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REGULATING THE IMPORTATION OF THE ADULT HONEYBEE (*Apis Mellifica*)

HEARING

BEFORE THE

COMMITTEE ON AGRICULTURE AND FORESTRY
UNITED STATES SENATE

SIXTY-SEVENTH CONGRESS

SECOND SESSION

ON

H. R. 11396

AN ACT TO REGULATE FOREIGN COMMERCE IN THE
IMPORTATION INTO THE UNITED STATES OF
THE ADULT HONEYBEE (*APIS MELLIFICA*)

AUGUST 1, 1922

Printed for the use of the Committee on Agriculture and Forestry.

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REGULATING THE IMPORTATION OF THE ADULT HONEY-
BEE (*Apis Mellifica*).

TUESDAY, AUGUST 1, 1922.

UNITED STATES SENATE,
COMMITTEE ON AGRICULTURE AND FORESTRY,
Washington, D. C.

The committee met, pursuant to call, at 2 o'clock p. m., in the room of the Senate Committee on the District of Columbia, Capitol, Senator Charles L. McNary presiding.

Present: Senators Charles L. McNary; Arthur Capper, Kansas; Henry W. Keyes, New Hampshire; Frank R. Gooding, Idaho; Edwin F. Ladd, North Dakota; William B. McKinley, Illinois; and John B. Kendrick, Wyoming.

The CHAIRMAN. The committee will come to order.

The meeting was called to consider H. R. 11396, an act to regulate foreign commerce in the importation into the United States of the adult honeybee (*Apis mellifica*), which bill may be inserted into the record at this point.

[H. R. 11396, Sixty-seventh Congress, second session.]

AN ACT To regulate foreign commerce in the importation into the United States of the adult honeybee (*Apis mellifica*).

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That, in order to prevent the introduction and spread of diseases dangerous to the adult honeybee, the importation into the United States of the honeybee (*Apis mellifica*) in its adult stage is hereby prohibited, and all adult honeybees offered for import into the United States shall be destroyed if not immediately exported: *Provided*, That such adult honeybees may be imported into the United States for experimental or scientific purposes by the United States Department of Agriculture: *And provided further*, That such adult honeybees may be imported into the United States from countries in which the Secretary of Agriculture shall determine that no diseases dangerous to adult honeybees exist, under rules and regulations prescribed by the Secretary of the Treasury and the Secretary of Agriculture.

SEC. 2. That any person who shall violate any of the provisions of this act shall be deemed guilty of a misdemeanor and shall, upon conviction thereof, be punished by a fine not exceeding \$500 or by imprisonment not exceeding one year, or both such fine and imprisonment, in the discretion of the court.

Passed the House of Representatives June 5, 1922.

Attest:

WM. TYLER PAGE, Clerk.

Gentlemen, Mr. Root is here; and in a conversation with him a few days ago I asked him to keep down the number of witnesses as much as possible.

Mr. Root. We have brought along two or three experts in our line so that the committee might ask questions if they care to do so; but we would like the statement to be made by Doctor Phillips, of the Bureau of Entomology, our desire being to save the committee as much time as possible.

The CHAIRMAN. We will be glad to hear Doctor Phillips.

TESTIMONY OF DR. E. F. PHILLIPS.

The CHAIRMAN. Doctor Phillips, please give the reporter your name and your position with the Department of Agriculture.

Doctor PHILLIPS. E. F. Phillips, Bureau of Entomology, Department of Agriculture.

Mr. Chairman, you have before you two bills, as I understand it, Senate bill 3056 and House bill 11396. There is a slight amendment made in the House bill. Do you care to have that discussed now?

The CHAIRMAN. You may go ahead and discuss it in your own way, Doctor.

Doctor PHILLIPS. In 1894 there broke out in the Isle of Wight, South of England, a disease of adult bees, which caused very serious losses. Almost immediately after the discovery of this disease it spread to Great Britain and has now been found in all parts of the British Isles.

The cause of this disease was not known, and it was for a time attributed to a protozoan parasite, but later work has developed that this is not the cause of the disease; and in December of 1920 it was announced by Dr. John Rennie, of the University of Aberdeen, that the disease was caused by a mite, which gets into the respiratory tract of the honeybee and causes, first, paralysis, or inability to move freely, inability to fly, and ultimately causes death.

Because of the ravages which this disease has caused in Great Britain we immediately began a search in this country to determine whether we had the disease here. We have had from time to time reports of the death of adult bees which, in many cases, have not been adequately explained, so during the summer of 1921 we requested beekeepers all over the country, through journals and by circulars, to send us samples of any bees which they found which were abnormal in their behavior. During 1921 they sent us samples from 37 States, and in none of those were we able to find the mite causing the Isle of Wight disease. We felt, since no reports had come of serious outbreaks of the disease, that we were in all probability free of this trouble, and we then wrote to one of the investigators in the University of Aberdeen and asked him to send us over some material for study. He very kindly did send us over a queen bee, with accompanying worker bees, in exactly the same way the queen bees are normally imported into this country. These bees came here alive, and the mites were alive; so that if that shipment had gotten into the hands of the ordinary beekeeper who was not on the lookout for this disease, and he had introduced it into his colony, he would have introduced this disease into this country.

