The distribution of certain diseases in Brazil as indicated by data obtained through viscerotomy

I. The incidence of Schistosoma mansoni lesions in material collected from 1937 to 1946

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Viscerotomy is a simple and rapid method of obtaining material for histopathological examination from a cadaver. Its great practical advantage is in not requiring an autopsy, since even partial autopsies are, at times, unobtainable.

The instrument used for puncturing, introduced by Rickard in 1931, is called a "viscerotome". It was first used on a large scale by Soper, Rickard and Crawford who obtained specimens of liver by this means from fatal human cases suspected of being yellow fever infections. The method proved to be highly satisfactory, consequently the process was extended immediately to various zones of the country as a sanitary control measure. In 1932 the Brazilian Government made viscerotomy mandatory in all cases involving an acute fatal illness with a maximum duration of ten days.

In relation to yellow fever control the viscerotomy service has attained a high degree of organization and has become the principal means of establishing a post-mortem diagnosis of yellow fever infection. However, it should be noted that the same process is easily adaptable to obtaining material from organs other than the liver and so making material available for the histopathological diagnosis of various other diseases. Therefore, viscerotomy should be regarded as a general method in pathological technique.

The liver specimens obtained by this process are preserved in 10% formal-saline. Formerly these specimens were received and examined by the Histopathology Section of the Yellow Fever Laboratory established in 1931 by the Rockefeller Foundation. At present, this Histopathology Section forms a part of the National Yellow Fever Service. The number of liver specimens examined in this Laboratory from 1931 to the present is enormous, totalling nearly 400,000 from Brazil alone.

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The histopathological examination of these specimens is made as complete as possible. Data thus accumulated indicates the incidence of diseases and morbid conditions affecting the liver and is a source of valuable scientific information concerning general health conditions in the country. To make such data generally available a series of reports on the distribution of various diseases and conditions of medical and sanitary importance, such as Malaria, Visceral Leishmaniasis, Liver Atrophy and Sickle Cell Anemia will be published. The present paper, dealing with Schistosomiasis, is the first of this series.

Due to the necessity of limiting the quantity material analyzed, in general only material covering the period from 1937 to 1946 will be considered in this and others reports. The material collected during this period covers more than half of the total number of liver specimens examined in our laboratory. Also the criteria for the examination and diagnosis were uniform throughout that decennium.

A study of the occurrence of Manson’s Schistosomiasis in Brazil was reported by the author at the “Seventh Brazilian Congress of Hygiene” in December 1948 in the city of São Paulo. The present paper is partially based on that report.

THE OCCURRENCE OF MANSON’S SCHISTOSOMIASIS IN LIVER SPECIMENS OBTAINED BY MEANS OF VISCEROTOMY FROM 1937 TO 1946

The seriousness of infestation of Schistosoma mansoni in various regions of Brazil, especially in the east and northeast, has held the attention of many of our scientific workers ever since the classical studies of Pirajá da Silva in 1908. As a result of this interest valuable contributions concerning the biology of this trematode, prophylactic and therapeutic measures, as well as the pathogenesis of the disease have been made. Nevertheless, there is an urgent practical necessity of coordinating all this dispersed material for use in planning a nation-wide campaign against schistosomiasis, which unquestionably should be undertaken.

MATERIAL AND METHODS

The present study is based on the results obtained through the systematic examination of liver specimens obtained by viscerotomy.

The selection of such specimens is limited by its immediate and essential objective which is to discover yellow fever cases which otherwise might be
unrecognized. On this basis only cases of acute fatal illness that terminate in
death within 10 to 15 days are punctured. It is known that intestinal schistoso-
miasis only exceptionally shows an acute phase, since it is rarely fatal during
the toxic period. It is also recognized that the characteristic hepatic findings
of the disease, that is, the presence of Schistosoma ova in the sinusoids of the
liver will not be found earlier than two months after infestation has occurred.

