan apiculture ; to make the best of the Saharian areas' value.

Madagascar : to pass from the primitive stage to the 2nd stage by the use of an "apiculturable" hive : to improve honey and wax harvest in view of making these products exportable.

Following recommendations on world-wide scale are made by :

Romania : (Safer-special report) to take into consideration the nectariferous balance in view of determining honey production of plants covering an area of 2,826 ha., the length of flight being 3 km. ; to divide by the 120, one third of the presumed production of the area to be collected in view of determining the number of colonies for this area.

Greece : to create an international insurance organization.

Belgium :

a) to practise an apiarian policy superposed on apicultural policy ;

b) to provide resources to "Apimondia" : 1/2 kg honey per hive :

c) to establish for 1967 a single table (diagram) concerning world apiculture in view of drawing conclusions from the economic point of view ;

d) to unify laws and regulations ;

e) to organize honey markets ;

f) to turn to account industrial honey by new manufactures (mead) ;

g) to practise international solidarity ;

h) to promote Apiculture as being of public utility (Ledent).

Conclusions:

These are our conclusions. We kindly ask you to examine, discuss and approve them, for the best of the concerned countries' apiculture, as well as of world apiculture.

In view of obtaining the approval of all beekeepers and especially the support of State authorities, we wish that the largest publicity be given to the essential parts of the reports presented to the XX-th Congress, not only in the apiarian press, which is read only by the people concerned, but also in the agrarian and in the national press.

And, as any economic progress has to be conquered and be well deserved by sustained personal efforts, let us have the courage and the perseverance of our bees, always active in the hive.

REPORT IV.C.ON BEE BREEDING METHODS*

(Papers No. 3, 16, 18, 19, 23 and 26)

Rapporteur : **S.E. McGREGOR**
U. S. A.

The papers deal with queen rearing, and honey production as influenced by queen manipulations and size of worker brood cells.

Hidesheli, A.L. A comparative estimate of the different types of nuclei used in queen rearing. (Apicultural Experimental Station of Georgia, USSR).

Yudin, A.I. — Production in the State queen rearing apiary in the Kabardinian — Bulkar, A S S R. (Director of the State queen rearing apiary).

Kotova, G.N. — The influence of different factors on the survival of queens wintered outside the bee colony. (Candidate in Agricultural Sciences, Ministry of Agriculture, U S S R).

Konstantinovic, Bogoljub, Eng. — Biological and economic justification of some measures connected with queen bee during the main honey flow. (Docent of the Agriculture University, Zemun-Beograd, Yugoslavia).

Cudelca Vladimir and Păduraru Vasile — Increasing the honey bee colony strength and production with reserve queens. (Romania).

Constantin Antonescu — The efficiency of enlarged honey comb cells in Romania, (Romania).

A. L. Hidesheli states that highest percentage of queens was obtained in semi-forest and steppe locations, that bees desert micro-nuclei, and that the best size of nuclei is 1290 cm^2 of comb area, 200—250 cm^2 brood, 15 kg. bees, 6—8 kg. honey and 2 —3 kg. pollen.

This is roughly the size of nuclei in general use in the U.S.A. — large enough for brood and queen protection and small enough for economic stocking.

A. I. Yudin reports on queen rearing on a collective in the Kabardinian-Bulkar region, A S S R, an area more favorable for queen and bee production than for honey production. Some 1,600 colonies in 25 apiaries are operated, which in the last two years produced about 80,000 queens and 6,000 6-frame swarms of Georgian bees selected for tongue-length exceeding 7 mm.

They systematically use young queens, strong colonies, keep plenty of honey in the hive, and feed sugar syrup during the queen rearing season. More than 4 queens are produced per nuclei. Package formation starts when colonies for that purpose have 8 —10 frames of brood. Nuclei are 190 × 140 mm. or 190 × 230 mm in size.

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* Original text in English.

Their method appears to be quite similar to that used in the U. S. A. although the volume of queens produced is twice that of the largest private breeder in the U. S. A. The use of young queens, strong colonies, and the selection of bees with long tongues, along with other good qualities is commendable.

The migration of the honey-producing colonies 3 times annually — to forests in the spring, to sunflower and coriander in summer and to alpine locations in the fall is comparable to migratory beekeeping in the State of California, U.S.A.

G. N. Kotova contributes a highly interesting point in showing that heavier queens, wintered outside the colony, survive longer and are less likely to succumb to Nosema. He states that queens weighing 165 mg. died within 90 days. Those weighing 169 mg. died after 125 days, 175 mg. after 150 days, and those weighing 185 mg. overwintered successfully. They survived better on honey food than on sugar-water, and at a variable temperature of 10—25° C than at a constant 20°C.

Also of significance was the observation that colonies headed by queens wintered outside the colony had more brood (max. 2083 eggs/24 hours) than colonies with overwintered queens within the colony (max. 1 425 eggs/24 hours). Neither fecundity nor productiveness was damaged by wintering the queens outside the hive.

Eng. Bogoljub Konstantinovic obtained production records on colonies with (1) queens removed before the honey flow, (2) queens removed and queen cells added, (3) queens caged or barricaded, and (4) control colonies, during the early acacia flow and during the late summer flow. He found that manipulating the colonies of queens during the short acacia flow was detrimental to honey production from acacia or later crops. Caging or queen removal and cells given during the summer flow increased production by 4—7 kg., and caused more pollen for winter use to accumulate in a better organized position for wintering.

This increase is of some significance if the virgins from cells given at this stage are not disturbed by manipulation of the colony for honey storage or harvest before egg laying begins. Otherwise they might be lost.

Vladimir Cudelca and Vasile Păduraru have reversed the 2 — queen method usually recommended. They introduce a second queen after the summer flow, to produce a strong colony for the following spring acacia flow. Their method increased their production by 50%. Shortly before the spring flow they removed the weakest queen and united the brood nests.

This is a system that might be utilized in other areas to advantage where the prize honey, such as citrus, comes in early spring when colonies are weak.

Antonescu Constantin used combs with cell sizes of 5.65 mm. and 5.85 mm (726 and 678 cells/dm^2) as a means of increasing bee size. When used immediately for brood rearing no value was discerned. When bees were forced to store honey in the cells first, then used for brood rear-

ing, the honey production averaged 19.4 kg. compared to 16.6 kg/colony having control combs, an average increase of 16.9%.

The author concludes that cell size should be the same size as that constructed by bees in the area.

Whether the increased production was due to larger bees produced in the larger cells or more efficient use of the cells for honey storage was not indicated. No bee sizes were given.

In the aggregate these papers contribute materially to our knowledge of methods for increasing honey production and manipulating the honey bee. These authors are to be commended for their work in the preparation of these papers.

The papers become more significant when we look ahead to some logical goals. With present techniques artificial diets should soon be developed that will maintain colonies at optimum strength for any particular time. This would permit production of highest quality queens. They could be banked outside the colony under ideal storage conditions for use when desired. In fact by resorting to artificial insemination queens might be produced on a factory-like basis, at any time without resort to nuclei, and independent of all external environment. The information in the above papers contributes toward that goal.

During an intermission of the Congress proceedings.

REPORT IV. D. ON ORGANIZATIONAL METHODS AND MEASURES*

(Papers No. 2, 5, 14, 15, 17 and 20)

Rapporteur : Prof. Dr. **L. BORNUS**
POLAND

The Standing Commission on Bee Economy of Apimondia has sent me to study and comment upon six papers which are more or less connected with bee economy. Two papers describe the melliferous resources and the apicultural development in a certain zone, the other two refer to the improvement of the methods for the management of the apiaries. The five papers deal with the description of the specialization of the apiarian farms in the main zones of the USSR. The last report studies all possible principles of an intensive apiculture.

I will try to expound the main ideas and conclusions of the authors taken out from their papers, as well as my own remarks.

1. The paper : "Organization and exploitation of melliferous resources in the north of the country by using migratory beekeeping in the alpine zone", by Dr. L. Bogdan, the Socialist Republic of Romania. The author points out among the various apicultural districts of the Socialist

Prof. Dr. L. Bornus, *Director of the Beekeeping Institute of Poland.*

* Original text in Russian.

Republic of Romania, the mountainous region from the north of the country — Vatra Dorna, for its melliferous resources. Raspberry and fireweed (*Epilobium*) grow in the forests, and the white clover and dandelion grow on the pastures that cover an area of about 32,000 ha. A rich melliferous flora is found in the forest glades as well. The main flow period of this region begins on June, 25 and lasts until the end of July.

