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LETTER FROM DR. SOPER TO DR. SAWYER
WRITTEN AT FORTALEZA, CEARÁ, -ON SURVEY
OF ANOPHELES GAMBIAE IN NORTHEAST BRAZIL-

Fortaleza, Ceará,
November 25rd, 1938.

Dear Dr. Sawyer:

ANOPHELES GAMBIAE

Dr. Wilson and I left Rio on the 13th as planned in company of Dr. Evandro Chagas who had been over the worst of the gambiae infected district a couple of times during the past six months. We remained in Recife until the 16th when we came on to Natal by plane. At Natal we were joined by Dr. Manoel Ferreira, recently made head of the Federal Service for Malaria in the States of Rio Grande do Norte and Ceará, and by Dr. Valerio Konder, the representative of the National Department of Health in the State of Rio Grande do Norte. We left Natal the same morning and slept the first night at Assú after visiting São Gonçalo and Baixa Verde, both of which points have had heavy outbreaks of malaria following the introduction of gambiae to the region. The following day we visited the lakes about Assú - lunched at Mossoró, drove to Russas for dinner. At Russas we met Shannon and got a summary of his findings during almost a month's investigation. We spent the night at Limoeiro and on the 18th worked up the Jaguaribe River, through Jaguaribe-Mirim, Ouro Branco and Icó to Lavras, spending the night at Cajazeiras just over the line in Parahyba, because of better Hotel facilities outside of the gambiae district.

Since Shannon's work showed that gambiae was present at Icó but absent from Lavras, we decided to investigate the conditions between these two towns. Shannon thought there must be some natural barrier which had prevented the extension of the species up the river beyond Icó although there seemed to be some epidemiological evidence to suggest that gambiae had only recently arrived at Icó. The caravan was divided into three parties. Drs. Manoel Ferreira, Gastão Cesar and FLS worked the River Machado close to Lavras and the River Salgado close to Ouro Branco, without finding any evidence of gambiae although larvae of other anophelines were found. Drs. Evandro Chagas and Valerio Konder investigated possible breeding places along the road between Icó and Lavras especially in the first ten kilometers below Ouro Branco. Numerous foci of other anophelines were found and a fairly high incidence of mild endemic malaria was revealed but no evidence of gambiae was found. The third group consisting of Drs. Shannon, Rouanet and DBW began to work the Salgado River about ten kilometers above Icó and worked down the river to a point about five kilometers above this town without finding larvae. These results all agreed in confirming the absence of gambiae from the River Salgado above Icó. The caravan retired to Iguatú, which you will remember from 1934, to spend a well earned Sunday loafing, sleeping and believe it or not, playing Bidou.

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On Monday the 21st, we lost part of the caravan, the remainder being divided into two groups to further investigate the region above and below Icó. The previous work had left some doubt as to whether the gambias at Icó had come up the river valley from pool to pool or had made the jump from Jaguaribe-Mirim by automobile or truck. Shannon, Rouanet and I went up above Icó and began working down from the point where operations had been discontinued two days before. Within a few hundred yards of the point of beginning Rouanet found gambias larvae. A careful search by the three of us gave only eleven larvae, all from three small pools and all apparently of the same age. The uniformity in size caused Shannon to remark that we might very well be dealing with the progeny of a single female. A recheck on part of the stretch worked two days before failed to reveal any missed foci of gambias. Before leaving the river four or five houses nearest to the foci which were found were searched for adult gambias. In the last of these a single female gambias was found which Shannon pronounced a multipara thus confirming his original belief that we were dealing with the original invasion of this point on the river by a single gravid female. In the meantime DBW and Gastão Cesar worked the River below Icó about Bebedouro, finding gambias at all points investigated. Apparently the march of this species is in this case at least directly up the river bed.

Yesterday, we visited the lower Jaguaribe Valley and the town of Aracaty and came into Fortaleza, thus concluding this most interesting field trip. This morning we learned that gambias was found the other day by one of Shannon's men west of Quixadá. This is disagreeable news but only serves to emphasize the fact that once the gambias gets into a river valley it will spread up that valley unless blocked at some point by natural or artificial barriers.

I am enclosing herewith Shannon's seven page report on conditions in Ceará as noted in his work up to the 17th of this month. Were he writing it today some alteration would be made regarding the importance of impounded water and the resultant irrigation ditches but otherwise it would remain just about as it is. I find it impossible to be as optimistic about final results at as early a date as is Shannon but cannot force myself to be entirely pessimistic as to final results if we are able to avoid the spread to the Parnahyba and São Francisco River Valleys. The amount of work to be done in the areas already infested and threatened is enormous; whether final eradication is possible or not, I believe the effort will justify the expense in the actual reduction of malaria in the region during the time that operations are carried out. The most hopeful factor in the whole situation is the small proportion of the total infested area which is capable of year round breeding of any mosquitoes. Much of the States of Ceará and Rio Grande do Norte are as you have seen covered with a dry desert type of vegetation called caatinga. The caatinga areas have very little cultivation except right along the river beds or where water can be put on the land artificially. And even along the river beds the available breeding places are reduced to a minimum by the long dry season each year.

