Those who receive the mantle of a rich and noble heritage are expected to perpetuate it.
For those who wear such a mantle and give it no sustenance it becomes but an empty echo out of the past. - WLS
The PROCEEDINGS of the

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EDITORIAL

This little journal had a difficult and long drawn-out birth, and all was not as it might had been. Now that it has been born, its feeble postnatal struggle, at last, seems destined for a brighter future. The tolerant, patient and understanding support of Dr. G. Lombard Kelly has aided it materially in giving it the transfusion it so badly needed. This transfusion was furnished by reorganization. This reorganization was necessary since it was found that there was a tremendous amount of time required to get the journal out—more time than one individual could afford to give. Now the editor and associate editors will each be responsible, to a considerable degree, for a particular issue. In this way the burden is equally divided and the contributed interest more diversified.

Miss Mary P. Hallinan was appointed Managing Editor and will, no doubt, be the most important individual in coordinating and assembl-
The material for the journal. Since finances are vital to all today, Mr. Thomas N. Dwyer, Comptroller, will be an invaluable aid to the economic life of the PROCEEDINGS. The other additions to the Editorial Staff are Dr. Harry B. O'Rear, Professor of Pediatrics, and Mr. Orville A. Parkes, Professor of Medical Illustration.

Mailing lists of Alumni have been woefully inadequate. Large numbers of the journal failed to reach those to whom they were addressed. It is hoped that with the partial publication of the alumni lists in each issue that errors and omissions will be corrected and eventually we may be enabled to publish a separate issue devoted solely to an alumni directory with the type of practice.

We need news of the Alumni, abstracts of papers they have written, marriages, births, deaths, honors or offices in clubs and societies. In order to obtain this news more easily it has been suggested that selected members of the Alumni in scattered regions be appointed reporters for all the happenings in those areas. Another suggestion has been that some members of each class keep up with all other members and inform the journal as to their activities. We would appreciate your reactions to these suggestions.

The main articles in this issue of the PROCEEDINGS are the theses of Jack Birge, Department of Medical Microbiology, and Robert Benassi, Department of Medical Illustration, which were submitted as partial satisfaction of requirements for their Master’s degree. These degrees, awarded in 1951, were the first non-medical graduate degrees given by the Medical College since it has become an integral part of the graduate program of the University System.
THE INVESTIGATION OF NEUROGENIC HYPERTENSION

by Robert C. Benassi

The reason for attempting to produce neurogenic hypertension is this: approximately 28% of the patients with hypertension have no renal involvement, and in these cases the disease may be neurogenic in origin. We have attempted to produce neurogenic hypertension in dogs by sectioning the cardiac depressor fibers from the carotid sinus and aortic arch; then after we have a true neurogenic hypertension, find a way to cure it.

An experimental study of neurogenic hypertension must be fully grounded in a knowledge of the anatomy of the nerves to and from the heart and great vessels. In the past much work has been done by various investigators, the most recent having been done by Drs. D. T. Barry and J. F. Nonídez.

The observations of Dr. Barry are shown in Figure 1, with Figure 2 being the key. Dr. Barry observed scattered cardiac branches arising from the vagosympathetic and stellate ganglia (2 and 3, Figure 1) from the recurrent laryngeal and ansa subclavia nerves (4 and 12), which are distributed to the innominate artery. Lims nerve (8) found in three out of five dogs, goes to the left auricle and ventricle. The upper cardiac nerves (5) arise as two large branches on the left and one on the right. They come near the vagosympathetic ganglion and may be continued in the same sheath, for a varying distance, with the recurrent laryngeal nerve. They usually separate at the level of the convexity of the aortic arch and dip under the innominate artery towards the trachea and auricles. These communicate freely with the corresponding nerves from the other side in a plexus behind the pulmonary artery. The nerves on the right side pass behind the superior vena cava.

The lower cardiac nerves (6) come directly off of the vagus at about the level of the root of the lung. Several communicating branches from the right side of the plexus give off twigs and branches. Dr. Barry could not always find the communicating branch between Perman’s nerve (7) and the posterior pulmonary plexuses (9). There is an intervagal bridge (10) between the right and left vagi, which appears to be constant in the dog. A small filament from this bridge (11) was noted. This nerve branch was stimulated and negative results were received.
Key

1. Left Vagus
2. Vagus sympathetic Ganglion
3. Stellate Ganglion
4. Recurrent Laryngeal Nerves
5. Upper Cardiac Nerves
6. Lower Cardiac Nerves
7. Perman Nerve (Right Auricle)
8. Lems Nerve (Left Auricle)
9. Communications to Pulmonary Plexus
10. Connecting Intervertebral Bridge
    Branch from Bridge Destination Unknown
11. Anterior and Posterior Ansae Subclavia
    Right and Left