Some years ago, 2000 bee colonies were in total in this zone and the nectar abundance was used only to a little extent. Thanks to the propaganda carried on by the Romanian Beekeepers' Association and the State support (in contracting honey etc.), the number of bee colonies has increased to 4000. Following a study of the main flow it was found that in this region there can be obtained quite high annual honey crops, even under conditions of placing 7000 bee colonies, so allowing the shifting of the apiaries of other zones. In 1965, for instance, 1200 bee colonies were brought from Mureș Autonoma Maghiară Region, 775 from Cluj Region, and 300 from Suceava Region. The shifting of the apiaries based on the taking an account of the natural flow, is planned and controlled by the branch of the Beekeepers' Association at Vatra Dorna, that determines the places of all migratory apiaries and their extent. Moreover, the Association organises the transport and sanitary control of the shifted apiaries.

As the main flow begins comparatively late at Vatra Dorna zone, the Association also organises the sites of the local apiaries in depressions for the acacia flowers. This fact contributes to the rise in honey yield and to a better preparation of the apiaries for the flow in the mountainous zone. Lately the honey crop has been raised up to 20—25 kg per bee colony in migratory apiaries.

Remarks. The author described the rational methods of using the natural flow in a region that, till recently, was a zone of extensive beekeeping. Its full usage is carried out by increasing the number of local bee colonies and by shifting the apiaries from other districts during the main flow. The social importance of intensifying the beekeeping at Vatra Dorna zone was shown in the paper, but besides the organizatory stages it would have been interesting for the beekeepers to find out what was the volume of work and additional expenditures linked to the shifting of bees to far-away distances. The study of this economic elements would clarify how much is the difference between the cost price per 1 kg of honey in the migratory apiaries and in stationary beekeeping.

The additional capital investments necessary for the equipment of the migratory apiaries had also to be studied.

2. The paper : "The experience of the agricultural cooperative from Liphen, Diagan, in harvesting 177.6 kg of honey per each bee colony", presented by the Beekeepers' Association from the Korean People's Democratic Republic describes a very interesting apicultural district from the North Korea mountains. It is about a valley, three sides surrounded by mountains, situated at the height of 1000 m above sea level ; the climate is severe continental ; the mountains and forests cover about 93% of the surface.

In the forest 30—40% of the trees are lime (Manchurian and Korean) of 20—30 years old. A strong bee colony of about 4 kg in weight

gathers 6—10 kg honey during a day. Lime flow starts at the end of June and lasts about 20 days. In the forests there are lots of willow trees, bird cherry trees, plum trees, maple trees, honeysuckle. Each year, the cooperative plants wild trees like : plum trees, pear trees, apple trees and willow trees in the forests. The climate contributes to the nectar secretion of the plants ; for 170 days per year, there is over 10°C temperature, and for 84 days over 20°C.

70—80% of the average quantity of precipitations (800—900 mm) fall during the vegetation period.

The intensification of the apicultural economy took also place together with the progress in agriculture.

The number of bee colonies has increased 3 times as compared to 1957, and the honey yield per colony has increased even more. Modern and rational apicultural methods and proceedings have begun to be used on a wide scale. The beekeepers endeavour to winter strong colonies weighing at least 3 kg. These colonies receive 18 kg winter stocks each. The wintering is performed in heated shelters.

At the same time, spare queens winter in the Romanian type cells yet enlarged twice, in a habitable room at the temperature of 15°—20°C. There are necessary 300 workers (for about three shifts) and 700 g honey for the wintering of a queen. The queen cells are introduced in some special insulating boxes, 20 pieces in each box. Those queens allow to all wintered colonies to be divided into two in spring (at the beginning of April).

In the first decade of June, the number of bees with the new colonies increases up to 27,000 and during the main lime flow it reaches 50,000, that is enough for an abundant nectar crop. There were years when the extraction of lime honey was made 3—4 times.

In 1963, there were harvested 170 kg of honey from a colony. The bee selection started by replacing the local material with dark colour imported bees, characterized by a high honey yield and bearing better the local severe winters.

Remarks. The high average honey yield obtained from the bee-colony is a proof of an extremely good local flow. As the main lime flow starts quite late, the method of early layering to increase honey yield and to prevent swarming leads also to the solving of an important problem : the growth in number of the bee colonies. The author did not present a study of work expenditures in the apiaries of that form. It would have been interesting to know how difficult it is to take care of bees in the conditions of such a heavy flow.

3. The paper : "The use of polyethylene materials for intensifying the development of bee colonies in early spring" was presented by C. Antonescu — the Socialist Republic of Romania.

The author considers that most of the bee colonies do not develop quickly enough in early spring and therefore during the full blooming of the white acacia, they are not able to fully use this flow period. In spring an unstable weather prevails : cold, rains, wind etc. and for this reason, the bee colonies develop slowly. The beekeepers try to overcome these difficulties narrowing the nests and by heating them supplementary.

Nevertheless, the measures that were taken, do not solve to a sufficient degree the problem of quick development of the colonies. Instead of the means shown above, the author of the experiments used a polyethylene film. He made out of it something like a tent leaving in front of it a place for the flight of bees.

The experiments were made in 1964 and 1965, and there were noted down the temperature differences of the air in tents and outside. At the beginning of May, he removed the tents and compared the quantity of brood in the experimental colonies with that of the control. The group of the experimental colonies was made up of basic and supplementary colonies. During the control, the basic colonies had 10—12 dm more larvae and the supplementary colonies 7—8 dm, than those of the control. The experimental colonies gathered from the acacia 32% more honey than the control colonies. The tent temperature was always higher. especially in the cold nights (10°C+4°C). This method had its shortcomings, as for instance, in the sunny days, the temperature raised up to 39°C in the tents. Also it happens in certain sunny but cold days, that the bees go out from the hive and die. The author recommends to be used this method in the apiaries alongside the early flow.

Remarks. In the northern countries the temperature of the nests is maintained by the double walls of the hives. Thus, the use of some plastic materials out of polyethylene is very interesting.

We regret the author did not tell anything about the volume of labour and the cost price of the method. It is also difficult to imagine how this method can be introduced in the large apicultural farm where a man has to operate up to 500 bee colonies.

4. The paper: "Correlation between the size of the bee colony and honey crop in heathwort (*Calluma vulgaris*)" by Hans Thiri (Norway) presents the results of five years experiments (1959—1963) regarding the influence of the number of bees in a colony upon the honey yield in heathwort flow.

The strength of the bee colony was determined by weighing the colony, the colony with the hive, and after having removed the adult bees from the hive. The net total weight of the adult bees was divided by 125 mg (according to the author's opinion, this is the weight of a Caucasian worker). It was obtained 8 unities/kg. All the experimental hives (32 pieces) contained 5 frames each. The simple colonies weighing 1.7—3.00 kg were considered weak, the double colonies weighing 3.0—3.5 kg were considered average, and the colonies weighing 5.0—7.2 kg, that is 6 times more than the others, were considered strong. Moreover, there was selectioned a group of control bee colonies. The average honey crop per five years was calculated for finding out the rise in the honey crop, in different years and after obtaining the results, a calculation coefficient was used for the crop of each season. The coefficient for 1959 was equal to 0.9605 and for 1963 : 1.1577 etc.

The flowering period of the heathwort lasted about 16 days, from 25 July up to 10 August. The total honey crop of the strong colonies was larger than that of the colonies of average strength and much larger than that of the weak colonies. The results were not identical when calcula-

ting the crop per kg of bees. The highest crops were obtained by the colony of average strength, that is 3—5 kg. Similar results were noticed by the author during the raspberry and rape flow.

The author drew the attention on the strong colonies that did not gather proportionally more honey. He could not find an explanation to this phenomenon. He was convinced that his method of investigation was correct.

Remarks. The number of the adult bees of a colony can only inform about the possibilities of the honey crop. In the colony, there is very important the ratio among the number of workers that gather honey, the number of young workers and of those capping the brood. We have to endeavour that during the main flow to prevail adult workers and especially to be much sealed brood in the colony.

The author did not take into consideration that moment in his experiments. Moreover, the average weight of 125 mg of a worker seems to me exaggerated. Only the nurse bees weigh 117—120 mg, and the workers that gather honey, weigh 82—86 mg. We have to say that generally the author's experiment was interesting and it was carried out on a melliferous ground, little investigated. We are sure that his future experiments will bring him satisfactory results.

5. The paper : "Trends in the organization of apiculture in the main zones of the USSR" presented by A. M. Koralev, deals with the organization of the apiaries in different zones of the USSR, studying minutely the climatic factors, soil, botanics, economical geographic, that have an influence upon the specialization of the hives. The author distinguishes five sectors in apiculture .

a) Apiculture for the yield of honey commodity was developed in zones rich in natural flow as : forests, mountains and taiga. These zones include : the Far East, the Eastern Siberia, the Altai and the Urals.