The CHAIRMAN. Is this mite you speak of a microorganism?

Doctor PHILLIPS. No, but it is almost invisible.

Senator GOODING. You say this bee was imported from England?

Doctor PHILLIPS. No, from Scotland.

The CHAIRMAN. It is a germ, is it?

Doctor PHILLIPS. No, it belongs to the same group as the spider. It has eight legs, is normally very, very small and can barely be seen with the naked eye and, of course, to be identified and examined it has to be done microscopically.

The examination of material, suspected material, has gone on, and during the present year we are receiving even more samples than we did last year and so far we have found none of them from the United States infected with this parasite.

Attention was called to our apparent freedom from the disease at the Christmas meeting of the association of economic entomologists at Toronto, and at that time the section of the association devoted to bee-keeping work appointed a committee, which Dr. S. B. Fracker, State entomologist of Wisconsin, was made chairman, the committee to take up consideration of what should be done. The committee held a conference here in Washington with members of our own bureau staff on March 9, at which time they decided that the situation was quite acute and that something should be done to prevent the introduction of this disease, and the bill which you have before you is the result of the deliberations of the conference of that day.

Now, Mr. Chairman, I could go on at some length and tell you what this disease does, but I should like to point out this one thing which I think is important in the present consideration, namely, that since the discovery of the cause of this disease it has been definitely possible to determine whether the disease occurs elsewhere, which was not possible previously. Since that time the disease has been found in three departments of France, two of the Cantons of Switzerland, and in Germany. Just how wide its distribution in Germany may be we do not yet know, but we do know that it is present in those three countries. In most of the countries of Europe no work has as yet been done to determine how widespread the disease is.

The CHAIRMAN. How does the infection spread, Doctor?

Doctor PHILLIPS. It spreads from diseased bees to healthy bees by the mite simply crawling out of the respiratory tracts of the sick bees and getting into the respiratory tract of the healthy ones.

The CHAIRMAN. Would it spread from community to community of bees if it were here?

Doctor PHILLIPS. Yes. Bees mix a good deal in their flight. Bees from one apiary very frequently go to another and go into the hives, so the disease would probably spread quite rapidly under those circumstances.

The CHAIRMAN. What remedy do you prescribe for treatment of the disease?

Dr. PHILLIPS. No remedy has been discovered for the disease, which is one of the reasons why we feel it so important to keep it out.

Senator GOODING. It is pretty hard to reach, is it not?

Doctor PHILLIPS. Yes, it is.

Senator GOODING. You can not dip them.

Doctor PHILLIPS. No, you can not dip them and you can not gas them without affecting your bees. Destruction of the colony is the only thing that they are trying in Great Britain.

Senator GOODING. Does it destroy a colony very quickly; does it wipe them out?

Doctor PHILLIPS. It wipes them out, yes. In a great many parts of Great Britain bees were exterminated by this disease.

Senator GOODING. What action have you already taken to stop importation of the bees?

Doctor PHILLIPS. The Secretary of Agriculture requested the Postmaster General in March to prohibit the importation of queen bees by mail, which of course was the only thing he could do. That went into effect, prohibiting the importation by mail from all countries, except the Dominion of Canada.

Senator GOODING. Then this bill would cover the rest of the countries?

Doctor PHILLIPS. Yes, it will cover everything in addition.

Senator GOODING. Then I am for the bill, Mr. Chairman.

The CHAIRMAN. What number of queen bees are imported into this country annually?

Doctor PHILLIPS. It is impossible for me to answer that.

The CHAIRMAN. Approximately.

Doctor PHILLIPS. A good many hundred. During the period of the war there were practically none, so that for a number of years the importation was at zero.

Senator GOODING. What is it outside of Canada?

Doctor PHILLIPS. Canada has prohibited importation from Europe.

Senator GOODING. She is able to do that without legislation at any time, is she not?

Doctor PHILLIPS. Yes, they simply did it by an act of the Governor General or by an order in council. Australia has done the same thing. The Union of South Africa has done the same thing and Jamaica has done the same thing.

The CHAIRMAN. How long have entomologists recognized the existence of the disease, Doctor?

Doctor PHILLIPS. It was discovered in 1920.

Senator GOODING. Mr. Chairman, I would like to be noted as being in favor of the bill.

Senator CAPPER. Nobody is opposed to this legislation apparently.

The CHAIRMAN. No one that I know of.

Doctor PHILLIPS. I would like to make a statement with respect to that. There was some opposition to this bill. When it was first proposed the opposition originated in a native of Austria, who desired to import—that is, it was Austria previously, now Yugoslavia—who desired to import bees from his native country. He solicited the support in asking for a change in the bill—not to defeat the bill—but to change it—of the editor of the American Apiary Journal, one of our journals, and the journal, as I understand, wrote a letter to Senator Norris asking that certain modifications be made to this bill. As this bill was to be heard to-day I wired yesterday to the American Bee Journal asking them if they cared to be heard or to take any action in the matter, and I have here a telegram from the editor of the journal saying "Use your own judgment, I have no objection to raise myself." That is signed by Mr. Dadant. This would indicate that the objection has been met.

Senator CAPPER. The Department of Agriculture favors this legislation.

Doctor PHILLIPS. There is a letter on record from the Secretary of Agriculture indorsing the bill.

