Current Status of Parasitic Diseases

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THE past few decades have witnessed a remarkable advance in public health standards in the southeastern United States, and along with this advance changes have been recorded in the incidence of most parasitic infections. Other than the virtual disappearance of malaria, to which the insecticide DDT has contributed in no small measure, most of the gains have not been associated with any spectacular medical discovery.

The decline in hookworm disease is a case in point. Stiles (*1*), who awakened the consciousness of the south concerning this disease and who was responsible for much of the early control effort, believed that the important factors in the decline in hookworm disease were associated with the advent of the automobile, good roads, better schools, industrial expansion, higher economic status, and improved sanitation. These factors are even more potent influences today than they were more than two decades ago. Regardless of the responsible elements or the operative mechanism, it is interesting to trace the changes since 1910 and to analyze the present status of human parasitic infections in this area through such data as are available.

Sources of the Data

The more recent information concerning the incidence of intestinal helminths has been placed at my disposal by the directors of the State health department laboratories or other State officials. The data for 1930–38 have been taken from the extensive surveys conducted by the department of preventive medicine of Vanderbilt University School of Medicine and summarized by Keller, Leathers, and Densen (*2*). The figures for 1910–14 are from the reports of the Rockefeller Sanitary Commission. In certain instances, material has been abstracted from reports of State health officers.

Morbidity data on amebiasis and trichinosis have been extracted from records of the National Office of Vital Statistics, Public Health Service. Information concerning the incidence of *Trichinella spiralis* represents a summary of all diaphragm examinations reported by various investigators. The material covering malaria morbidity and cases appraised during 1948–53 was compiled by the Communicable Disease Center, Public Health Service.

The validity of some of the comparisons made in this paper is subject to question because of many variable factors. The surveys were made by many different individuals and different techniques were utilized. There is no certainty that the samplings came from the same areas in the various States or that similar population groups are represented. Regardless of these limitations, a comparative presentation of data for various periods is warranted, and in many cases the comparisons are of considerable significance.

Ascaris lumbricoides

The classic report of Otto and Cort (*3*) summarized the information regarding the dis-

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tribution of *Ascaris lumbricoides* infections in the United States up to 1934. The high incidence areas were defined by these authors as the southern Appalachian plateau with its foothills and contiguous valleys, isolated areas in the coastal region of North and South Carolina, and areas in Florida, Arkansas, and central and south Louisiana. The highest incidences recorded have been from the mountainous regions of Kentucky, Virginia, and Tennessee.

The latest available data on the incidence of *A. lumbricoides* infections in certain southeastern States are summarized in table 1. The figure for Kentucky is strikingly higher than that for any other State, and Florida and Louisiana follow in order. These figures are then consonant for the most part with the summation of Otto and Cort 20 years ago.

A comparison between the recent incidence of ascariasis in various southeastern States and the data for 1929–38 also appear in table 1. The data indicate a decided improvement in the situation with regard to this parasite except in Florida, which now shows a higher incidence than that reported for 1937–38.

Zoonotic Larval Ascariasis

Zoonotic larval ascariasis is also known as visceral larva migrans. During recent years a number of reports, some from the southeast, of a clinical syndrome associated with hepatomegaly and pathological foci in the liver believed to be due to invasion by ascarid larvae have appeared. In most cases an intermittent fever is present. There is usually a history of nausea, vomiting, anorexia, irritability, cough, and loss of weight. In cases with pulmonary involvement, roentgenograms may show transitory, shadowy infiltration. There is marked anemia, a striking leukocytosis, and a high eosinophilia. Liver function tests frequently show deviation from the normal. In cases in which laparotomy has been performed, the liver has been found to be studded with white plaques of scar tissue.

Perlingiero and György (*4*), Zuelzer and Apt (*5*), Mercer and associates (*6*), and Behrer (*7*) were the first to describe these cases, which have occurred mainly in young children. Most of these authors associated the condition with larvae of *A. lumbricoides*. However, Beaver and associates (*8*) were of the opinion that the three observed by them were due to the larvae of *Toxocara canis*, the most common of the two species of ascarids infecting the dog. Since that time, the larvae of the cat ascarid, *Toxocara cati*, have also been incriminated.