In the Far East, there are millions of hectares of lime forests (local species) wherein the honey crop per hive reaches 20 kg in 24 hours in certain places. The kolkhozes (collective farms) and sovkhozes (state farms) operate large apiaries, obtaining 58—85 kg of honey from each colony. Some sovkhozes have up to 15.000 bee colonies.

The taiga zone of Siberia having as prevailing melliferous plants : raspberry, fireweeds and Siberian "daghil", is very interesting for apiculture. There the honey crop reaches 150 kg from a colony. The average honey crop was about 100 kg per colony, per season, in some orchards of the sovkhozes in the last 10 years.

The mountainous and submountainous zone of the Altai, with its various climate and a very rich flora, is inviting for beekeepers. There the "Putințev" sovkhoz has 25,000 hives.

The forest and mountainous zone of the Urals has also favourable conditions for beekeeping. The limes and a various herbaceous and wooden vegetation are the sources of the honey crop. There, apiculture plays to a certain extent, a part in pollination.

The nectar stock is used in a very small degree in these four zones. The general density of the colonies per one sq. km is small, in average up to 0.7 bee colonies. In order to turn to good account these rich nectar

resources, the large network of apiaries is enlarged and it is organized the usage of the package bees from the south on a wide scale.

b) Apiculture directed to honey-pollination was developed in the steppe forest zones of the Far East, Siberia, the middle region of the Volga, the West Ukraina, the Bielorusian Polesia etc. The main flow is yielded by the natural flora and the supplementary flow by the cultivated plants such as : lime and buckwheat.

The unprofitable apiaries are helped in covering a part of their expenditures, on the account of the crop incomes. In some districts the apiaries increased up to 600—800 colonies (Bashkir and Tataria).

c) Apiculture directed to honey-pollination prevails in zones where entomophilous cultures are extensively cultivated, and the natural sources of the honey crop are insignificant. Such conditions are in the European part of the country, in places where the arable area of the territory reaches 80%. Here are very many bee colonies (45% of the total number of colonies) on a surface of only 6% of the country's territory.

It is much cultivated the sunflower, buckwheat, coriander, white mustard and pumpkins. Besides honey crop, there are obtained royal jelly, propolis, bee venom, pollen and package bees. The last ones are of large prospects.

d) Apiculture directed to pure pollination is found only near the big towns where there are vegetable centres. All the expenditures of the apiaries are made on account of the phytotechnics.

e) The apiaries of the reproduction sector are developed in the south, where the climatic conditions and the flora favour them. They are in the Caucasus zone, the Crimea, the West Ukraina and the Moldavia zone. There, the apiaries yield swarms and queens for meeting all the domestic demands, as well as for export.

Remarks : After such a minute work on the specialization of the apicultural farms it would be desirable for the author to present in future the framework of organization of all the types of hives, as well as their economic calculation in different natural-geographical conditions of the USSR.

The beekeepers of some countries are interested, especially in the way of calculation of the expenditures of the pollinating apiaries and their relation to agricultural cultures in Kolkhozes and Sovkhozes.

6. The paper : "Factors determining profitableness in beekeeping and work productivity", presented by Eng. Virgil Safer (the Socialist Republic of Romania) underlined the quickness of the apiculture development in the last decades of the XXth century as a result of science achievements and the advanced experience of the beekeepers all over the world. It can be stated that the modern organization method of the apiaries has been fixed. This method consists in :

1. — Minute knowledge of the relief and climate of zones where the apiaries will be placed.

2. — Drawing up of the nectar and pollen balance knowing the melliferous flora area and the average nectar and pollen yield per 1 ha. Starting from the premise that the flight radius of the bees is equal to 3 km, then the consumption of one colony reaches 90 kg of honey and 30

kg of pollen per year and the respective zone stocks are acessible to bees in the ratio of 1/3.

3. — The beekeepers' tendencies to obtain strong colonies during the main flow, additional queens, layering in due time, increase of the colonies' strength, supplementary stimulative feeding.

4. — Permanent activity in the field of bee selection, the use of the best races and of the guaranteed mating places.

5. — Continuous supervision of the apiaries from the veterinary point of view.

6. — The organization of the large apicultural farms with good equipment ; about 25—40 multiple-storey hives in each place.

7. — The organization of the sites for different flows, to assure a continuous flow.

8. — The production of the honey varieties : acacia, lime, raspberry, flood plain and forest honey, as well as other apicultural products such as : venom, propolis, royal jelly, pollen etc.

9. — The training of expert beekeepers by means of schools, classes, a good beekeeping literature, trips etc. The author maintains that the modern organization of the apiary assures its profitableness.

Remarks. The programme of organization and management of intensive apiaries, proposed by the author, is generally universal and must get followers in the whole world. Certainly, some of the author's premises have to be changed in different countries in relation to the local conditions. For instance, the number of colonies in a certain place, the ratio of use of the nectar resources, honey and pollen quantity for the maintenance of a colony etc. Moreover, there can be also considered such facts as : artificial insemination, the use of heterozygote lines of package bees etc.

The Romanian press, broadcasting and television have taken a particular interest in the proceedings of Apimondia Congress.

SYNTHESIS OF THE DISCUSSIONS ON THE PAPERS PERTAINING TO THE COMMISSION ON BEE ECONOMY.

Joint chairmen of the 1st working meeting :

R. BORNECK, *France*
Dr. L. BORNUS, *Poland*
Dr. S. CANNAMELA, *Italy*
Dr. EVA CRANE, *England*
Dr. M. DOUHET, *Madagascar*
Dr. F. GNÄDINGER, *Federal Republic of Germany*
H. ISBETCHIAN, *Lebanon*
R. VAN RAPPARD, *Holland*
V. VELCIEV, *Bulgaria*

Mr. R. BORNECK is in the chair.

Opening the 1st working meeting of the Commission on Beekeeping Economy Mr. Borneck gives his synthesis report on the beekeeping capital. He is followed by Mr. Xavier Grandjean who expounds his synthesis report on apicultural organization in various countries, history, monograph. These reports being read, the floor is given for discussions on the basis of the papers presented.

Mr. G. Alphandery (France) states that the agrees with the proposals made by Mr. R. Willson (U.S.A.) in his paper relating to the standardization of legislations and arrangements on honey circulation in all countries. A special Commission is dealing at present with the regulations within the Common Market. Nevertheless he considers as convenient for Apimondia to set up a Committee to draw up a code of the international norms prior to the application of the new Rules and proposes Mr. R. Willson to be entrusted with this difficult task. He thinks it is necessary for Willson's plan to be largely popularized in future through the apicultural press in all countries. He considers that in this way numerous opinions and suggestions will be expressed thus enabling this work to be really efficient.

Mr. R. Borneck (France) considers the regulations worked out by the Codex Alimentaris are not specific of Europe. These are world wide in character and comprise a great part of the proposals made in different reports including that of Mr. Willson. He further reads the "Honey" Chapter of this draft regulations.

Taking the floor Mr. R. Willson recommends along with Mr. Alphandéry that Apimondia have a Committee dealing with these problems, which should especially deal with this Alimentary Codex.

Mr. R. Borneck reminds Mr. Willson of the Commission on Beekeeping Economy already in existence. This work could, therefore, be done in that section.

Mr. Alphandéry shows that there are numerous provisions which impede the honey circulation and the extension of its sale, and that numerous regulations in force in Germany are forbidden in France as are those concerning the diastases.

Therefore, he considers it to be necessary for the report of Apimondia to be presented to the authorities concerned before being too late.

Mr. R. Borneck shows that within the frame-work of Apimondia it is possible to set up a working group dependent upon the Commission on Bee Economy. With that end in view he will propose the Executive Council to set up such working groups asking Mr. R. Willson to kindly preside over it.

Mr. Ntengo Gratias (Tanzania) states that the beekeeping in Madagascar is governed by two factors : the variety of climate and the temper of bees.

He shows that for maintaining bee colonies the beekeepers in his country make use of a way of cycle hives which enables them operating colonies with the least attack from the bees. This type of hive is a good one and at the same time suitable to the tropical forest conditions.

Mr. Dunand (France) explains by presenting some photographs at epidiascope the advantages of bee breeding in hives of plastics. The experimental apiary, his own property, comprises hives with walls made of glass fibres and poliester or insulating foam polyuretan, wherein 10 mating nuclei were wintered which were very small in view of the period of maxim frost in this region.