We must admit that finding lesions of schistosomiasis during our routine
examinations constitutes, in the majority of cases, a fortunate accident. For
that reason we are not surprised to find that the incidence of schistosomiasis,
as shows through viscerotomy is, in general, lower than the index obtained
through the examination of feces. On the other hand, the frequency of the
cases of schistosomiasis revealed by the viscerotomy service is notable in spite
of the fact that the material should be considered inadequate for an accurate
survey of schistosomiasis in endemic zones. The discovery of livers with char-
acteristic schistosomiasis lesions among our diminutive viscerotomy specimens
would be merely fortuitous except for the finding, by Lambert (1927) in
Puerto Rico, that the liver is invariably involved in the Schistosoma infesta-
tions, generally in a definitely characteristic manner in addition to the diffuse
hepatic lesions which are produced.

Davis, in 1934, published a statistical analysis of the principal histopatho-
logical findings resulting from a study of the first 29,593 liver specimens exa-
mined in our laboratory. The principal objective of this study was to determine
the incidence of malaria and schistosomiasis in Brazil.

As already mentioned, a total of approximately 400,000 liver specimens
have been obtained in Brazil. Our study, however, covers only the specimens
collected during the ten year period from 1937 to 1946 inclusive, totalling
267,107 specimens.

The present analysis is based, in fact, almost exclusively on routine diag-
nosis made from the examination of a single preparation stained with hema-
toxylin-eosin from each liver specimen received. Tissue was embedded in
paraffin. In the present analysis only livers containing ova or a typical gra-

nuloma have been diagnosed as cases of schistosomiasis. All specimens show-
ing only lesions in which a diagnosis of schistosomiasis would be doubtful
have been excluded.

It is possible that, had our study been based on serial preparations or
without adhering to a strict diagnostic criteria, our incidence of schistosomiasis
would be appreciably higher. However, in this case the data would not offer
the same degree of reliability.
It should be stressed that viscerotomy findings need for correct interpretation reliable data concerning the locality in which infection occurred. Consequently, correlated epidemiological studies should always be undertaken to complete the data presented by viscerotomy, which only reveals the presence of infected people in a locality. To find out whether or not this locality constitutes an actual or probable focus careful epidemiological surveys are necessary.

ANALYSIS OF VISCEROTOMY DATA

Among a total of 267,107 liver specimens from the entire country examined during the period from 1937 to 1946, 5,953 showed lesions of schistosomiasis. This represents $2.23 \pm 0.019$ per cent.

This material came from 1,174 municipalities in Brazil where viscerotomy posts are operated which produced at least 5 liver specimens each during the years from 1937 to 1946 inclusive. Less than 5 specimens each were received from 31 municipalities during that period. These are not included in our tabulation. It is worth mentioning, however, that 28 of these municipalities sent only specimens without schistosomiasis lesions. Only three were positive, namely Natal, in the State of Rio Grande do Norte, Recife in Pernambuco, and Santa Luzia in Minas Gerais.

The total number of municipalities in Brazil is 1,669 therefore our net of 1,174 active viscerotomy counties covers the inhabited area of the country almost completely.

Among the 1,174 municipalities with viscerotomy posts active during the ten year period from 1937 to 1946, 419 sent specimens with schistosomiasis lesions.

Geographical Distribution of Cases — The incidence of schistosomiasis among liver specimens was first calculated for each community, locality or viscerotomy post. In order to obtain maximum accuracy these were then grouped and the data combined for each municipality, to which the percentage of infection refers.

TABLES 1 AND 2

From tables 1, 2 and 3 it can be seen that livers with schistosomiasis lesions were received from all the States and Territories of Brazil, with the exception of the Territory of Amapá.
Regions and States — Tables 1 and 2 show respectively the incidence of schistosomiasis in the regions and states of Brazil, as well as the number of infected municipalities in each state among the total number of municipalities with active viscerotomy posts.

In the north region of the country the incidence is low. Among a total of 26,825 liver specimens only 60 cases or 0.22% of schistosomiasis were found.

Among 8,929 liver specimens from the western zone of the northeast region 62 cases or 0.69% were diagnosed.