The CHAIRMAN. Senator Keyes, have you any questions to ask the doctor?

Senator KEYES. No, Mr. Chairman.

The CHAIRMAN. Senator McKinley?

Senator MCKINLEY. I have nothing to ask, Mr. Chairman.

The CHAIRMAN. Then I imagine the committee is in favor of reporting the bill unanimously.

Senator CAPPER. I move that the bill be reported favorably, Mr. Chairman.

Senator KEYES. I will second that motion.

The CHAIRMAN. Senator Kendrick, we are considering the bill as it passed the House, preventing importation of bees infected with the Isle of Wight disease. We have heard testimony here favorable to the adoption of the bill, and the committee, being in favor of reporting it, was just about to conclude the hearing. Would you like to ask the doctor some questions about the bill?

Senator KENDRICK. I am certainly in favor of it, Mr. Chairman. I have some very strong appeals from the people of my State about it, and I see no more reason why we should deny the people of this industry protection than we would in any other kind of animal life. We would not think at all of allowing any live stock to come in here now with the foot-and-mouth disease or any other contagious disease, and it seems to me that this is as little as we can do to extend protection to this industry.

The CHAIRMAN. Senator Capper has moved that we report the bill favorably. (The motion, having been duly seconded, was unanimously carried.)

Senator CAPPER. This is the House bill you were refering to?

The CHAIRMAN. Yes.

Senator KEYES. As I understand it, it is the bill in the form as passed by the House, rather than the Senate bill, which you prefer?

Doctor PHILLIPS. The Senate bill was amended at the suggestion of the House committee, which change simply removed certain restrictions; but there is no change in the fundamental character of the bill, and the changes made have met with the approval of the department.

Senator KEYES. Then the bill that we are reporting now is the House bill?

Doctor PHILLIPS. Yes.

The CHAIRMAN. Senator Ladd, the committee has just voted on this bill favorably, and Doctor Phillips has made a statement to the committee. Have you any questions to ask him?

Senator LADD. No; I accept the verdict of the committee and stand with the committee.

Senator CAPPER. At what period of the year are these importations made specially?

Doctor PHILLIPS. Mainly in the summer time. I would like to say, in view of the fact that we have prohibited the importation through the mails, that we know some men who are importing otherwise in order to get ahead of us.

Senator KENDRICK. Where do most of the importations come from, outside of Canada?

Doctor PHILLIPS. Very few from Canada. The importations are mainly from Italy, Yugoslavia—principally the Province of Carnalia.

Senator KENDRICK. Don't you get a great many from China?

Doctor PHILLIPS. Practically none. There was one shipment last year, the only shipment that I know of in years.

The CHAIRMAN. This disease, you say, is found only on the Isle of Wight?

Doctor PHILLIPS. No; it is France now, Switzerland, and Germany. We do not know to what extent it is spread in Europe, but those are the only places where an investigation has been made.

Senator KENDRICK. What treatment are they giving it?

Doctor PHILLIPS. None.

Senator KENDRICK. They destroy the colonies?

Doctor PHILLIPS. They destroy the colonies to prevent the spread of it.

Senator KENDRICK. It spreads very easily?

Doctor PHILLIPS. Apparently it spreads very rapidly. It spread throughout Great Britain in just a few years.

(The following documents were by the committee ordered printed as part of the record:)

DEPARTMENT OF AGRICULTURE,
Washington, April 21, 1922.

HON. GEORGE W. NORRIS,
United States Senate.

DEAR SENATOR NORRIS: In response to your verbal request to Dr. E. F. Phillips, of the Bureau of Entomology of this department, the following statement is being made regarding the importance of the protection of beekeeping in the United States against the Isle of Wight disease, which is contemplated in the proposed bill which has been presented to you by the committee of the

Association of Economic Entomologists and the American Honey Producers' League.

This disease was first discovered in the Isle of Wight in 1904 and spread with great rapidity throughout Great Britain. It is now credibly reported from the French Alps and from Switzerland. Wherever this disease has appeared the losses of bees have been excessive, and no remedy has yet been found for the malady. In December, 1920, Dr. John Rennie and his associates, of the University of Aberdeen, announced that the cause of this disease is a mite, *Acarapis woodi*, which invades the respiratory tract of adult bees, and later investigations have shown that this mite is always found in the diseased bees.

On the announcement of this discovery the Bureau of Entomology made a survey to determine whether this mite is present in the United States, and during the summer of 1921 none of them were found. There has never been any disease of adult bees in the United States which compares in destructiveness with the conditions reported from Europe for this disease. There is good reason to believe that the Isle of Wight disease has not been introduced, and it therefore becomes important to safeguard the beekeeping interests of the country by preventing its introduction. The results of the work of the Bureau of Entomology are given in department Circular 218, a copy of which is being inclosed.

The honeybee is not native to America, and all the bees which are now in the United States have been obtained as a result of importations. So far as can at present be determined there is no need for further introductions, as the bees now in the United States have been improved by selection and are superior to most of the stock which has been introduced from time to time of recent years. The queen breeders of the country seem to be unanimous in believing that no harm will result if importations are prohibited.