Our trip throughout the infested area coincided with Dr. Barreto's trip through the plague regions of Pernambuco and Ceará on the final lap of which he spent one day in the gambias district looking things over with Dr. Manoel Ferreira, who is as mentioned above the Director of the Special Federal Malatia Service organized just a few weeks ago to attack the gambias problem. Late this afternoon we had a four way discussion of the situation with Ferreira, Barreto, Wilson and myself present. Barreto opened his remarks with the statement that he had always been in favor of the fullest cooperation possible with the Rockefeller Foundation and that he hoped some way could be found for the Foundation to attack the gambias problem. I said frankly that I had hoped that we might have a breathing spell to clear the boards before jumping from yellow fever into something else but did admit that we had been considering what could be done about gambias even before learning of the extension to the State of Ceará and the 1938 epidemic. With the present extension of gambias I feel that any failure to take immediate steps would be criminal if means can be made available for immediate action. After Barreto's request for a proposal I state that I have no authorization to enter into definite commitments without consulting the New York office but that after this week's experience I am willing to appeal to the Foundation for funds immediately with which to collaborate with the Government in the organization of control work if he and the other responsible authorities desire such collaboration. I give a tentative estimate of budget for 1939 at seven thousand contos (approximately \$350,000.00 USA) of which I am willing to request two thousand contos from the Rockefeller Foundation if the Government is willing to contribute with the remaining five thousand contos. I explain that this estimate is nothing more than a shirt cuff calculation but that it should permit the organization of as much of the service as would be possible under any circumstances the first year. I insist that the service should be organized as an anti-gambias service rather than as an anti-malaria service so that all those areas having malaria but not gambias would not feel free to insist on having attention from the service; also, the service to be organized should not have the responsibility for medical care of the sick in dispensaries or otherwise. JBB objects to this point but we all finally agree that quinine will have to be distributed by field personnel working in infested districts. Since there is no time in which to develop a separate organization I suggest that the anti-gambias service be organized as part of the Yellow Fever Service, thus permitting us to build on the enormous experience of this service in this very area. (Gambias is now in districts which have had to be organized for the control of egypti in rural areas). Also, and this is most important, the SFA has a group of trained men who are accustomed to working under discipline which can be drawn upon for the nucleus of the new service. The idea of the SFA taking over the gambias problem appeals greatly to JBB, who, we learn, is anxious to avoid having his five thousand conto malaria budget of next year broken into, although at least one thousand contos of it had been ear marked for Ferreira's work. JBB suggests then that we write the yellow fever contract on the basis of 15,000 contos for the first nine months of 1939 and depend on getting a supplementary budget later to complete the year. This suggestion is unanimously rejected by myself and I tell JBB that I am not willing to mix yellow fever and malaria budgets this year since we are turning the yellow fever service back to the Government at the end of

the first semester of 1939. *Actually the contract is for the first semester of 1939.*

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To get on with the story: We all finally agreed that the present situation requires immediate organization, that the proposed budget is a reasonable one until further information is acquired, that the present service under Ferreira should be taken over, there being no obligation on the part of the service to be organized to keep undesirable personnel, and that the SFA be used to mother the new organization during its first months. Barreto and Ferreira are stopping off in Natal tomorrow and DBW and I are to proceed to Rio to get action as soon as possible. I promise to send information to New York immediately for early action.

In regard to the central government, I can say that everything indicates that there will be no difficulty in getting the necessary budget and in taking over the gambiae control problem. I told Barreto frankly that I had talked the situation over with the Minister of Education and Health and had promised to make suggestions on our return from this trip. I did not tell him that the Secretary to the President had communicated with me the afternoon before leaving Rio, stating that we could count on full support from the executive arm of the Government!

In regard to budgets I believe arrangements can be made to make all necessary disbursements this year from the budget which Ferreira already has available. Much of the material we will want to purchase cannot be gotten before next year in any case and can be charged to the 1939 budget. As stated above I wish to recommend a one hundred thousand dollar budget from the Foundation on the basis of five thousand contos from the Government. Thus, if my memory is correct, the requests now stand at one hundred fifty thousand for yellow fever and one hundred thousand for gambiae for Brazil.

I am cabling you from Recife tomorrow:

Request authorization propose government immediate gambiae organization
Budget 1939 Foundation \$100,000.00 Government five thousand contos
Answer Rio - Soper

There can be no doubt that we are asking for an enormous headache for quite some time in offering to organize this programme but I see no way to avoid the issue. And if work is going to be done it must be done on as large a scale as possible from the beginning. When we came north (I think you should know this before deciding to authorize the amount asked for) we found Shannon thinking that it would be useless to attempt to do anything this dry season and found Ferreira planning on a full year's study of the situation before undertaking control.

Incidentally, gambiae or no gambiae, this field is very short of personnel. A few good men in the younger age group who could be in training for the future are indicated. Likewise, I believe that Bates could be of more value here in the future than almost anywhere else. Shannon is up here now and is very much interested in the whole situation but in the meantime the overhead on the yellow fever laboratory goes on without many things being done which might be done with more technical personnel.

Very sincerely yours,

Fortaleza 23rd
Recife 24th

Fred L. Soper