From these two regions all the states showed indices below 1.0% except the Territory of Rio Branco, where the percentage was 3.41 ± 1.34, which, however, may be accidental since the number of specimens examined was relatively small.

The eastern zone of the northeast region of Brazil is well known as an area of high schistosomiasis endemicity. Among a total of 43,338 liver specimens examined from this area 2,238 cases of schistosomiasis were diagnosed, giving an index of 5.16%.

The number of liver specimens examined from the northern part of the eastern region was 33,379. Of these a total of 2,502 cases, or 7.49% proved positive for schistosomiasis, which is the highest regional index in all Brazil.

Among the states covered by these two areas only the State of Ceará shows a low percentage. In the States of Rio Grande do Norte and Paraíba the incidence is moderate (between 1.00 to 5.00 per cent).

The States of Pernambuco, Alagoas and Sergipe, with indices of 9.44, 11.46 and 10.25 per cent respectively, once more proved to be the zones of highest endemicity for schistosomiasis in Brazil.

Only 1,020 cases of schistosomiasis were diagnosed among 113,333 liver specimens coming from the southern part of the eastern region of the country, which gives a low index of 0.90 per cent.

In this region a low incidence, less than 1.0%, is shown in the States of Espirito Santo and Rio de Janeiro. In the State of Minas Gerais the incidence is moderate (index = 1.26%).

The states in the central-western and southern regions of Brazil show a low index for schistosomiasis, similar to the north of the country.
FIGURE 1

For the southern region 47 cases were diagnosed among a total of 33,772 viscerotomy specimens examined, or an incidence of 0.14%, the lowest index of any of the seven regions of the country.

For the central-western region the number of specimens examined totalled 7,531. The positive cases encountered were 24, or 0.32%.

It is interesting to note the agreement existing between the figures shown in Table 4 giving the incidence of schistosomiasis as revealed by viscerotomy as reported by Nelson Davis in 1934 for 12 states of the Union, based on a total of 29,593 livers, and our findings concerning the same states, based on a total of 267,107 liver specimens examined during the ten year period from 1937 to 1946.

In fact, significant differences, greater than three times the probable error of the difference, were found for the following states only: Paraiba, with a higher index for the period 1937-1946 than in 1934; Pernambuco, Alagoas, Sergipe and Bahia with higher indices in 1934 than during the later ten year period.

Although a significant fluctuation in the absolute value of the indices was encountered for these four states, there is no alteration in their general classification regarding the intensity of schistosomiasis, since in both series Alagoas and Sergipe showed the highest indices in all Brazil.

States and municipalities — Table 3 lists, by states, all municipalities positive and negative for schistosomiasis during the period from 1937 to 1946 as revealed by viscerotomy findings.

Figure 1 shows the 1,174 municipalities in Brazil with viscerotomy in operation during the period from 1937 to 1946 and indicates an index in each one the municipalities have been divided into five groups according to the index of infestation, negative 0.0%, low 0 to 1%, moderate 1 to 5% average 5 to 10%, and high over 10%.

It would appear that an incidence of more than 20% always indicates the massive endemicity.

The incidence of schistosomiasis in the Territories and States of Brazil, with their respective negative municipalities, during the ten year period as follows: —

ACRE — Only one municipality was found positive for schistosomiasis in this Territory, namely Sena Madureira, with a moderate incidence of 1.04%.
TABLES 3 AND 4

The incidence for this Territory is low being only 0.2%.

RIO BRANCO — This Territory has only one viscerotomy post, Boa Vista, and that had a moderate incidence of 3.41%. This index is based on a total of only 88 liver specimens and may be considered fortuitous.

GUIAPORÉ — The incidence for this Territory is 0.19%. The only municipality found positive is Porto Velho with a low incidence of 0.26%.

AMAPÁ — This was the only territory from which no liver specimens with schistosomiasis lesions were received during the ten year period.

AMAZONAS — The incidence for this state is low, or 0.30%. Among a total of 25 municipalities with viscerotomy posts in operation only 3 proved positive for schistosomiasis. The only one presenting a moderate incidence (1.33%) is Coari. For the other two the incidence is low.