On March 10 a letter was written to the Postmaster General recommending that the postal regulations be amended to exclude from foreign mails for all countries except Canada all queen bees and their attendants. On this recommendation the Post Office Department has issued an order dated March 21, 1922, which makes this prohibition, and the International Bureau at Berne has been asked to notify the countries of the Universal Postal Union of this amendment to the regulations. This precautionary measure will prevent the mailing of queen bees to the United States from Europe but will not prevent the bringing in of queen bees by means other than the mails. There is no legislation now in force which prevents such importations. Because of the expectation that the Dominion of Canada will take measures similar to those contemplated by the United States the post-office amendment makes it possible to receive queen bees in the mails from Canada, and the proposed bill drafted by the committee makes provision for similar exceptions.

At the annual meeting of the agriculture section of the Association of Economic Entomologists at Toronto, Canada, in December, 1921, a committee with representatives from the United States and Canada was appointed to study this question to determine what steps should be taken to prevent the introduction of this disease. This committee had a conference with members of the staff of the Bureau of Entomology on March 9, and following this conference the committee drafted a proposed bill, a copy of which is in your hands. The American Honey Producers' League, the national organization of beekeepers, has appointed a representative to urge the passage of this bill. The bill has been examined by the solicitor of this department and has the indorsement of the department.

The beekeeping industry of the United States is becoming more and more important every year and has assumed proportions which entitle it to every protection which can be given to prevent the introduction of injurious diseases. The annual honey crop of the United States is valued at about \$75,000,000 and there is room for still greater development. In addition to its value as a producer of honey, the honeybee adds greatly to our national wealth as an agent in the cross-pollination of fruits and other farm crops, this benefit doubtless exceeding in value the value of the honey crop. The Department of Agriculture is giving all the aid possible to this branch of agriculture through investigations of the best means of increasing the production of honey and the introduction of better methods of management. It seems quite proper, therefore, that a bill of this character be passed in the further protection of this growing industry.

Very truly yours,

HENRY WALLACE, *Secretary.*

[United States Department of Agriculture, Department Circular 218.]

THE OCCURRENCE OF DISEASES OF ADULT BEES.

[E. F. Phillips, Apiculturist.]

INTRODUCTION.

The diseases to which adult honeybees are subject have from time to time been discussed in the American beekeeping literature, but so far there has been no serious and widespread outbreak of any such trouble and not much work has been done in this country on the causes of these diseases. Because of the possibility of the introduction and establishment in the United States of another disease of adult bees which seems to be serious in its nature, it seems best at this time to publish the information at hand regarding the apparent absence of this disease in the United States. The purpose of this paper is to discuss the status of adult bee diseases without reference to the details of work as to their causes. A list of citations is appended.

ISLE OF WIGHT DISEASE.

Isle of Wight disease is evidently a serious source of loss to beekeepers of the British Isles. It was first observed in 1904 in the Isle of Wight, hence the name, and in succeeding years it has spread with considerable rapidity to all parts of Great Britain. Because of the large losses from this disease reported by British beekeepers, it has been the subject of investigation by several workers for a number of years. It has been called acarine disease in England, from the order name (Acarina) of the mite which causes it.

Studies as to the cause.—At first a study was made of bacteria in the alimentary tract of the diseased bees, but this proved valueless in determining the cause. Later work indicated that the malady was due to the pathogenic action of *Nosema apis*, a protozoan parasite of the alimentary tract of adult honeybees, described by Zander in 1909. This protozoan has been found to be widely distributed in the United States and elsewhere throughout the world, without causing the serious conditions described for the Isle of Wight disease, and for this reason some doubt was cast on the results of the English workers in this field. Furthermore, the organism was found not to be present in all colonies suffering from Isle of Wight disease. Later, Anderson and Rennie called these results in question, without, however, giving the cause of the disease, but *Nosema apis* came to be looked upon as a relatively harmless parasite. In December, 1920, Rennie and his associates announced that the Isle of Wight disease is caused by the parasitic mite *Tarsonemus woodi* Rennie, and the results of their work were published early in 1921. Later the mite was placed in a new genus, *Acarapis*, by Hirst.

Search for Isle of Wight disease in the United States.—During the period when the Isle of Wight disease was attributed to *Nosema apis* there seemed to be no cause for alarm in the United States, but when this theory was disproven and another organism was given as the cause of the trouble, fears regarding the introduction of the disease were renewed. On the receipt of the published results of the work by Rennie, steps were at once taken to determine whether *Acarapis woodi* is present in the United States. Requests were sent out widely to beekeepers, asking that they send to the Bureau of Entomology samples of any adult bees which showed any unusual symptoms or any disease. During the summer of 1921 there were no reports from any part of the United States that indicated any serious diseases of adult bees. During the summer 200 samples were received, all of which were examined for all known causes of diseases among adult bees. The examinations for the mites were made by J. B. Moorman, and A. P. Sturtevant examined the bees for *Nosema apis*. Certain samples were examined for arsenic, when there seemed reason to suspect poisoning as the cause of death, this work being done by the Bureau of Chemistry. Table 1, prepared by Mr. Sturtevant, gives the results of the examinations:

TABLE 1.—Results of examinations of adult bees.