He further shows the picture of a frame of Dadant — Blatt super on which one could see how bees were circulating free at a temperature of +29°C in January and February, the temperature being noted at fixed hours : at 4 a.m. and 4 p.m. These small hives, the speaker asserts, had 29°C inner temperature while outer temperature was — 20°C. On the same frame one could see brood in its centre and eggs laid by the queen in the rest of the area. The queens had neved stopped laying eggs although the temperature was oscillating frequently during the night around — 10—15°.

For 5 years studies have been directed to solve the question interesting all the beekeepers : hygrometry. The problem has been solved itself through a phenomenon well-known to all engineers working in calorimetry and dealing with the heating installations. This phenomenon consists of a rapid fall of hygrometry in the air when temperature rises.

According to his sayings the exceptional qualities of this material are the following :

1. Mechanical resistance ;
2. Chemical resistance to all agents ;
3. Great calorimetric resistance.

Mr. Dunand further explains how 100 bee colonies maintained in these small mating hives prepared in autumn and wintered under the aforesaid conditions have been brought by feeding them until April — May when they were doubled with the help of 100 mated queens previously reared in normal hives.

The same operation was repeated in June when by a new doubling he obtained 400 small hives. Most of the queens were sold and the remainder small hives fed on pollen and syrup developed until the end of the year when they became normal bee colonies.

There being no further question, Mr. R. Borneck declares the 1st meeting of the Commission adjourned.

The 2nd meeting of the Commission on Bee Economy was held on the morning of the next day.

Joint chairmen of this meeting :

Dr. L. ARMBRUSTER, *Federal Republic of Germany*
R. BANKER, *U.S.A.*
NTENGA GRATIAS, *Tanganyka*
Dr. SCHWARTZ HANSEN, *Denmark*
E. LEYSEN, *Belgium*
Dr. A. ROSENBERG, *Norway*
Eng. V. SAFER, *Romania*
M. STEYSKAL, *Venezuela*
R. ZIVANOVIC, *Yugoslavia*
Dr. W. ROBERTS, *U.S.A.*

Dr. W. ROBERTS *from U.S.A. is in the chair.*

Dr. W. Roberts gives the synthesis report on bee breeding methods by Mr. Mc Gregor who is absent. He is followed by Dr. L. Bornus who gives his synthesis report on organizational methods and measures.

In the ensuing discussions Mr. Lavrehin (U.S.S.R.) inquires about the biological material and the hive system used in the beekeeping of Northern Korea.

Then he asks Dr. Roberts some questions concerning the fertility of queens in U.S.A. relating to the number of larvae offered at once to a finishing colony, if there is in use the queen breeding in the presence of unsealed brood and finally what are the bee races used in U.S.A. for queen rearing.

The author from Korea being absent Dr. Bornus takes the floor for answering the problems raised by Dr. Lavrehin.

In answering the question how many larvae are given to each finishing colony in queen production Dr. W. Roberts shows that they give 15 to 40 larvae at each 3 to 4 days or 18 to 22 cells (queen cells) each 4 days. The queen cells are in a frame in between 2 frames of unsealed brood.

As concerns races of bees he emphasizes that most of them in U.S.A. are so called Italian. They are a mixture originating from the importations which occurred many years ago and consequently the Americans recognize very few races of bees in the United States. "Our bees — he says — are just bees".

M. Lavenson in answering Mr. Lavrehin — relating to the basic material used in the Fentz husbandry — emphasizes that in Korea most of bees are Italian. Therefore the basic material used in this husbundry was also Apis Ligustica and the hive system was a multiple-storey Dadant standard.

Further M. Roberts shows that the arrangement of international legislation concerning the standardization of regulations for the movement of honey in the market of the world is very important and deserves to be one of the primaries for action by Apimondia.

He feels, therefore, that it is time for Apimondia to know the extent and practices of beekeeping all over the world. He hopes that Apimondia in its new phase will attempt to better promote beekeeping practice and to start some studies on the best methods of promoting the use of honey to improve our markets.

Then Mr. Roberts thanking the reporters and all speakers winds up the proceedings of the meeting considering them particularly important.

The visitors look with interest at the exhibits of the first Beekeeping Exhibition-Fair.

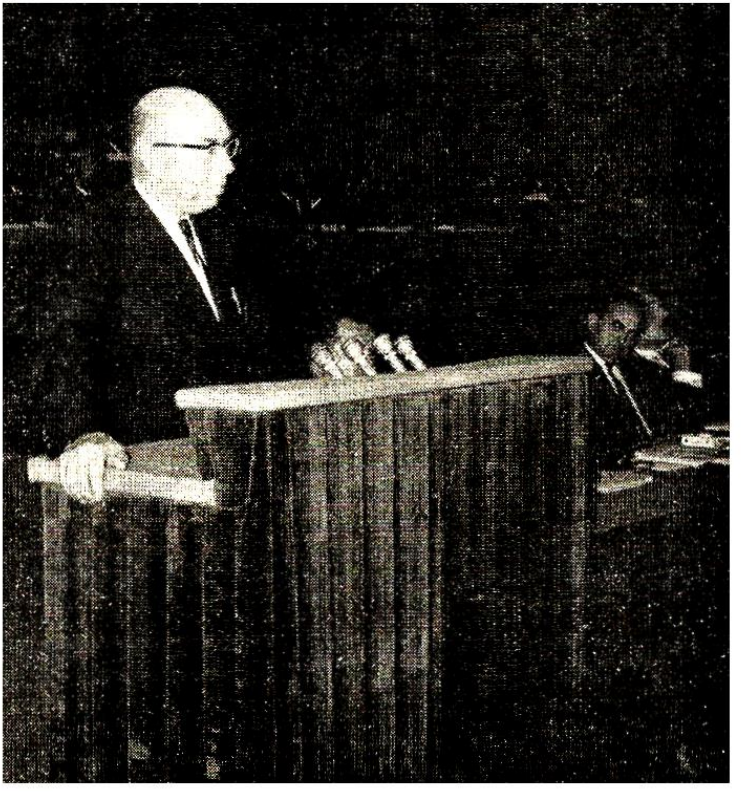
COMMISSION ON BEE TECHNOLOGY AND EQUIPMENT

PRESENT STATE AND FUTURE DEVELOPMENT OF TECHNOLOGY AND EQUIPMENT PROBLEMS

SPEECH BY PROF. Dr. G. F. TOWNSEND
CANADA

Chairman of the Standing Commissions on Bee Technology and Equipment Problems

The beekeeping industry until very recently has gone through few changes since the time of Langstroth. Modern development in transportation, machinery, science and drugs, coupled with the large enterprise approach to business and farming, are now having a profound effect upon the industry. These changes are particularly noticeable in North



Prof. G. Townsend *(Canada) member of the Executive Council of Apimondia and Chairman of the Standing Commission on Bee Technology and Equipment.*

America and Australia, and perhaps to a lesser extent in other areas of the world.

* Original text in English.

The small 100-acre diversified farm with its few colonies of bees has virtually disappeared. In its place we find large 200- to 500-acre farms in eastern America, and 1000-acre or larger farms in the West devoted to specialized crops. The hedgerows and woods have been removed and along with them most of the wild pollinators and the natural bee forage. Under such conditions the specialized fruit and seed grower has become dependent upon the beekeeper for pollination, and the beekeeper's success in many areas depends upon the forage crops grown by the farmer.

Perhaps the main exception to this change is the vast semi-tropical and tropical areas of Mexico and south through Central and South America, where vast areas of honey producing plants are growing naturally. There are large areas of Mexico and south where honey production is limited only by roads to enter the jungle and bees to place in them. No doubt these vast areas will be tapped in the near future. A good example is Yucatan, which twenty years ago produced little or no honey and now export honey in the tens of millions of kilogram.

We now find the bulk of the honey produced by relatively few beekeepers, with some specializing in pollination in the major seed and fruit producing areas. This means that the equipment must be of a type which is readily movable and the system of management, including extracting of the crop, both simple and highly mechanized. Since the demand for beekeeping equipment is limited, as well as the funds for research and development, most mechanical changes have been introduced through the enterprising efforts of various commercial producers.

It is not uncommon in Western United States for one man with the use of an automatic loader mounted on a truck to operate 1,000 colonies of bees, moving them as many as six times a year and only rarely examining the brood chambers. Single enterprises have reached the 50,000 colony number (Miel Carlota, Cuernavaca, Mexico), with many in the 5,000 to 10,000 colony bracket in United States and the 1,000 to 3,000 colony operation in Canada.

It is therefore time we take a look at the methods and equipment used and what the needs of the future may be to meet the rising costs of production and the inevitable increase in production as some of the tropical areas take advantage of their possibilities.