Wright (*9*) showed that the life cycle of *T. canis* is similar to that of *A. lumbricoides*. However, in abnormal hosts the larvae have a pronounced tendency to wander extensively in various tissues without necessarily completing the entire life cycle. According to Mendheim, Scheid, and Schmidt (*10*), the adult cat ascarid, *T. cati*, has been found 18 times in man, but only 1 authentic case involving a mature infection with the dog ascarid, *T. canis*, is on rec-

Table 1. Comparison of recent and prior data concerning the incidence of infections due to Ascaris lumbricoides in 9 southeastern States

State	Recent period [1]	Total examinations	Percent positive	Former period	Total examinations	Percent positive
Alabama	1953–54	83, 901	0. 4	1934–37	253, 630	1. 1
Florida	do	163, 479	7. 8	1937–38	33, 185	2. 5
Georgia	do	170, 856	2. 1	[2] 1935–36	63, 316	1. 3
Kentucky	do	5, 756	21. 1	1934–35	[3] 23, 964	34. 7
Louisiana	do	128, 343	4. 4			
Mississippi	1951–54	85, 362	. 9	1932–33	50, 733	1. 1
North Carolina	1953–54	36, 480	2. 6	1935–37	43, 647	11. 4
South Carolina	1951–54	25, 239	3. 8	1934–35	[3] 28, 875	4. 0
Tennessee	1950–54	23, 529	2. 7	1929–31	31, 999	27. 1

[1] As revealed by State health department laboratory examinations. [2] Georgia State Board of Health Biennial Report, 1935–36. [3] White only.

Table 2. Incidence of infections due to Trichuris trichiura in 9 southeastern States as revealed by recent and prior surveys

State	Period	Total examinations	Number positive	Percent positive	1930–38 Percent positive
Alabama	1951–52	40, 845	13	0. 03	0. 04
Florida	1953–54	163, 479	1, 441	. 9	. 4
Georgia	do	170, 856	513	. 3	. 3
Kentucky	do	5, 756	217	3. 8	10. 0
Louisiana	do	128, 343	5, 562	4. 3	
Mississippi	1951–54	85, 362	499	. 6	. 3
North Carolina	1953–54	36, 480	75	. 2	. 9
South Carolina	1951–54	25, 239			. 04
Tennessee	1950–54	23, 529	197	. 8	7. 6

ord for man. Regardless of the fact that these worms seldom develop to maturity in man, children especially are no doubt often exposed to the infective ova. The potential exposure must be considerable since it has been estimated that there are in the United States some 22 million pet dogs and 11 million domestic cats, the majority of which at one time or another probably become infected with *Toxocara*.

Although perhaps not directly related to zoonotic larval ascariasis, the cases of nematode endophthalmitis reported by Wilder (*11*) present another indictment against nematode larvae as disease agents. Wilder reported 46 cases in which nematode larvae were found in 24 of the enucleated eyes and a characteristic reaction in the other 22. With few exceptions, the 46 patients were children, the greatest number being from the southeast. While Chitwood identified the larvae as hookworm larvae, recent findings concerning conditions due to *Toxocara* larvae would leave the suspicion that perhaps these larvae are involved in cases of endophthalmitis.

Trichuris trichiura

While the general factors responsible for the transmission of *A. lumbricoides* are applicable to *Trichuris trichiura*, the ova of the latter have a much higher moisture requirement for their development and are less resistant to desiccation (*12*). The incidence of *T. trichiura* infection is usually higher in tropical and subtropical areas with heavy rainfall than in the temperate zones, where conditions in the external environment are less favorable for the ova. Even in the mountains of Kentucky, where conditions were once extremely favorable for transmission of both parasites, Keller and Leathers (*13*) obtained an incidence of 40.8 percent for *A. lumbricoides* and an incidence of only 12.1 percent for *T. trichiura* infections. Recent data concerning the occurrence of the latter parasite in certain southeastern States and data for 1930–38 are shown in table 2. Relatively low indexes were recorded in all States represented, with the highest recent incidence in Louisiana. The relatively heavy rainfall and high humidity in parts of Louisiana may provide favorable conditions for the development of the ova of this parasite.