State or country.	Counties.	Towns.	Negative.	Nosema apis.	Not examined for Nosema.	Arsenic.	Total.
Alabama.....	2	2	2				2
Arkansas.....	1	1			1		1
California.....	13	16	15	4+1?			20
Colorado.....	2	3	3	2			5
Connecticut.....	1	1	2	2			4
District of Columbia.....	1	1	2				2
Florida.....	2	2	2	1			2
Georgia.....	2	2	2				2
Idaho.....	2	2	2		1		3
Illinois.....	6	7	5	2	1		8
Indiana.....	6	6	5	2	1		7
Iowa.....	4	4	6				6
Kansas.....	2	2	1	3			4
Kentucky.....	1	1		1			1
Maryland.....	1	1	1				1
Massachusetts.....	4	4	7			1	8
Michigan.....	6	6	5	3			8
Mississippi.....	1	1	1				1
Missouri.....	2	2	2				2
Montana.....	1	1	1				1
Nevada.....	1	1	1				1
New Jersey.....	7	7	5	1		3	9
New Mexico.....	1	1	1				1
New York.....	13	16	10	9	1		20
North Carolina.....	4	5	7	1?			8
Ohio.....	8	8	8	2			10
Oklahoma.....	2	2	3				3
Oregon.....	4	4	3	3			6
Pennsylvania.....	14	16	16	2			18
Rhode Island.....	1	1	1				1
South Carolina.....	1	1	1				1
South Dakota.....	1	1	1				1
Tennessee.....	2	2	2				2
Texas.....	3	3	2	1			3
Utah.....	2	3	4				4
Virginia.....	4	4	4				4
Washington.....	6	9	5	4			9
West Virginia.....	5	5	4	1			5
Wisconsin.....	5	5	4	1			5
Scotland.....	1	1	2				2
Canada.....	1	1		1			1
Total (41).....	146	161	147	45+2?	4	4	202

Since at the beginning of the examinations no specimens of *Acarapis woodi* had been seen by any of the workers in the United States, there existed some fear that they might in some way be overlooked. Through the courtesy of Prof. John Anderson, lecturer in beekeeping, University of Aberdeen, Scotland, two lots of bees suffering from the Isle of Wight disease were received and it was found that no difficulty exists in finding the mites when they are present. Not only are the mites themselves easily found on examining the tracheal tubes of the thorax, but the tracheal tubes are so discolored (as described by Rennie) as to make the detection of the infestation easy.

While negative results on only 200 samples do not prove the absence of the mite in the United States, the wide distribution of the samples received and the apparent absence of any serious adult bee disease indicated that the Isle of Wight disease does not exist within the limits of the United States. Statements regarding supposed cases of Isle of Wight disease have appeared in American bee journals from time to time, but there is nothing to support these diagnosis and such statements may be safely disregarded. It is desirable that further examinations be made as material is available.

Introduction through queen-mailing cages.—The shipments made by Professor Anderson brought to light a fact of great importance. In the first shipment all the bees were dead on arrival and no live mites were discovered. The bees had been selected from a colony that was being robbed, and the bees were apparently old and worn out before being sent. The second shipment consisted of a queenbee and attendants in a queen-mailing cage, all but two of the worker

bees reaching Washington alive. The queen was not found to contain mites. Many of the accompanying living worker bees were found to contain living mites, showing conclusively that it is an easy matter to import the living mites to the United States. Living mites were found in worker bees after they had been dead for several days.

Means of preventing introduction.—If the reports of the great losses caused by the Isle of Wight disease in Great Britain are credited, and if it be assumed that the mite is not present in the United States, there is reason to look on the introduction of these mites as a dangerous possibility. Since the mites are so readily imported through the shipment of queen bees through the mails, it is a matter of some surprise that the disease is not found and universally distributed here. While some of the earliest importations of bees to the United States were made from England, such as the introduction of Massachusetts in the seventeenth century, the recent shipments of queens have been from Carniola, Cyprus, the Caucasus (chiefly through France), but especially from Italy. Because of the newness of the discovery regarding the cause of the Isle of Wight disease, the absence of any record of the occurrence of the mite in Italy or elsewhere, on the continent of Europe¹ or Asia is without significance. There, of course, remains the possibility, but scarcely the probability, that the parasite is exceedingly local in its distribution, as stated by Rennie. This is supported by the belief of many British beekeepers that the disease was first limited to the Isle of Wight and then spread rapidly through the British Isle. It is now reported generally but not universally in those islands.

The fact that this mite belongs to or is related to the genus *Tarsonemus*, suggests that it may be at some stage of its life history a plant feeder, yet its specialized structure (causing it to be put in a new genus by Hirst) may be taken as evidence against this view. The fact that all stages of the mite have now been found in the tracheal tubes of the honeybee thorax would suggest its strictly parasitic habit.

The climatic conditions of the British Isles have been considered by some beekeepers as a contributing cause of the disease. While this is a possibility, unless the mite is associated with some species of plant which is limited in its distribution by these climatic conditions, this view is not probable. The fact that the honeybee so largely creates its own environment within the hive is against this view. Within the limits of the United States there is found such a diversity of climatic and floristic conditions that it would be impossible in the present state of knowledge regarding this disease to believe that the bees of this country are in no danger from this mite. While the work of Rennie and his associates bears evidence of thoroughness, there still remains the possibility that they are mistaken in attributing this disease to the mite. This possibility will be removed as work is done on this disease by other investigators. There is no question that the mite is present in colonies suffering from the disease.