The cost of production per kilogram of honey is more dependent upon yield per colony than upon any other factor, as is depicted by the following cost survey carried out in Ontario, Canada.

Relationship of Production per Colony to Cost
(It does not include operator's labour)

Production in kilograms	Cost per kilogram in cents
25	44
25—50	32
50—75	22.5
More than 75	18.0

While the yield per colony will vary from year to year, depending upon weather conditions, average yield and therefore cost of production are closely associated with available forage. Forage available is dependent upon farm practice in some areas and natural forage in others, or occasionally a combination of both. It therefore naturally follows that commercial beekeeping is only advisable in areas where plenty of forage of the proper plants is available.

The second greatest factor in cost of production is labour. Surveys which have been made indicate that in the commercial areas this average is 4 to 6 hours per colony per year. It is quite conceivable that this cost may be reduced appreciably by mechanization and efficient operation.

Pollination is now carried out in many areas on a commercial basis and will no doubt expand as seed and fruit and some vegetable enterprises become larger. Practical results are only obtained when the person responsible for handling the bees has a thorough knowledge of bee behaviour, insect control, and physiological factors affecting set of fruit or seed. Generally speaking, the honeybee is a very satisfactory tool for pollination of all clovers including alfalfa in some areas. It is now impossible to produce most clover seeds commercially without the use of honeybees. In some of the valleys in California where irrigation is necessary and complete climate control is nearly possible, alfalfa has been grown with the complete exclusion of all other plants useful to honeybees. Under these conditions the honeybee has been the tool in producing enormous crops of seed averaging 1,000 to 1,500 kilogram per hectare. In one year, in one country, one man coordinated the use of 80,000 colonies of bees to pollinate 20,000 hectare of alfalfa with yields as high as 3,000 kilogram of seed per hectare.

The use of honeybees in the pollination of fruit has not been as spectacular but is more widespread, and does require more attention to behaviour habits. While most fruits will benefit from the use of honeybees, for those requiring cross-pollination they are a must. These fruits include sweet cherries, pears, apples and almonds in particular. It is now commercially practical to grow fruits requiring cross-pollination in solid block plantings. Compatible pollen is collected, processed and stored at —20°C until needed. This pollen is then distributed by honeybees, using special adapters to the colony entrance called pollen inserts. It is important to move the colonies into the orchard after the crop is in bloom, especially in crops as unattractive to honeybees as pears. It is also necessary to apply the pollen dispensers immediately the bees are free to fly, as often the bees will work the required orchard for only a few hours after placed in it. This practice is now being followed commercially in both United States and Canada and could most likely on a large scale in other areas and on other crops.

PRESENT APICULTURE EQUIPMENT

Whether the bees be used for commercial pollination or honey production, the hives must be easy to move, readily adjustable in size, and easy to examine. The equipment must be strong to withstand transport, light for lifting and resistant to decay or insect damage and still as cheap as possible.

The kinds of equipment which have met most of these requirements and have been adapted to commercial beekeeping in various parts of the world are: The standard Langstroth using 9 frames, in America and Australia. The frame size is length 44.76 cm and depth 23.7 cm. Unfortunately, one box of this type is not large enough to hold all the brood at the height of the season. The other type, and one which is large enough to accommodate most or all of the brood, is the Dadant or modification of it. In America and to some extent in England and on the Continent, an 11-frame version is used with frame 44.76 cm long by 28.57 cm deep. In Canada and England to some extent and in Mexico by Miel Carlota, the jumbo version is used, with 10 and sometimes 9 frames to the box.

The Dadant or jumbo type supers are too heavy for lifting when full of honey, as indeed is the Langstroth.

It is important to have as few different pieces of equipment per colony as is necessary. Some have even adopted tops and bottoms which are interchangeable.

Perhaps the greatest moves forward in recent years have been made in the extracting of honey. With hive loaders for lifting colonies and supers, automatic uncapping machines and large automatic extractors, and by taking advantage of the use of heat to reduce viscosity, large quantities of honey can be extracted daily with a minimum of labour.

THE FUTURE REQUIREMENTS OF THE INDUSTRY

Our future equipment must be adaptable to producing a high quality honey and extracting it with speed and a minimum of labour. It must be easily moved and adaptable to a minimum of management.

I believe that the present style movable frame hives are completely suitable for future developments. I do, however, think that the brood chamber and super of the future will have to be of different sizes and not necessarily interchangeable. The best quality honey is produced in white super combs and should not be produced in brood chambers. The jumbo and Langstroth supers are too large for honey production. We need something which is lighter to lift and transport with less breakage. We need a super which is shallower than the present Langstroth and more adaptable to the use of chemicals for removing the honey in one trip to the apiary. One of the main problems with all of the repellents used for driving bees is that they work well for 15 to 18 cm but beyond that the bees tend to cluster. Supers of the future will likely be uncapped

and extracted by the super without removing the frames. Shallower supers will be more adaptable to this procedure as well. A possible practical size for this type of operation would be a standard Langstroth box 15 to 18 cm deep. Since these combs will have a very limited examination it will be wise to the strongest of comb available and for this purpose the new 3-ply (centre ply of plastic) Duracomb would be the most practical.

It will be possible to manage bees with a minimum of operations as our knowledge of bee behaviour develops.

The brood chamber should therefore be large enough to accommodate all the brood area requirements at any season of the year. The most practical approach to this is the 10-frame jumbo. I would therefore recommend that those planning equipment for the future should consider 10-frame jumbo size brood chamber and supers with a depth of 15 to 18 cm.

The present extensive research dealing with behaviour and physiology of the honeybee will likely show the way towards cutting our labour costs for management of bees to less than one-half of what it is now, and improve our methods of handling honeybees for pollination as our farming and beekeeping become more specialized.

SYNTHESIS REPORTS

REPORT V. A. ON BEE EQUIPMENT, RATIONALIZATION AND MECHANIZATION PROBLEMS*

(Papers, No. 2, 5, 10, 12, 13 and 17)

Rapporteur : Eng. **P. HORGUELIN**
FRANCE

I agreed to present to the Congress a synthesis report on a certain number of papers dealing with what I consider as my speciality. According to the new organization feature of the International Congress, it is for the first time here in Bucharest that the reports were printed and distributed prior to the Congress, this enabling the participants to get acquainted with their content. A certain number of persons were asked to secure the synthesis reports on these papers.

Eng. P. Horguelin *(France), Vice-President of Apimondia.*

* Original text in French.

The summaries that I want to present to you correspond exactly to the spirit of organization of the Congress by allowing sufficient time and place for long and practical discussions on the reports interesting most of the people. By taking cognizance of these reports every part is given the possibility to take part in the discussion, and lend them warmth and vitality. Thus they will derive from these reports the greatest possible benefit.

The first (No. 2 in the list of the 5th Standing Comission on Technology) of the papers I had to sum up, belongs to Dr. Herman Graze from the German Federal Republic, and deals with "The problems of rationalization, mechanization and automation in beekeeping".

The author deals with the important matter of the honey extractors and their various types which are divided into two groups.

A. Vertical rotation axle extractor

B. Horizontal rotation axle extractor

The first group comprises the tangential and the radial or stellar extractors.

The second one refers to those more particularly known by the name of "wheel extractors" which are not articles to be manufactured on an industrial scale.

The category of "automatic reversible" extractors belonging to the tangential ones is particularly studied : the author also examines the "inertia reversal" extractors at the stoppage of the apparatus and those provided with "mechanical reversal" whilst the extractor is working.

While professional beekeepers in need of these big and important patterns (up to 50 francs) of good mechanic construction seem to be easily satisfied with, the author also wishes for the achievement of more rational and practical models of more efficiency for the little beekeepers who are the most numerous and especially of a "reversible" extractor under convenient cost prices.

I no more insist upon for I intend to resume this problem of extractors during the discussions.

The report especially examines all the categories of extractors but the author finally confines himself to examine the extractor built upon the principle of centrifugal power. It was not our purpose to study the extractor-problem in another light, namely instead of attaching solely to a mechanics questions, he could for example examine the possibility of modifying the principles of honey extractor. But we will resume it presently.

The report No. 5 in the nomenclature of the Standing Commission on Technology is presented by Mr. J. Gidron from Israel who entitled it "The use of compressed air instead of honey pump".

The author depicts a double honey extraction installation comprising a main extraction station and a movable honey extraction centre located on a trailer (for extracting honey on the spot in the orange plantations apiaries) wherein honey is transported from the extractor into the honey-tanks by compressed air instead of honey pump which is most frequently used for this purpose.