PARÁ — The incidence of schistosomiasis in Pará is low (0.19%). Fifteen of its 52 municipalities proved positive for schistosomiasis. All show low indice with the exception of four with a moderate incidence, namely: Marabá, Faro, Monte Alegre and Portel.

Pará is one of the states of the Union where the stream of immigrants from the northeast is most intense. For this reason the viscerotomy findings regarding the presence of schistosomiasis in most of the Amazon region should be regarded with reservation, since it may constitute imported cases.

MARANHÃO — The incidence of schistosomiasis in this state is also low (0.95%). Among its 49 municipalities with active viscerotomy posts 13 were found positive. Three of these show low indices. In 7 the incidence is moderate while in 2, Cajapio and São Vicente Ferrer, the incidence is average (+5 to 10%). Only the municipality of Cururupu gave a high incidence (14.71%).

PIAÚ — The incidence of schistosomiasis in Piauí is low, with an index of 0.41%. Among the 34 municipalities with viscerotomy posts only 6 were found positive. In two of these the incidence is low, and the other four, União, Picos, Jurumenha and Uruçu, are moderate.

CEARÁ — Among the 79 municipalities with viscerotomy posts 21 were found positive for schistosomiasis. The incidence for this state, as a rule, is low (0.48%); nine of its 21 positive municipalities showing a low incidence.
For the remainder the incidence is moderate (+1 to 5%). Among these the following show an incidence above 2%: Redenção, Brejo Santo, Caririçau, Icô, Juazeiro and Morada Nova.

**RIO GRANDE DO NORTE** — A total of 24 municipalities with viscerotomy posts in operation in this state indicated a moderated incidence of 1.17. Of the six municipalities found positive for schistosomiasis only one shows a low incidence, whereas four have a moderate incidence. Only the municipality of Ceará-Mirim shows a high incidence (12.10%).

**PARAÍBA** — Twenty-five municipalities in this state with viscerotomy posts in operation were considered in this study. The incidence is moderate (3.04%). Fifteen of its 25 municipalities were found to be positive and have been classified as follows: 2 with low incidence, 10 with moderate incidence, and three with average incidence, namely Ingá, Pilar and Santa Rita.

**PERNAMBUCO** — In this state 57 municipalities had viscerotomy posts in operation during the ten year period. Of these 47 were positive for schistosomiasis. The incidence for this state is average, being appreciably high (9.44%). Of the 47 positive municipalities 17 show a moderate incidence for schistosomiasis, in 14 the incidence is average, and in the remaining 16 the incidence is high (+ 10%). In this last group the municipalities of Nazaré da Mata, Quipapá, Vitória de Santo Antão, Aliança and Timbaúba have incidences higher than 15%. The highest are Aliança and Timbaúba (+20%).

**ALAGOAS** — All 16 municipalities with viscerotomy posts were positive for schistosomiasis. The mean incidence for this state is the highest in all Brazil, or 11.46%. Four of its 16 municipalities show a moderate incidence, three other have an average incidence and for the other nine the incidence is high (+10%). In this last group the municipalities of Assembleia, Coruripe, São José da Lage, Quebrangulo and Palmeira dos Índios have indices of more than 15%. In Quebrangulo and Palmeira dos Índios the incidence is massive with 25.00% and 52.10% respectively. The latter is the highest incidence of schistosomiasis we have encountered.

**SERRIGE** — In this State 28 out of 31 municipalities with viscerotomy posts were positive. The incidence is high, or 10.25%. The incidence among 28 municipalities is as follows: moderate 4, average 8, and high 16. Among these the municipalities of Maruim, Tobias Barreto, Carmópolis, Inajaroba, Rosário do Catete and Laranjeiras show an incidence of more than 15%. For the last four mentioned the incidence is massive (+20%).
BAHIA — Among the 110 municipalities with viscercotomy posts in operation, 85 were found positive for schistosomiasis, the mean incidence being 6.74% or average. Of these 1 showed a low incidence, 21 moderate, 39 average, and 24 a high incidence. Of the latter the municipalities of Catu, Irarã, Santarém, Santa Cruz and Ubairá showed an incidence of more than 15%. For Santa Cruz and Ubairá the incidence was massive.