Since at present it would be indicated that the Isle of Wight disease is not present in the United States, probably not in North America, the question of preventing its introduction is an immediate one. The ease with which the parasitic mites may be carried in queen-mailing cages, the most likely method of introduction, suggests the desirability of restricting or prohibiting the importation of queen bees. Restriction of importations of adult bees would entail considerable expense, since it would presumably be necessary to establish Government quarantine apiaries located near one or more of the usual places of entry.

Prohibition or restriction of importation of adult bees from the British Isles alone would be of little value, because of the ease with which queen bees and the accompanying workers could be sent to the Continent of Europe and re-shipped to evade the law. It would also be folly to assume that the mite is restricted in its distribution to Great Britain until much more work is done on its distribution. Except during the period of the war, when importation of queens was almost impossible, a considerable number of queen bees have been sent to the United States every year for many years. Many of these queens

¹ In the January, 1922, issue of *L'Apiculteur* (vol. 66, No. 1, pp. 20-23) appears the announcement that the mite associated with the Isle of Wight disease has been found and determined by L. Berland, assistant in the Museum d'Histoire Naturelle (Paris), in bees sent through the editor of the above journal from the French Alps. The exact location is not recorded.

are imported by beekeepers for their own use, on the presumption that they can get better stock in Italy than they can in the United States—an entirely erroneous belief. Many are also imported by specialist beekeepers who make a business of raising queen bees for sale. These men should be breeding better bees, instead of sending to Italy annually for unselected material for breeding work, and it is probable that a prohibition of importation would actually be desirable from the point of view of compelling better breeding methods. There is, so far as known, no race or strain of bees anywhere in the world superior to those that have already been introduced, and no obvious advantages come from the repeated importation of queen bees. If a prohibition on importation seems desirable for the present, and if at some later time a better race of bees is found, provision might then be made for its importation under proper precautions. Prohibition rather than restriction through quarantine would seem preferable because of the high cost of such regulatory measures. At present there is no law which would seem to cover this case, and new legislation will be required to safeguard the beekeeping industry of the United States from this pest. It would be quite possible to provide by law for either restriction or prohibition, with the understanding that for the present only prohibition would be enforced. In view of the possibility that desirable races of bees may be found after further explorations have been made, especially in Africa, such a double provision would be desirable.

NOSEMA DISEASE.

In 1909 Zander described a protozoan parasite which is found in the alimentary tract of the adult honeybee and to which he attributed serious losses to beekeepers in continental Europe. Zander was evidently misled as to its seriousness. Following the announcement of his findings, investigators in all parts of the world began a search for this parasite, and it was soon found in several places in the United States, in Australia, and in various parts of Europe. From these various investigations information regarding the life history of the parasite was obtained, although some curious mistakes of observation were made and the literature is not in agreement regarding it.

As previously stated, some of the earlier work on the Isle of Wight disease in England indicated that it was caused by *Nosema apis*. This conclusion was reached by Fantham and Porter, although their work contained errors regarding the life history and led to considerable confusion. Assuming that the results of this work were correct, and knowing that *Nosema apis* is a widely distributed parasite, those interested in bee-disease control naturally concluded either that the reports regarding Isle of Wight disease were grossly exaggerated or that the environmental conditions in the British Isles resulted in a more serious aspect of the disease than was observed elsewhere. Outside the British Isles there was no proof that *Nosema apis* caused great losses, although, perhaps misled by the work of Zander and Fantham and Porter, certain other investigators were led to attribute serious conditions to the organism. Those who knew the actual results of *Nosema apis* infection were inclined to question the results of the British investigators, and, as has been shown earlier, this work is now virtually disproven, in that the mite *Acarapis woodi* is now believed to be the cause of the Isle of Wight disease.

While there is a disease of adult bees caused by the pathogenic action of *Nosema apis*, the wide distribution of the parasite in the United States and the absence of any serious disease of adult bees anywhere within this territory lead to the conclusion that the efforts to ascribe serious results to this organism are misleading. That a colony of bees may be weakened by heavy artificial infection of the organism is by no means proof that the organism under usual conditions of the apiary ever leads to the death of a colony. In fact, so far as can be determined from the present evidence, it is doubtful whether a colony of bees free to fly is seriously affected by this parasite. Petersen observed many bees infected with *Nosema* spores, but observed no pathogenic symptoms.

The effects of food containing material which the bees are unable to digest, leading to the ordinary conditions of dysentery, and of various other environmental factors in permitting or encouraging the growth of the organism have not been adequately studied. Zander attributed an infectious dysentery to this organism, as distinguished from the ordinary dysentery with which beekeepers have long been familiar when the bees are wintered badly. It remains to be established whether conditions of ordinary dysentery are favor-

able to the growth of the organism, and whether it in turn causes certain additional conditions favorable to the death of the bees. Without wishing to underestimate the damage from *Nosema apis* alone, it is exceedingly doubtful whether it is the cause of a serious disease of bees.