The honey flowing from the extractor is collected by a hermetically closing reservoir in which compressed air is introduced either by a compressor (the main station) or by a gas cylinder (the movable installation).

This system "pushes" honey without incorporating into it air bubbles thus meeting all the exigencies of those making use of it.

Though the author thinks this experiment of transporting liquid honey through compressed air to be for the first time tried out we must point out that such installations have been in work, in France as well as in other countries for many years.

This matter could also be resumed at once in our discussions. Nevertheless I take the liberty of making evident that I do not agree at all with the author who nearly declares unfit the honey pump which is on a large scale employed both by the big amateurs and by the large conditioning installations and cooperatives. This deserves, therefore, a priority to be studied before saying that the system is not good. Had it not been a good one, people would have tried long before to search for something else, or remedy its disadvantages.

Now the disadvantages pointed out by the author arise from a bad utilisation and a bad installation of the honey pump which I must recognize to have many times ascertained myself even in the most modern installations at least at the moment of starting and before adjusting it, does not correspond at all to the technics of pump utilization. The author says that the system of compressed air is more advantageous "because it does not incorporate air bubbles into the honey".

But a pump well installed must not give such results and if it does, this is because of its bad mechanical manufacture which makes it unfitted for transferring honey or more often because of its bad installation due to the fact that the honey pump is supposed to work like a hydraulic one. But this is a mistake.

The honey pumps must work very slowly and without any suction ; if these can make it mechanically, they must not make the same in practical utilization. The honey must arrive to the pump in more than sufficient quantity to exceed the delivery pump flow and it goes without saying — without any suction. If a honey pump is, therefore, well installed neither suction takes place, nor air enters the pump ; at any rate, the smallest model pump for the big amateurs as well as the largest ones devoted to the large installations do not incorporate air bubbles into honey. If you yield the point, the honey transferring system through compressed air is far from being advantageous ; on the contrary, — considering the necessary workings to assure the honey outflow at the moment of its going out of the extractor into a reservoir tightly closed before introducing into it compressed air and besides another supplementary handling after honey has been transferred for decompression with a view to a new outflow from the extractor — this system is more complicated and particularly for the producer amateur.

Now what can be the object of beekeeper when he is extracting the honey ? He wants to step in as rarely as possible without being obliged to resort to these operations. The pump must work by itself. We would

no doubt bring it up during our discussions and it will be possible for this report also be completed on this occasion.

The third report (order no. 10) is presented by Dr. Nicolae Romanescu from Romania.

Dr. Romanescu whom I have just had the pleasure to meet, describes a small tool which is difficult enough to be designated in French. It works like a plough having ploughshares. Before this report it was designated in French by an old word which is no more used since a long time. In the new edition it was called „scarifier", but I think it also could hardly give us the precise meaning of this implement. Only supplementary explanations would enable us to exactly understand this tool. It should, therefore, be created a special term in French to be used on purpose.

The author describes an artisan construction tool and the manner to handle it for fashioning on a wax comb supports for queen-cells started with a view of queen rearing or of producing royal jelly.

The apparatus rapidly destroys lengths and width-wise on a comb a certain number of cells, leaving behind and judiciously distant only the required cells whose opening is also fashioned with the help of the same implement inverted.

This is a device resembling a rake provided with teeth having a certain inclination and which are guided during the work in such a manner as not to surpass the mid partition of the comb i.e. not to burst it. This apparatus which is easily handled furrows the comb length — and — width-wise and in 30 seconds 100 cells can be transformed into incipient queen-cells. Those who know how tiresome a work is to prepare queen-cells started either in usual manner or by trying to obtain from natural combs supports for queen-cells, by using this tool can easily and rapidly perform their task. Here are some details to give you an idea of this apparatus. This device destroys 15 cells leaving behind only one and gathering round it all the wax resulting from the trace furrows. Thus the bees will immediately find near the cells the necessary raw material to turn easily and as rapidly as possible these cells started into magnificent queen-cells. No doubt that amateurs as well as beekeepers rearing queens without resorting to a special breeding — material — are interested in this system. On the other hand this system can enormously simplify the work of amateurs as well as of professionals for producing both royal jelly and other products.

Finally, one of the last reports (order no. 12) is presented by M. Zalewski and J. Curyle from the Fruit Growing Institute Beekeeping Section — in Poland, entitled : "Comparison of the refractometric and lye solution methods in quantitative establishing of wax contained by the old combs". In fact, this report aims at a comparison between two methods permitting to extract wax from old combs, to determine the percentage of the remainders in order to establish which is the best of these methods.

The author gives the results obtained in pure wax extraction from old combs depending on the utilization of the refractometric method with

the help of chloronaptaline or of that by lye — washing with refined benzina.

These results are much about the same (50% to 80% pure wax) excepting the wax extraction from very old, almost black combs, when the chloronaphtaline treatment gives 6 to 8% less than the lixivium one.

The results are, however, different (35% less) when already steam pressed combs are treated. These treatments are to be utilized only for extracting wax quintessence which can still remain in the steam pressed combs according to the most generally and frequently utilized methods.

The report No. 13 of N. Romanescu from Romania deals with the "Advantages and disadvantages of the open mobile pavilions in intensive migratory beekeeping".

The author develops in a masterly manner the matter of the pavilion apiaries which as you could ascertain by yourselves — are all the rage in the countries of Central Europe and particularly in Romania, Hungary, Bulgaria and Yugoslavia. The other ones are less interested in, because the beekeeping in these countries did not at all develop in the same way. After a certain number of trials took place, particularly in France, they ended by admitting that the pavilion apiaries even for migratory beekeeping did not really present advantages justifying their manufacturing. Nevertheless, in the countries mentioned above and especially in Romania where migratory beekeeping is very well organized and developed, one can easily guess the reason why researches were carried out to establish the most interesting mobile pavilion apiaries.

The author examines the possibility of small pavilion apiaries located on a trailer with a view to make sure of rapid removal according to honey flows.

He recomends even to previously send by motor-car an advance trial hive in order to establish the rentability of honey flow in one or more regions and the pavilion apiary will promptly be moved to the richest one indicated by these results.

Advantages and disadvantages of this method used in migratory beekeeping and especially of the entirely closed pavilions which are often arranged to offer the beekeeper a "summary abode" and also of the open ones, wherein the apiaries are less confined but better ventilated and the work protected by a permanent roof is easier, are also shown in this paper.

As a matter of fact the author studies the advantages and disadvantages of the closed mobile pavilion apiaries which some times are even provided with a dwelling for the beekeeper in the available space. The disadvantages especially consist of a greater heat inside the bee colonies, hence a greater tendency of swarming. He also examines the open pavilions located on a trailer wherein the hives are seated vertically one near another or one above another, the pavilion being not completely closed. It has only a plane roof, the back wall of this trailer apiary being amounted like a penthouse. One of the pavilion walls can be folded and arranged to offer the beekeeper a suitable abode wherein he can have a reservoir of water (600 litre capacity) to use in case of need when installing his pavilion apiary in the most advantageous spot.

This new system is rather interesting in case of a small apiary enabling the beekeeper to promptly move it according to the successive nectar flows without being obliged to load and unload the hives and besides, the roof gives him the possibility of working at any time even when raining.

The author adopted on his own account the open pavilion apiary located on a trailer, which lacks the disadvantages of the wholly closed pavilions.

The last report (Order no. 17, in the nomenclature of the Standing Commission on Technology) treats of the uncapping problem.

The author of this report is Mr. Kalman Chaim from the bee-farm near Moshaw Gan-Haim in Israel.

After having examined the uncapping knives heated by steam or electrically, the author describes a very simple system of uncapping honey combs mechanically.

He employs a rotary metal brush the width of which is equal to half of the super frames commonly used. These frames are brought near the brush which turns with 300—450 r.p.m. according as it is driven by an electric "ratchet drill" (say an electric borer) or a device provided with a strap adjusting to the extractor shaft.

The brushed cappings are directly sent into a settling tank.

Difficulties arise of course when one tries to recover the honey mixed with these very little particles of cappings ; but, in return, according to the author, the honey is not heated at all.

This matter, I think, will also be resumed in our discussions. It is obvious, therefore, that the honey was not heated at all but the question arises, however, as to the advantages of this system compared with the others generally used. It is a certainty that machines of great efficiency like that of American make — you could have the opportunity to see at the Institute for Sericiculture and Apiculture researches here in Romania under direction of Eng. Barac, if you called it on or its copy displayed at the beekeeping Complex Exhibition — uncap very shortly a good many frames ; all you have to do is to introduce the frames into the machine which is also provided with a rotary system of brushes or even of knives. But I was aware many times in the U.S.A. where I saw these machines in work, of the problem of this intimate rubbish mixture of crushed cappings to be separated in order to recover the honey which remained in. Many researches were carried out aiming at adjusting these machines to work according to the elementary and usual uncapping knife i.e. to hoe the capping pellicle without destroying and crushing it, so that their separation may be easy. There are here some people making use of these machines and especially Mr. Banker, the chairman of the American Beekeepers' Federation, who will be able to tell us what he is thinking. As to speed, they are perfect. But with respect to their results, they need improvement.