Hookworm Infection

At one time hookworm disease constituted a serious public health problem in the southeast and was responsible for much physical and mental retardation. The current incidence is relatively low (table 3). Florida shows the highest incidence of all southeastern States represented, followed in immediate order by Georgia, North Carolina, and Alabama. The marked reduction which has taken place in the incidence of hookworm infection since 1910–14, the days of the Rockefeller Sanitary Commission and since the survey conducted by Vanderbilt University in the 1930's is shown in table 4. It is not possible to arrive at any definitive evaluation concerning changes in the intensity of the infection over the past 40 years because efforts to ascertain the relative worm burden

were not made during the 1910–14 surveys nor are such data available for the recent period. However, the available evidence would indicate that there has been over the period in question a marked reduction in the worm burden. Keller, Leathers, and Densen (*2*) found that about one-fourth of the individuals in their 1930–38 surveys had infections sufficiently severe to produce clinical symptoms. Hood (*14*) stated that in Florida there had been a marked diminution in the intensity of infection during the 10 years previous, and noted that in western Florida only 7.7 percent of infected children had moderate to heavy infections. Hosty and co-workers (*15*) stated that in Alabama the typical clinical case is rarely seen.

Table 3. Incidence of hookworm infection in 9 southeastern States as revealed by examinations by State health department laboratories

State	Period	Number of examinations	Number positive	Percent positive
Alabama	1953–54	83, 901	9, 936	11. 8
Florida	---do----	163, 479	30, 844	18. 9
Georgia	---do----	170, 856	29, 231	17. 1
Kentucky	---do----	5, 756	217	3. 8
Louisiana	---do----	128, 343	5, 106	4. 0
Mississippi	1951–54	85, 362	5, 406	6. 3
North Carolina	1953–54	36, 480	4, 665	12. 8
South Carolina	1951–54	25, 239	2, 022	8. 0
Tennessee	1950–54	23, 529	460	2. 0

Creeping Eruption

Creeping eruption is an annoying but not a serious condition caused by the migration, through the skin, of infective larvae of the dog and cat hookworm, *Ancylostoma braziliense*. It occasionally comes to maturity in man in certain parts of the tropics. The condition is associated with papular formation and tortuous or serpiginous, subepithelial burrows with later vesiculation. The larvae may continue to migrate for weeks or months. Infection is contracted when parts of the body come in contact with infested soil.

Since creeping eruption is not a reportable disease, the frequency of its occurrence is not known. However, physicians along the south Atlantic and gulf coasts are called upon to treat many cases annually. In 1949 Donaldson, Steele, and Scatterday (*16*) sent questionnaires to 1,100 Florida physicians, of whom approximately 50 percent replied. These physicians had seen, within a 6-month period, more than 8,000 cases of the disease. These authors conducted surveys of hookworm infection in dogs and cats in Florida; of 495 dogs examined 44.2 percent were infected with *A. braziliense*. Seven of 26 cats were positive. Of the 495 dogs, 86.1 percent carried one or both hookworm species, *A. braziliense* and *Ancylostoma caninum*. The larvae of the latter species may also be involved in the causation of creeping eruption. The opportunities for exposure to dog and cat hookworm larvae would seem to be exceptionally good, particularly along the Atlantic and gulf beaches.