Various names have been given to the disease caused by this organism, such as Nosema disease (a translation of Zander's name *Nosemasenche*), Microsporidiosis actually suggested as a substitute for the name Isle of Wight disease), nosemosis, infectious dysentery, and Nosemakrankheit.

Distribution by years.—During the years 1912, 1913, and 1921 special requests were sent out to beekeepers asking for samples of adult bees that appeared to be suffering from some disorder. This fact accounts for the larger numbers of samples received during these years. Table 2 shows the results of the examinations of samples received, so far as the presence of *Nosema apis* is concerned:

TABLE 2.—*Samples of Nosema disease, by years.*

Year.	Nosema present.	Nosema doubtful.	Nosema absent.	No diagnosis for Nosema.	Total.
1910.....	0	0	6	13	19
1911.....	1	0	7	21	29
1912.....	35	0	49	16	100
1913.....	11	0	52	15	78
1914.....	0	0	14	9	23
1915.....	5	1	16	21	43
1916.....	6	2	31	4	43
1917.....	20	2	21	5	48
1918.....	1	1	20	1	30
1919.....	5	0	27	6	38
1920.....	9	0	22	1	32
1921.....	45	2	149	6	202
Total.....	145	8	414	118	685

Certain samples have been received in such bad condition as to make examination of any kind impossible. In other instances, samples were received in which the history did not indicate the necessity for laboratory examination. In recent years more care has been exercised in examining all samples of adult bees for the presence of *Nosema apis*, because of a desire to determine its distribution. The majority of the samples tabulated have been examined by A. P. Sturtvant, apicultural assistant. From 1905 to 1909, previous to the description of *Nosema apis*, a few samples of adult bees were received, but as at that time no examination was made for this organism, these samples, 14 in all, are not included.

Distribution by months.—Because of the possibility that Nosema disease is in some manner correlated with the activities of bees, and especially with the character of the food, it is desirable to present data as to the time of year at which the various samples have been received for examination. The dates used are those at which the samples reached the laboratory, which in a few cases might mean that they had been taken from the hives late the month preceding.

TABLE 3.—*Samples of Nosema disease, by months.*

Month.	Number of samples examined.	Number with Nosema.	Per cent of samples infected.	Month.	Number of samples examined.	Number with Nosema.	Per cent of samples infected.
January.....	11	0	0	September.....	37	2	5
February.....	21	1	5	October.....	23	0	0
March.....	37	7	19	November.....	16	3	19
April.....	60	14	23	December.....	17	8	47
May.....	146	39	27	Total.....	685	145	
June.....	141	33	23	Average.....			21
July.....	112	30	27				
August.....	64	8	12				

It would appear that there is more of this disease in early summer than at other times, but in some cases at least it is evident that the disease has started during the winter and has not been detected until the bees have become active. Since some samples were sent on request at particular times, the numbers for the several months can not be taken as too definite.

Geographical distribution.—Table 1 gives the distribution of 45 samples of Nosema disease received during the season of 1921.

The small number of samples of Nosema disease which have so far been diagnosed makes it impossible to draw definite conclusions regarding the geographical distribution of the disease. Samples have been received from 33 States and from 3 Canadian Provinces. There is also in the record a sample from Canada without information as to the Province from which it came.

TABLE 3.—*The distribution of Nosema disease by States.*

California.....	9	North Carolina.....	4
Colorado.....	2	Ohio.....	9
Connecticut.....	6	Oregon.....	6
Florida.....	4	Pennsylvania.....	3
Georgia.....	2	Rhode Island.....	1
Idaho.....	2	South Dakota.....	1
Illinois.....	6	Tennessee.....	2
Indiana.....	3	Texas.....	1
Iowa.....	5	Utah.....	1
Kansas.....	4	Vermont.....	1
Kentucky.....	2	Virginia.....	1
Massachusetts.....	2	Washington.....	9
Michigan.....	14	West Virginia.....	2
Minnesota.....	2	Wisconsin.....	5
Missouri.....	1	Wyoming.....	1
Nebraska.....	1		
New Jersey.....	3	Total.....	145
New York.....	21		

The listing of these records by States fails to show the distribution by bee-keeping regions. The clover region has furnished far more samples than any other. The alfalfa region shows comparatively little of the disease, while the sage and willow-herb regions of the West, in proportion to their sizes, show as much of the disease as does the clover region. The Southeastern States show few records.

The time of the year at which the samples have reached the laboratory from the various regions might throw some light on the character of the disease, as is the case with the records of European foulbrood. Because of the scant number of records, nothing definite can be learned from such an examination, but it seems probable that outbreaks of the disease may be expected more commonly in the Southern States during the winter and early spring. No samples have been received from this region during late summer. This suggests a relationship between wintering and Nosema disease.

Prevention of spread.—While it would seem possible for *Nosema apis* to remain virulent in honey for a short time, the danger of introducing Nosema disease to an apiary through honey as a carrier seems slight, especially in view of the fact that the organism is destroyed by the amount of heat to which honey is usually exposed in the process of bottling. The most probable means of distributing the organism to new locations would seem to be through the shipment of living bees. Obviously any precautions taken against the introduction of Isle of Wight disease by the restriction or prohibition of the importation of living adult bees would seem to be adequate to keep out any further introduction of Nosema disease, but the present wide distribution of Nosema disease, and especially its mild character, would seem to make unnecessary any quarantine measures against it alone.