ESPIRITO SANTO — In this state there are 32 municipios with viscercotomy posts in operation and 14 of these proved positive for schistosomiasis. The incidence for the State of Espírito Santo is low, or 0.82%. Among the 24 positive municipalities 6 gave a low incidence, 6 moderate, and only two, namely Baixo Guandu and Itaguaçu gave an average incidence.

RIO DE JANEIRO — Among the 50 municipalities with viscercotomy posts in operation in the State of Rio 19 proved positive for schistosomiasis. The incidence is low in this state with an index of 0.36%. All ist positive municipalities give a low incidence with the exception of Itaguai and Silva Jardim where the incidence is moderate.

MINAS GErais — In this state the positive municipalities number 89 among a total of 263 with viscercotomy posts in operation. The incidence of schistosomiasis in Minas Gerais is moderate with an index of 1.26% for the entire state. Among the 89 positive municipalities 23 show a low incidence, 48 moderate, 10 average, and 8 a high incidence, the municipalities of Medina and Peneda Azul giving indices above 15%. The municipalities showing the highest incidence are almost all located in the northern and central zones of this state.

SÃO PAULO — In this state 19 municipios proved positive for schistosomiasis among a total of 156 with viscercotomy posts in operation. The mean incidence for the state is low, with an index of 0.19%. Eleven of the 19 positive municipios have a low incidence and 8 show a moderate incidence. Among this latter group the following give an incidence of more than 2%: Andradina, Bastos, Guairá and Guará.

PARANÁ — The number of municipalities with viscercotomy posts in the state of Paraná is 47. Of these six were positive for schistosomiasis. The incidence is low or 0.10%. The six positive municipios all also show a low incidence.

SANTA CATARINA — Only 2 of 32 municipios with viscercotomy posts in operation proved positive for schistosomiasis in this State. The incidence
for the entire state is very low (0.05%) which is also the case with the only two positive municipios.

RIO GRANDE DO SUL — In this state 15 municipios had viscerotomy posts in operation, during the period under study. Only the municipality of São Luiz de Gonzaga proved positive for schistosomiasis and here only one case was diagnosed among a total of 168 liver specimens examined. The incidence for the entire state is very low, or 0.07%.

GOIÁS — Five of the 40 municipios with viscerotomy posts in operation were positive for schistosomiasis. However, the incidence for the entire state is low, or 0.25%. Of the positive municipios 2 have a low and 2 other a moderate incidence. Only the municipio of Planaltina gives an average index.

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MATO GROSSO — In this state there are 24 municipios with viscerotomy posts in operation. Of these 6 were positive for schistosomiasis. With an index of 0.37% the incidence for Mato Grosso is low. It is also low in 3 of its positive municipios and moderate in the other three, that is Aquidauana, Poço Redeu and Três Lagoas.

Comparative Value of Coprology and Viscerotomy in the Diagnosis of Intestinal Schistosomiasis — Table 5 shows, for comparative purposes, the findings of various Brazilian investigators in surveys of the incidence of schistosomiasis in some municipios of Brazil, through the examination of feces, as compared with our findings obtained through viscerotomy.

There is an extensive medical literature on schistosomiasis in Brazil, and, when making our selection among the many surveys on the incidence of this disease by examination of feces, our criterion has been merely quantitative. For comparison with viscerotomy data we have selected those indices obtained by coprological examinations that were based on the largest number of specimens for each municipio.

In table 5 the incidence as found by coprology and viscerotomy are shown for 19 municipios situated in five states of Brazil.

In 12 of these 19 municipios the indice obtained by the examination of feces were decidedly higher than those obtained by viscerotomy. However, in 4 municipios the indice obtained by viscerotomy were higher than those by coprology, and in the other 3 municipios the two indices were practically identical.
The municípios where coprology gives lower incidence are João Pessoa in the State of Paraíba, Garanhuns in the State of Pernambuco, Maceió and São Luiz Quitunde in the State of Alagoas.