Without awaiting the discussions I would, however, like to tell the author — I don't know if he is here — that I do not agree at all with him because he condemns the knives heated either by steam or by electricity stating : "The steam knives are of great service to the beekeeper ;

their temperature does not raise over 100°". Obviously the steam does not raise above 100° if it is not under pression. And he adds : "But the electric knife temperature although more efficient and expeditive raises above 100°". Not at all ! is the reply. Since the heating principle of the uncapping implement is as follows in the case of the steamplane knife in other respects the manner in which steam is utilised in America, points out that here is almost no more question of steam, because being utilized for the purpose of realizing expansion, this is far from attaining the temperature mentioned above. In any case ,the implement loses its temperature while being used.

All the more so as to the electric knife, because it has a thermostatic control and this apparatus is heated in order to replace the beekeeper's motion everywhere, who dips his knife in warm water for making his work easier. He only wants to re-heat his knife. Well ! The steam or electric knives and planes should not utilize steam or electric energy but to merely heat the sheet to make work easy. If, however, it reaches 100° or more, — as the another emphasizes — this becomes incomprehensible according to the principle that the implement temperature should not be equal or superior to that of wax melting i.e. 63°. If, therefore, using these implements we resort to heat in order to facilitate the slide of the uncapping sheet, this temperature must be maintained at 40—45° approxi-

mately. This temperature is the most adequate to make the work easy and that's all what is required. But with such a temperature there is no question of adulterating or burning honey as the author brings out in his report.

I have thus finished with the reports which I presented to you very briefly. However, I took the liberty — towards a better understanding — to develop them in passing by. On the other hand, the discussion will immediately be resumed by Prof. Townsend, a person of much account in the domain and I will be only too happy to answer the questions to be put with reference to these reports or better still, to ask the authors themselves to give us supplementary information, if necessary.

REPORT V. B. ON HONEY AND BEE PRODUCTS*

(Papers No. 1, 3, 4, 6, 7, 8, 9, 11, 14 and 16)

Rapporteur : **Prof. Dr. G. TOWNSEND**
CANADA

Among the papers from the Commission on Bee Technology and Equipment are to be found two of particular interest with respect to the lipids in pollen and royal jelly. Battaglini and Bossi of Italy identified nine fatty acids from Quercus ruber (Red Oak) pollen by the use of gas chromatography. Of particular interest was the high content of linoleic and linolenic acids. Since pollens vary so much in lipid content it would be interesting to see further studies of this nature.

Sacchi and Bossi identified 3 new acids in royal jelly namely : lauric, succinic and palmitoleic. They have also made further contributions toward the elucidation of the proportional amounts of various 10 — carbon compounds in royal jelly. Of particular interest is their report that royal jelly has a large percentage of its fatty acids as 9 — keto — 2 — transdecendioic acid, queen substance.

The balance of the papers deal with honey chemistry and honey products. I was particularly interested in the paper of Ţintea from Romania dealing with light absorption as a method of classifying honey as to colour. This is a field which has been too long overlooked. Ţintea claims that the transparency varies with the presence of two different pigments the concentration of which changes from one sample to another and he suggests that a more accurate reading of colour can be taken from the transmission curve.

Picha from Dol, Czechoslovakia, makes an appel for the adoption of better methods for grading honey such as aroma and flavour and suggests methods by which it might be done.

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* Original text in English.

Lupşan, Valer, Horwath and Peter of Romania, have studied the fermentation of Romanian honeys and have come up with the same results as Lockhead from Canada in the late 1940's.

I would particularly recommend the paper of Safer and Ioan from Romania to anyone interested in honey wines as such detailed information is not readily available.

Curylo of Poland in two papers shows the presence of arabinose in honeydew and the use of diazouracyl for determination of sucrose in honey quantitatively.

Zalewski of Poland examined over 400 samples of honey, nectar, pollen, and bees for acid phosphatase. Practically none was found in bees and the highest amount was found in pollen.

Now since very little time has been spent on equipment, I thought it might be interesting if I should depict a few slides of equipment associated with honey products in Canada.

The slides deal with pollination of fruit. Pollination of fruit is very important in Ontario — and this equipment is used for pollination of fruit requiring cross pollination. Fresh pollen is collected by hand from suitable varieties either the year previous and stored at the minutest 16°C or in California just before it is used. The pollen is mixed with lycopodium spores and placed in the box on the top of the hive of bees. This is released by a clock mechanism which slowly drops on to the bees the pollen to the flowers in the orchard. Further, details concerning the use of the device are shown, as the positive results following the pollination of an orchard by this method.

SYNTHESIS OF THE DISCUSSIONS ON THE PAPERS PERTAINING TO THE COMMISSION ON BEE TECHNOLOGY AND EQUIPMENT.

Joint Chairmen of the Commission on Bee Technology and Equipment :

Eng. P. HORGUELIN, *France*
S. KOCSIS, *Hungary*
Eng. N. NICOLAIDE, *Romania*
Dr. H. OSCHMAN, *German Democratic Republic*
J. POOS, *Luxembourg*
Eng. G. SELLIANAKIS, *Greece*
Prof. G. TOWNSEND, *Canada*
R. WILLSON, *U.S.A.*
R. ZIVANOVICI, *Yugoslavia*

Prof. G. TOWNSEND is in the chair

Prof. G. Townsend opening the working meeting of the Commission on Bee Technology and Equipment gives a review on a part of the synthesis reports. Then he gives the floor to Eng. P. Horguelin to expound his synthesis report on bee equipment, rationalization and mechanization.

Prof. G. Townsend further gives his synthesis report on honey and bee products. The presentation of these two works is followed by questions and discussions.

Mr. Morten Peter Thomson (Scotland) shows that he is particularly interested in the form of ventilation used in the research institutes in Ontario (Canada) since temperatures in this country are considerably low althoungh he believes the relative humidity is not quite so high as it is in Scotland in summer. "We have tested" — the speaker stresses' — a system of almost total ventilation of hives through the moving clamp boards in the inner cover. The entrance at the bottom is completely cleared apart from moth guards". He wants to know what could we do against humidity as he considers that the utilization of the ventilation system mentioned in the report would affect the hives.

Prof. G. Townsend considers the question is related to moisture and type of packing used in Ontario. He adds that from the slides one could notice that there is both a top and a bottom entrance. These are to remove the moisture as it is also a problem in Ontario.

Dr. N. Romanescu (Romania) shows that in his synthesis report Eng. P. Horguelin summarized quite accurately the advantages of comb butting plough.

As to the utilization of the apiarian pavilion, the speaker is of the opinion that it must be limited. Of course, in the regions where the means of conveyance are well organized and notably where the beekeeper need not hasten to reach the zone with an intense but short flow, the utilization of the pavilion is not justified.

Dr. Kalman Chaim (Israel) points out that in the United States of America and in other countries with an advanced apiculture heat is used in uncapping honey combs and to separate honey from wax. Unfortunately in this system honey coming in contact with heat loses its natural colour and gets inferiour. Therefore it is not a matter of a new apparatus. It is the principle used which deserves our attention.

Eng. Orlovski (Czechoslovakia) states that he is particularly interested in the manner in which heat influences on honey quality. He refers especially to the action of heat in course of time on the diastase, inhibinacetylcolin, vitamines and

other indices. In answering the question regarding the effects of heat on honey, Prof. Dr. G. Townsend shows that the answer can be found by picking up 1—2 papers by Dr. R. B. Willson (U.S.A.) presented at the Congress. In case Eng. Orlovsky wants to have detailed information he will send him some of the works by Dr. White.

Eng. Lupșan Valer (Romania) shows that the most interesting paper among those included in the synthesis report is that which deals with the manufacture of hydromel by Eng. V. Safer and Zamfir Ivan (Romania).

It results from the paper by Eng. V. Safer and Zamfir Ion (Romania) that for obtaining the fermentation and consequently the hydromel they have started from the utilization of honey in pure form and the nutritive substances. "The hydromel — the speaker continues — can also be obtained by other methods, making use for example of different natural leavens and the best of them is the must of grapes. This method precludes the utilization of the respective nutritive substances. Thus by adding must of grapes in proportion of 10—20% we provide for the nutritive proteic layer and that of oligo-elements for the development of ferments in the liquid mass meant to the preparation of hydromel".