Amebiasis

In 1950, Wright reported on the public health status of amebiasis in the United States and pointed out the factors which account for a considerable variability in reporting (*17*). Because of these factors, there is some question whether morbidity reports accurately reflect the occurrence of the disease. At that time it was pointed out that amebiasis was more prevalent in the West South Central States, Arkansas, Louisiana, Oklahoma, and Texas, than in any other part of the United States. There was also evidence that the disease was more widespread in the southern States as a

Table 4. Comparison of recent and prior data on the incidence of hookworm infection by percentage found positive in 8 southeastern States

State	1910–14 [1]	1930–38 [2]	1950–54 [3]
Alabama	41. 0	17. 7	11. 8
Florida	61. 8	34. 8	18. 9
Georgia	65. 2	31. 6	17. 1
Kentucky	37. 4	8. 5	3. 8
Mississippi	53. 0	19. 6	6. 3
North Carolina	36. 6	12. 3	12. 8
South Carolina	37. 3	24. 8	8. 0
Tennessee	25. 4	6. 8	2. 0

[1] Rockefeller Sanitary Commission surveys. [2] Reference 2. [3] State health department laboratories. For exact dates of survey, see table 3.

Table 5. Reports of cases of amebiasis in 10 southeastern States for various years

State	Number of cases					
	1933	1940	1950	1951	1952	1953
Alabama	8	6	45	31	18	46
Florida	33	37	113	88	161	177
Georgia	70	99	37	15	18	21
Kentucky	0	10	33	0	7	0
Louisiana	41	43	339	155	124	85
Mississippi	892	1,797	121	177	92	81
North Carolina	N. N.	N. N.	132	96	44	31
South Carolina	1	6	6	0	4	4
Tennessee	11	23	102	90	144	60
Virginia	14	11	10	4	8	20
Total	1,070	2,032	938	656	620	525

N. N.=Not notifiable.

Table 6. Surveys for Entamoeba histolytica in various population groups in certain southeastern States prior to 1945

Survey group	Number examined	Number positive	Percent positive	Date	Locality	Author
Inpatients and outpatients						
Private patients	1,003	55	5.5	1933	Atlanta, Ga	Dougherty.
Clinic patients	1,100	158	14.4	1934	New Orleans, La	Faust.
Do	4,270	355	8.3	1936	do	Faust and Headlee.
Outpatients	2,265	77	3.4	1939	do	Moss.
Patients with colonic symptoms.	236	68	28.8	1943	do	D'Antoni.
Total	8,874	713	8.0			
General population						
Rural population	460	92	20.0	1930	Virginia	Faust.
Do	4,987	861	17.3	1930	Tennessee	Meleney.
Do	374	136	36.4	1931	do	Milan and Meleney.
General population	20,237	2,305	10.1	1932	do	Meleney et al.
Students	729	38	5.2	1936	Athens, Ga	Byrd.
Persons on relief	537	33	6.1			
Rural population	322	66	20.5	1936	Georgia	Seckinger.
Students	291	9	3.1	1938	New Orleans, La	Swartzwelder.
Airline personnel and others	566	42	7.4	1939	Jacksonville, Fla	Borland.
Accident autopsies	202	13	6.4	1941	New Orleans, La	Faust.
Students	181	15	8.3	1942	do	Do.
Do	2,393	119	5.0	1942	Berea, Ky	Headlee and Cable.
Total	31,279	3,729	11.9			
Institutions						
Orphanage	119	66	55.5	1931	New Orleans, La	Faust.
Mental hospital	70	28	40.0	1941	Milledgeville, Ga	Reardon.
Do	142	5	3.5	1941	Columbia, S. C	Young and Ham.
Industrial school	188	8	4.3	1942	Jacksonville, Fla	Summers.
Newly admitted mental patients.	637	11	1.7	1943	Columbia, S. C	Burrows.
Mental patients	1,418	116	8.2	1943	Columbia, S. C	Burrows.
Total	2,574	234	9.1			
Grand total	42,727	4,676	10.9			

whole than in any other section, with the possible exception of the Pacific Coast States.

The number of cases reported in certain southeastern States for various years since 1933 when the occurrence of the disease was first recorded by the Public Health Service is presented in table 5. If these figures could be relied upon at all, they would indicate a gradual reduction of cases in this part of the country. The erratic figures from Mississippi are accounted for by a change in reporting methods in 1947; reports prior to that time were probably inaccurate.