Some of the 12 municípios which show a higher incidence by coprology than by viscerotomía deserve further consideration. Jansen (1946) and Tavares (apud A. Meira, 1945), who worked at the same time and with practically the same number of stool specimens (6559 and 6288 respectively), show surprisingly similar figures for the município of Catende in the State of Pernambuco, both arriving at a value of 53%. During the ten year period from 1937 to 1946 an incidence of only 13.42% was found among the 514 liver specimens obtained by viscerotomía.

In the município of Vitória de Santo Antão in the State of Pernambuco, Magalhães et al. found an incidence of 38.6% among the stool specimens from 1.530 individuals, which, at that time, equalled one tenth of the total population of the município. The incidence found for this município by viscerotomía was 14.10% in 1934 (312 liver specimens examined) and 15.76% during the period from 1937 to 1946 (203 liver specimens examined).

In the State of Alagoas, Barros Barreto (1946) found an index of 31.4% for the município of Rio Largo, based on examination 2,349 stool specimens. The incidence found by viscerotomía during the period from 1937 to 1946 in this same município was 14.27% on the basis of 729 liver specimens.

For the city of Salvador, the capital of the State of Bahia, Vieira (apud R. Lobo, 1946) obtained an incidence of 16.72% among the 2223 individuals examined. The indices based on viscerotomía findings for this município was 8.7% in 1934 and 6.67% during 1937-1946 based on the examination of 724 and 90 liver specimens respectively.

An index of 40.0% is given by Cesar Pinto (1944) for the município of Itambacuri in the State of Minas Gerais on the basis of the examination of feces from 1,452 persons. Our index for this same município, obtained by viscerotomía, was 9.19%, based on the examination of 283 liver specimens.

In the município of Belo Horizonte, in the State of Minas Gerais, an index of 10.88% was found by Renault and Versiani (1940) through the examination of feces from 6,000 individuals. The incidence found by viscerotomía (1937-1946) was 1.51% based on the examination of 465 liver specimens.

Incidence of 20.00% and 85.18% respectively were calculated for the municípios of Montes Claros and Pedra Azul in Minas Gerais, by Martins and Versiani (1938), on the basis of the examination of feces from 85 and 81
persons respectively. An incidence of 11.43% (35 liver specimens examined) and 17.37% (167 liver specimens examined) was found by viscerotomy (1937-1946).

A total of 61,121 stool specimens from the 19 municípios shown in table 5 were examined. Of these 12,498 or 20.45 ± 0.11% were positive for schistosomiasis. The number of liver specimens examined from these 19 municípios during the period from 1931 to 1946 totalled 7,679. Of these 792, or 10.31 ± 0.074%, were positive for schistosomiasis or only one half the index obtained by coprology. The difference between the two indices is highly significant (Dif. = 10.14 ± 0.133%).

### TABLE 6 AND FIG. 2

It seems justified, therefore, to conclude that the incidence of schistosomiasis, as revealed by viscerotomy is, as a rule, comparatively lower than that shown by the examination of stool specimens, even when only one specimen per person is tested.

That viscerotomy findings are of great importance in the diagnosis of Manson’s Schistosomiasis is demonstrated in Table 5, even though the examination of feces, when undertaken under adequate technical conditions, would be the preferable method for discovering cases of this disease. However, liver viscerotomy serves as a valuable auxiliary process and should, for this reason, never be ignored.

**Age distribution of cases** — Of the 5,953 liver specimens positive for schistosomiasis during the period 1937-1946 only 5,924 had data pertaining to age available. Due to the impossibility of accurately analyzing the distribution by age of the 5,924 cases found during this period, since such an analysis would require age grouping of the 267,107 dead persons, from whom viscerotomy specimens were examined during the ten year period. Such a statistical study would be difficult because this material has not yet been properly codified for analysis by mechanican means. For this reason we have restricted the study of the age group incidence to the year 1938.