ARSENICAL POISONING.

Most of the samples that have been received at the Bureau of Entomology have not been examined for the presence of arsenic, but in a few instances, where the history of the case suggested this as a possible cause of the trouble, examinations have been made through the courtesy of the Bureau of Chemistry.

It is not the purpose of the present discussion to take up the question of the losses incident to the poisoning of bees by ill-advised applications of poisonous materials in sprays used for the control of insect pests. There is reason to think that in some instances serious results have come from this use of arsenic. Aside from Isle of Wight disease and Nosema disease, this is the only other cause of death of adult bees which at present can be determined by laboratory methods.

NEGATIVE RESULTS.

The most regrettable fact about the data so far obtained on the diseases of adult bees is that so many of the samples have given negative results. This is due partly to the fact that certain diseases of adult bees exist for which the causes have not been determined. The serious nature of the diseases of the brood of bees has made it necessary that more attention be given to these, and while the causes of the three diseases of the brood have been learned, little good work has as yet been done on the diseases of adult bees.

Attention should be called to the fact that many samples have been received which could not be diagnosed by laboratory methods. The greatest abnormal death of colonies of bees is doubtless due to poor wintering or to losses indirectly to be attributed to this cause. The conditions known to beekeepers as dysentery is caused by an accumulation of feces in the alimentary tract, due to a poor quality of food and to a rapid accumulation due to excessive heat generation made necessary by improper care in winter. These conditions have been fully discussed in the publications of the United States Department of Agriculture on wintering. In some instances it is possible to surmise that the samples of dead bees have been taken from colonies that have died because the beekeeper did not take proper care of his bees in winter, but proof from laboratory diagnosis would be difficult or impossible. When bees are received in early spring which show a large volume of feces, this diagnosis is rather definite.

A large number of cases possibly arise from the death of colonies observed after brood-rearing has begun in the spring, and this the beekeeper usually calls spring dwindling rather than winter loss. It has been shown that the death of bees after brood-rearing is under way in the spring is also a result of poor wintering, and should properly be so diagnosed. There is no other known cause of the condition known as spring dwindling. While laboratory proof of such a condition is difficult, the well-known deficiency in winter protection, so prevalent throughout the United States, suggests this as a major cause of the death of bees submitted for examination. This has been recognized elsewhere than in the United States, for in the work on the Isle of Wight disease in England it was found desirable to eliminate bees dying from exhaustion, and Mrs. Pixell-Goodrich has worked out methods for the determination of death from old age. It is out of the question to submit all the samples received by the Bureau of Entomology to the tests which she has described, but there can be no question that death from quite natural causes induced by poor care is often mistaken by beekeepers for the work of some disease.

Even though we eliminate the cases where there is reason to suspect poor care as the cause of death of adult bees, there still remain cases where evidence exists that death is due to some disease which can not be diagnosed in the laboratory at present. Cases which answer to the usual description of the so-called bee paralysis can not be diagnosed in the laboratory because there is still doubt as to the cause or causes of the trouble. According to Turesson this disease is due to the molds which bees sometimes get in their food under unsatisfactory conditions in the hive, such as those of damp hives in winter. Whether there is more than one condition which is put under this name by beekeepers is still a matter of doubt. Other names have been given by beekeepers to abnormal death of adult bees, among which may be mentioned May disease (rarely used in the United States) and disappearing disease. The multiplication of names without adequate descriptions of symptoms or some other means of differentiating the disease has nothing to commend it, and beekeepers will do well to avoid the making of new and confusing names for adult bee diseases.

A serious difficulty arises from the fact that the symptoms observed for almost all the conditions which cause the abnormal death of adult bees are much alike. Even for Nosema disease, the cause of which is known, there is no definite description of symptoms, and this is likewise to a considerable degree true of the Isle of Wight disease. Abnormal bees behave much alike,

whatever the cause of the abnormality, and the descriptions of characteristic symptoms for the several diseases is exceedingly difficult. Symptoms of adult bee diseases can not be described from the appearance of the dead bees, as is the case with the brood diseases.

POST OFFICE DEPARTMENT,
Washington, March 24, 1922.

HON. HENRY WALLACE,
Department of Agriculture.

MY DEAR MR. SECRETARY: I have the honor to acknowledge the receipt of your letter of March 16 concerning the question of prohibiting the importation of honeybees in the mails from all foreign countries except Canada, and to inclose a copy of the notice of this office of March 21, providing for such prohibition, cablegram having been sent the International Bureau at Berne, requesting that the countries of the Universal Postal Union be notified of the prohibition.

By direction of the Postmaster General.

EDWIN SANDS, *Superintendent*,
(For the Second Assistant Postmaster General.)

WASHINGTON, March 21, 1922.

Owing to the prevalence of a serious disease, known as Isle of Wight disease, among adult honeybees in certain foreign countries, the importation of honeybees through the regular and parcel-post mails is hereby prohibited.

Owing to the precautions taken by the authorities in Canada to guard against the spread of the disease among adult honeybees in that country, this prohibition does not apply to bees imported from Canada.

E. R. WHITE,
Acting Second Assistant Postmaster General,

(Whereupon the committee adjourned to meet at the call of the chairman.)

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