The results of stool surveys for *Entamoeba histolytica* in various population groups in the southeastern States prior to 1945 (table 6), may be compared with the findings of such surveys carried out since 1945 (table 7). Table 8 summarizes the data in tables 6 and 7. The overall incidence of the parasite prior to 1945 was 10.9 percent and that from 1945 to 1954 was 10.5 percent. Thus, insofar as stool examinations are concerned, there is no indication of any marked decline in the incidence of the infection in the population of the southeastern States within the past 10 years. These data are certainly not in conformity with the morbidity reports. Several explanations might be offered to account for this discrepancy, but since no factual data are available to support any one of them, they would constitute mere speculations.

Restudy of Intestinal Parasites

Because of the numerous variables which are recognized as influencing certain comparisons in this presentation, it is of interest to review the data presented by Jones, Smith, and Eyles (*18*) concerning a restudy of intestinal parasitic infections in a Tennessee community 21 years after a previous survey. Jones was responsible for the technical work in the recent investigation and was also largely responsible for the examinations in the 1930 survey (*19*). The samplings included many of the same people who were sampled in the former survey. Comparative findings of the principal parasites in the two periods are summarized in table 9. The figures indicate a substantial reduction in

Table 7. Recent surveys for Entamoeba histolytica in various population groups in certain southeastern States

Survey group	Number examined	Number positive	Percent positive	Date	Locality	Author
Inpatients and outpatients						
Inpatients and outpatients	246	42	17. 1	1948	Memphis, Tenn	Anderson et al.
Inpatients	2, 522	321	12. 7	1950	Winston-Salem, N. C	Mackie et al.
Veterans	878	277	31. 5			
Outpatients	926	54	5. 8	1952	Atlanta, Ga	Goldman and Johnson.
Veterans	400	37	9. 3	1954	Chamblee, Ga	Brooke et al.
Total	4, 972	731	14. 7			
General Population						
Food handlers	58	4	6. 9	1948	Chapel Hill, N. C	Larsh et al.
Rural population	2, 657	278	10. 5	1953	Fayette County, Tenn	Eyles et al.
Do	935	100	10. 7	1953	Yazoo Delta, Miss	Jones et al.
Do	322	72	22. 4	1954	New Hope, Tenn	Do.
Urban population	733	26	3. 5	1954	Memphis, Tenn	Eyles and Jones.
Mental hospital employees	191	4	2. 1	1954	Milledgeville, Ga	Jeffery.
School children	1, 440	68	4. 7	1955	Cumberland County, Tenn.	Young.
Total	6, 336	552	8. 7			
Institution						
Mental hospital	1, 408	58	4. 1	1954	Milledgeville, Ga	Jeffery.
Grand total	12, 716	1, 341	10. 5			

Table 8. Summary of surveys for Entamoeba histolytica in various population groups in certain southeastern States prior to 1945 and for 1945–54

Nature of group	Prior to 1945			1945–54		
	Number examined	Number positive	Percent positive	Number examined	Number positive	Percent positive
Inpatients and outpatients	8, 874	713	8. 0	4, 972	731	14. 7
General population (nonpatient status)	31, 279	3, 729	11. 9	6, 336	552	8. 7
Institutionalized individuals	2, 574	234	9. 1	1, 408	58	4. 1
Total	42, 727	4, 676	10. 9	12, 716	1, 341	10. 5

parasite incidence over the 21 years. The difference in prevalence appeared to be due primarily to a lower current incidence in the adult population. No special efforts were made during the period represented to reduce the parasite burden of the community, and improvements must be regarded as accruing from economic and general sanitation advances.

Trichinosis

A number of surveys involving the examination of the diaphragm for *T. spiralis* among persons coming to necropsy in the southeastern States have been conducted by various individuals. The total number of diaphragms examined were 2,233, of which 323, or 14.5 percent, were positive for the parasite (table 10). This incidence figure is only slightly lower than that encountered by Wright, Kerr, and Jacobs (*20*) in 1943 in the examination of 5,313 diaphragms from 37 States and the District of Columbia, of which 855, or 16.1 percent, were positive.