We have chosen this year not only because it is the year which yielded the highest number of viscerotomy specimens but also because it has a representative distribution of liver specimens among all the states and territories of Brazil. In addition, it presents excellent uniformity in the results of the examinations. In our opinion these characteristics make the year 1938 worthy of being analyzed as the most typical during the period 1937-1946.
Table 6 and Figure 2 show the data regarding the age distribution of the 374 cases of Manson's Schistosomiasis, which were diagnosed among the 30,819 liver specimens examined during the year 1938.

When analyzing this data a marked predominance of the total number of specimens coming from the age group 0-9 years, or more precisely, the subgroup 0 to 4 years is observed. This age group includes 36.80% of the 30,819 specimens. The liver specimens obtained from the 0 to 9 age group total 13,622 or 44.20%. This same predominance was observed by Davis (loc. cit) with reference to 11,112 liver specimens from the States of Pernambuco, Alagoas, Sergipe and Bahia. He limited his analysis of the age group distribution of schistosomiasis to this material. Among a total of 11,112 liver specimens obtained through viscerotomy Davis found 7,264 or 65.37% came from the 0-9 age group. Thus, the predominance of the first age group analyzed by Davis is considerably higher than the one found in 1938.

From our data it can be seen that the liver specimens corresponding to the four age groups that include the 2nd to the 5th decade of life are equally distributed, which makes the comparison among these same groups highly significant.

In the last age group considered (50 +) there is another increase in the number of liver specimens received, probably due to the amplitude of this group.

For the year 1938 the incidence of schistosomiasis was highest in the age group 10-19 years (2.61%), although it does not differ significantly from the two following age groups (Difference: 0.25% ± 0.288 and 0.68 ± 0.283 respectively). However, the difference between this incidence and the one found among the age group of 40-49 years is statistically significant (1.02 ± 0.274).

The lowest incidence is observed for the first and last age groups (0-9 and 50 + years), being decidedly lower in the first age group (the difference between the first and last group is 0.42 ± 0.089). It is also significant that the difference in incidence between the age group 50 + and the immediately preceding group is — 0.57 ± 0.185.

The incidence of schistosomiasis decrease gradually from the second decade of life to the 3rd, 4th, 5th and 6th age groups. The indices referring to the 3rd and 4th as well as the 4th and 5th age groups do not differ significantly among themselves, the only significant difference being between the 3rd and 5th age groups (0.77 ± 0.249).

The incidence in the sub-group 5-9 years (2.32%), which shows the same number of liver specimens as those in groups 2, 3, 4, and 5, is practically
identical to the one encountered among the latter four groups. The difference between the incidence found in this sub-group and the one observed in each one of the other four groups is without statistical significance.

It can be said that, as a rule, the incidence of schistosomiasis found among liver specimens examined is very low for the first years of life and increases notably during the later part of infancy reaching its maximum among the juveniles and young adults. A decrease is noted among the adults but is only accentuated in the 6th decade, that is among old people.

This distribution coincides with the findings which have generally been given for this disease in nosological studies and agrees with the recognized epidemiological conditions for exposure and infestation of man with this helminth infection.

SUMMARY AND CONCLUSIONS

Examination of 267,107 liver specimens obtained in Brazil by viscerotomy during from 1937 to 1946 inclusive revealed 5,953 Schistosoma mansoni infections. This represents 2.23% ± 0.019 of the total number of livers studied.

Data on the incidence of the disease is tabulated by states and municipios. Infected livers were found in all of the states and territories except the Territory of Amapá.

Schistosomiasis is widespread in Brazil with highest incidence in the states of the Northeast. The disease is quite common in Espirito Santo and Minas Gerais as well.

A study of the age distribution of cases of intestinal schistosomiasis observed among liver specimens obtained in the year 1938 showed a low incidence on young children with a peak of prevalence in the 10 to 19 year age group.

The purpose of this contribution is to call attention of the health authorities to the extent and gravity of the problem of intestinal schistosomiasis in Brazil.