As far as his work drawn up in co-operation with other two biologists is concerned Eng. V. Lupșan mentions that it appeared casually just as the work by Mr. Chauvin (France) "Oriental novelties in bees" wherein he shows that his collaborator Laily pursuing the treatment of acarine disease by mere chance discovered some fungi which are natural yeasts but which can also be artificially cultivated and pulverised in hives. In this way there have been healed up to 60% of the diseased bee colonies. And so could he — knowing of the work of Dr. Grete Mayerhoff (German Democratic Republic) "The diseased honey" — discover the phenomenon of fermentation of granulated honey. As to the work itself he shows that the expounded data are very concise and refer only to the observations made directly on this assortment of honey.

Dr. Alphandéry (France) stresses that in their papers, Eng. Safer and Mr. Zamphir gave excellent advices especially as to the addition of fresh grapes must and after manufacture, as to the addition of ascorbic acid and SO_2.

He further shows the influence of these products on stomach. Of course, it would be more interesting to avoid secondary fermentations by pasteurizing hydromel. At the same time we could obtain high quality hydromels, if we had the possibility of using all what is authorized for wine for producing hydromel.

Unfortunately the French legislation is very restrictive in this respect. He believes, however, that the Congress would favour the manufacture and sale of hydromel — in case a high quality of this product were obtained — by the modification of the legislation in force that is by obtaining the authorization of using all what is used for wine production and notably the pasteurization for manufacturing hydromel.

Eng. Horguelin (France), Vice-president of Apimondia, in referring to the paper dealing with extractors, calls the attention of the persons concerned to the fact that the extractor so as it is now in existence has not gone through many changes since its invention by Ruscot as to its essential qualities as for instance the utilization of centrifugal force for extracting honey from combs. But. if this was considered the most practical and interesting system of the respective epoch — what was proved by the fact that since then it has been maintained unchanged — it does not mean that it is perfect. On the contrary it presents two disadvantages and he believes it is a mistake that one has not tried to remedy.

The centrifugal extractor is a true emulsion apparatus and if we want to emulsify honey that is to incorporate it with as great a quantity of air particles as possible intimately hinked with one another there is no other better apparatus to do it. The result is easy to see : suffice it to consider the same honey obtained by direct letting out for example at the teeth of the uncapping fork and at its going out from the extractor. Whereas one has a specific colour and composition the other has a completely modified colour and texture. As a matter of fact this situation is known to beekeepers and to remedy it they make use of maturators. But what we need and wait for is to extract honey maintaining its natural primary qualities just as it has been put in the cells by bees. Therefore a new system of extracting honey is expected — so to speak — the extraction of air bubbles from the honey mass.

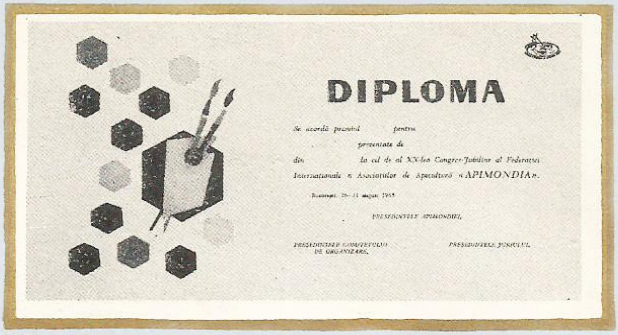
In case extraction systems based on the same principle cannot be found he suggests to extract honey under vacuum. In this case the centrifugal force could still be used but the honey particles should no longer draw air since the extractor is under vacuum.

The second and very short remark is related to the movable system of extraction which was the object of a paper namely that it would be possible and at the same time profitable to use air under pressure for helping honey let out between the moment of extraction and that of transferring it to the maturator.

In the United States there are trailers adequately equipped which are true movable extraction stations. On the other hand, the apicultural press in all countries describes the material used in Australia where apiaries are frequently removed and where extraction takes place on the spot and honey is transported to the centre of the enterprise.

In both cases the problem of transferring honey from the extractor to the containers is very simple and needs no intervention. The trailer is sufficiently high to create the necessary space for barrels of 300 kg capacity and in this case the problem is no longer the same. Honey will let out because of gravity directly from the extractor in these barrels lying below the platform of extraction which is surrounded by a net to impede the access of bees. As it is natural the beekeeper will need a crane to permit him to lift up these full barrels of 300 kg or the whole quantity of honey at the end of an extraction day and to load them on the truck for transporting them.

Eng. Horguelin thanking the reporters and speakers winds up the proceedings of this Commission.



DIPLOMA

Se acordă premiul pentru

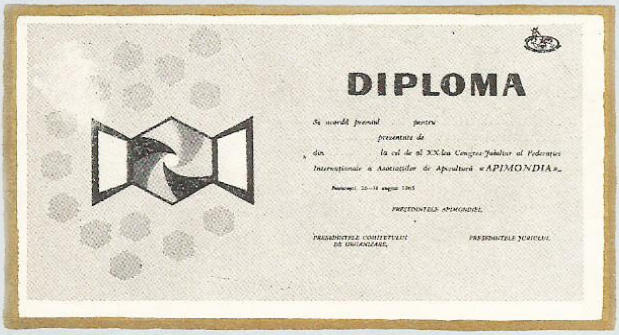
prezentate de

din la cel de al XX-lea Congres-Jubiliar al Federației Internaționale a Asociațiilor de Apicultură «APIMONDIA».

București, 20–31 august 1965

PREȘEDINTELE APIMONDIA,

PREȘEDINTELE COMITETULUI DE ORGANIZARE, *PREȘEDINTELE JURIULUI,*



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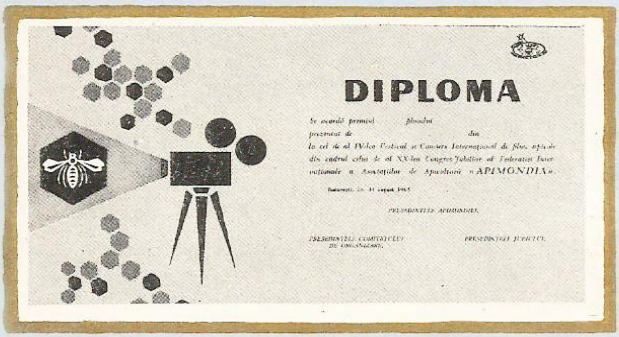

DIPLOMA

Se acordă premiul filmului

prezentat de din

la cel de al IV-lea Festival și Concurs Internațional de filme, aplicate din cadrul celui de al XX-lea Congres-Jubiliar al Federației Internaționale a Asociațiilor de Apicultură «APIMONDIA».

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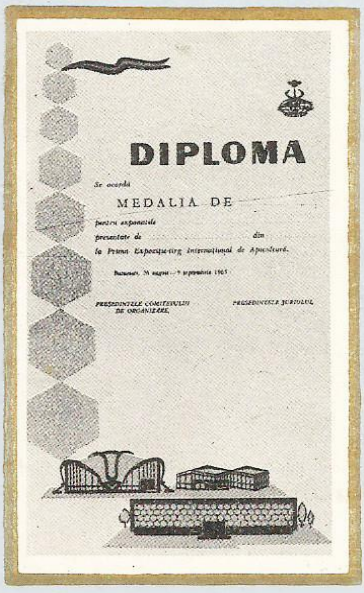


DIPLOMA

Se acordă

MEDALIA DE

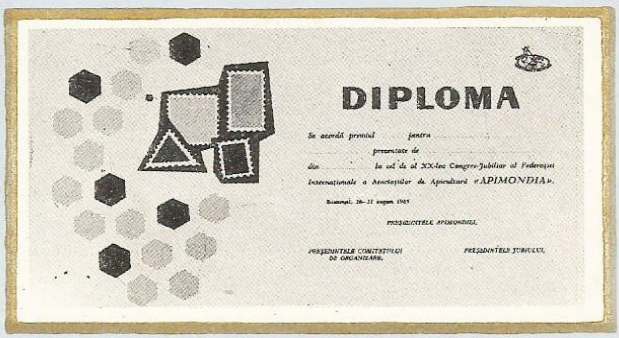
pentru expunerea

prezentată de din

la Prima Expoziție-cîrg Internațional de Apicultură.

București, 30 august – 9 septembrie 1965

PREȘEDINTELE COMITETULUI DE ORGANIZARE, *PREȘEDINTELE JURIULUI,*



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