Table 9. Results of parasite surveys in a western Tennessee community 1930 and 1951

Parasite	1930 survey;[1] percent positive of 357 examined	1951 survey;[2] percent positive of 322 examined
Ascaris lumbricoides	32. 8	9. 6
Trichuris trichiura	10. 6	0. 9
Necator americanus	5. 9	1. 9
Entamoeba histolytica	38. 1	22. 4

[1] Reference 19. [2] Reference 18.

The number of reported clinical cases of trichinosis in the region is not impressive, as indicated in table 11, and is certainly not correlated with the infection rate as revealed by the diaphragm surveys. In fact, the southeastern States rank well below many other parts of the United States in the number of reported clinical cases of the disease. This may be due to failure of diagnosis or failure to report some cases but is probably more closely related to food habits and a lower incidence of the parasite in southern swine (*21*). At any rate, if we are to judge correctly from the available data, trichinosis would not seem to constitute an important health problem in the southeastern States.

Toxoplasmosis

Toxoplasmosis is still an obscure disease, and little is known concerning its prevalence or mode of transmission. Clinical cases have occurred in the southeastern States, but since the disease is not a notifiable one, there is no record concerning the number of such cases. The only available data which throw light on the occurrence of infection in this part of the country are those derived from the application of the Sabin-Feldman dye test. Feldman (*22*) tested 270 individuals from New Orleans, La., of whom 84, or 31.1 percent, showed a positive reaction in a titer of 1 : 16 or greater. Gibson and associates conducted dye tests on 987 individuals from the rural Negro population of Fayette County, Tenn., of whom, he wrote in a personal communication, 27.5 percent were positive. Exclusion of positive serums with titers of 1 : 4 or

Table 10. Incidence of Trichinella spiralis infections in the population of 10 southeastern States as indicated by findings on diaphragm examinations

State	Number diaphragms examined	Number positive	Percent positive
Alabama	434	148	34. 1
Florida	15	2	
Georgia	33	2	
Kentucky	570	89	15. 6
Louisiana	600	31	5. 2
Mississippi	60	4	6. 7
North Carolina	123	6	4. 9
South Carolina	15	1	
Tennessee	250	29	11. 6
Virginia	133	11	8. 3
Total	2, 233	323	14. 5

below reduced the overall incidence by about 8 percent. In a personal communication, Jacobs wrote that he conducted tests on 207 individuals from Norfolk, Va., and found 42 percent positive with a titer of 1 : 16 or more.

If dye test results are indicative of past or present infection with *Toxoplasma gondii*, and the tests are believed to have considerable validity in this respect, the limited data would indicate that toxoplasmic infection is far from uncommon in the southeast. In addition to congenital toxoplasmosis and acquired postnatal disseminated clinical infections, the role of the organism in the production of chorioretinitis and uveitis (*23*) indicates that toxoplasmosis may well prove to be a disease of considerable public health importance.

Table 11. Clinical cases of trichinosis reported from 10 southeastern States in various years

State	Total cases to Jan. 1, 1949	1949	1950	1951	1952	1953	Total
Alabama [1]	2	0	0	0	0	0	2
Florida	46	0	0	1	0	0	47
Georgia	45	0	0	0	4	0	49
Kentucky	10	0	0	0	0	0	10
Louisiana [1]	19	0	0	1	2	1	23
Mississippi	20	0	0	0	0	0	20
North Carolina	4	0	0	0	1	2	7
South Carolina	5	0	0	0	0	4	9
Tennessee	31	0	1	1	2	2	37
Virginia [1]	30	0	0	0	1	0	31
Total	212	0	1	3	10	9	235

[1] Not notifiable.

Table 12. Malaria morbidity reported and cases appraised in the United States, 1948–53

Year	Reported morbidity [1]		Cases appraised [2]			
	Number cases	Rate per 100,000	Number	Confirmed [3]	Confirmed primary indigenous	Presumptive primary [4] indigenous
1948	9, 797	6. 7	770	242		
1949	4, 231	2. 8	514	60	17	46
1950	2, 227	1. 5	713	30	6	39
1951	5, 600	3. 7	[5] 1, 874	1, 272	14	5
1952	7, 023	4. 5	[5] 3, 098	2, 707	34	16
1953	1, 310	0. 8	[5] 449	217	30	3
1954	[6] 706		124	95	8	1

[1] National Office of Vital Statistics, Public Health Service. [2] Appraised by the Communicable Disease Center, State, or local epidemiologists. Positives all confirmed by blood smear for 1948. [3] Clinically and epidemiologically consistent with malaria, confirmed by positive blood smear. [4] Clinically and epidemiologically consistent with malaria, not confirmed by positive blood smear. [5] Case records on file at the Communicable Disease Center. Many cases of foreign origin investigated by State epidemiologists are not included. [6] Provisional data through Dec. 18, 1954.

Malaria

The rapid decline and the virtual extinction of malaria in the United States should stand as a fitting monument for all time to those who participated in the campaign, and to all who were engaged in the research and development which contributed to its success.

Great strides were made toward control of the disease during the war years through the Office of Malaria Control in War Areas. The national malaria eradication program was activated on July 1, 1947 (*24*) as a cooperative effort on the part of the States and the Public Health Service. As the campaign gained momentum substantial reductions were made in the number of reported cases, a trend which was interrupted only during 1951 and 1952 following the return from Korea of military personnel infected with *Plasmodium vivax* (table 12). When this threat was removed, the number of cases continued to drop, so that by 1954 there were only 8 confirmed primary indigenous cases and 1 presumptive primary indigenous case in the entire country.

The southeastern States, formerly the hotbed of malaria, are now practically free of the disease. Thus there has been conquered, probably for all time, the most serious of the parasitic diseases which have plagued this part of the country since the earliest of colonial days.

Conclusions

The data presented certainly warrant the general conclusion that remarkable declines have been registered in the incidence and intensity of certain parasitic infections in the southeastern United States. In most areas, intestinal helminths are much less prevalent than they were two decades ago. On the other hand, there appears to have been no marked reduction in the incidence of *Entamoeba histolytica*, although the number of reported cases of amebiasis seems to be on the decline. Trichinosis does not appear to be important in this area. The virtual eradication of malaria has eliminated one of the most serious health problems of the southeast. Zoonotic larval ascariasis and creeping eruption, conditions which are due to larval forms of certain dog and cat parasites, are still prevalent in the area; the former will probably be recognized with increasing frequency. Nematode endophthalmitis and toxoplasmosis are known to occur and may also prove to be of increasing importance.

While improvements are obvious, the situation does not warrant complacency. Health is a relative state. A heavy parasite burden is no doubt deleterious, but we cannot be equally certain that a few parasites are entirely innocuous. There are probably many implications of parasitism of which we are not aware. There is increasing evidence, for instance, that certain parasites may be the means of transporting other disease agents. The classic discovery of Shope (*25*) that the swine lung worms, *Metastrongylus apri* and *Metastrongylus pudendotectus*, carry the virus of swine influenza; the findings of Syverton, McCoy, and Koomen (*26*) that the larvae of *Trichinella spiralis* are capable of transporting the virus of lymphocytic choriomeningitis; and the recent disclosure by Mochizuki, Tomimura, and Oka (*27*) that *Toxocara canis* larvae can open the blood-brain barrier and pave the way for the localization of the virus of Japanese B encephalitis should make us hesitate to deprecate too quickly the health hazards of even a modest parasitic invasion of the human body. As Hardy (*28*) has so aptly stated, "Optimum health, not the mere absence of obvious illness, is the objective of public health and obstacles to the attainment of this goal must be removed. The individual has a right to be free of parasites. . . ."

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