Figure 1

Figure 2

Key

1. Vagus
2. Cervical Sympathetic Chain
3. Bundle of Aortic Depressor Fibers
4. Middle Cervical Ganglion
5. Dorsal and Ventral Limbs of Ansae Subclavia
6. Stereate Ganglion
7. Inferior Cardiosympathetic Nerves
8. Thoracic Cardiosympathetic Branches
9. Middle Cardiosympathetic (accelerator) Nerves
10. Small Ganglion at Junction of inferior and
    Middle Cardiosympathetic Nerves
11. Left Recurrent Nerve
12. Anastomosis of the Vagus with the Middle
    Cardiosympathetic Nerve
13. Cardiac Branch of the Recurrent
14. Cardiac Vagal Nerve
15. Anastomosis of the Middle Cervical Ganglion
    with the Cardiac Vagal Nerve
16. Superior Cardiosympathetic Nerve
17. Branches Containing Pressoreceptors for Aorta
    and Pulmonary Artery
18. Epithelial Bodies
19. Cardiac Branch to Right Vagus
20. Right Anterior and Posterior Longitudinal Plexus
21. Left Anterior and Posterior Longitudinal Plexus

Figure 3

Figure 4
Stimulation of the thoracic vagus (1) almost invariably gave rise to cardiac inhibition, similar to that obtained when the cervical vagus was stimulated. Usually one accelerator nerve was found in each small group of cardiac nerves, and in some strands of fibers excitation set up a conflict of acceleration and inhibition. They are separate afferent nerve bundles from the auricles, but no definite anatomical details can be given.

Dr. Barry summarized his findings by saying that the cardio-inhibitor branches of the vagus nerve in the dog are easily separable into upper and lower groups, the former coming off from the vago-sympathetic ganglion or a little above it, and the latter from a point a little above and below the recurrent laryngeal nerve. This is better seen on the left side. Cardiac inhibitor filaments can sometimes be demonstrated in the branches of the vagus to the pulmonary plexuses on both sides. Accelerator effects may also be produced by stimulation of fibers which pass through these plexuses.

The work done in 1939 by Dr. Nonidez is illustrated in Figure 3, with Figure 4 the key. There are no important cardiac branches coming off of the ansa subclavia (5). However, different afferent fibers may run through the ansa subclavia. The superior cardio-sympathetic nerve (16) originates from the middle cervical ganglion on the left side, and is distributed to the aorta as pressoreceptor fibers (17) and over the innominate and left subclavian, forming a plexus.

The middle cardiosympathetic (accelerator) nerve (9) is the largest nerve coming off of the middle cervical ganglion (4). It passes over the ventral (anterior) surface of the aortic arch and receives branches from the vagus (12). At the base of the left ventricle some branches of the middle cardiosympathetic nerve join the coronary arteries, and on the posterior lateral surface of the left ventricle it forms the posterior longitudinal plexus (21). This nerve contains fibers that stain as afferents. The right accelerator nerve of the dog also arises from the middle cervical ganglion but is soon joined by the cardiac branch of the right vagus (19), which carries afferent fibers ending at the base of the right subclavia. It continues down, passing behind the aortic arch and between the ascending aorta and pulmonary trunk, forming a ganglionicated plexus behind the aorta. It continues down, forming the left anterior and posterior longitudinal plexuses.

The inferior cardiosympathetic nerve (7) is inconstant but important when present, as it conveys many afferent fibers to the
accelerator nerve at the junction of the inferior and middle cardio-
sympathetic nerves. There is a small ganglion (10) here. The location
of this nerve (7) varies but is usually high. Experiments have shown
that the cardiosympathetic nerves (8) convey accelerator and afferent
fibers to the heart.

The left cardio vagal nerve (14) runs straight to the arch of the
aorta from the vagus at the level of the middle cervical ganglion,
and several sympathetic fibers from the ganglion (15) join this
nerve. The nerve ends in small epithelioid bodies (18) and plexuses
(17) on the aortic arch and pulmonary artery. Its right component
is the accelerator nerve (9).

The recurrent nerve (11) usually gives off one or more small
cardiac branches (13). Cardiac branches from the right recurrent
nerve may join the pretrachial plexus. Occasionally an aortic (de-
pressor) fiber is found very low. It is known as Perman's nerve.

**WORK IN THE LABORATORY**

From observations of several dogs we have noted numerous variat-
ions in the anatomy of the nerves of the dog's heart. Figure 5 is the
key to Figures 6, 7, 8, 9, and 10, which show the variations we
observed. These illustrations show the left vagal nerve and its
branches that came off in the area around the heart. Figure 6 shows
the upper cardiac nerve coming off the vagus below the vagosympa-
thetic ganglion. The upper cardiac nerve comes down and forms a small
plexus over the base of the pulmonary artery. The recurrent laryngeal
nerve also gives a twig off to the pulmonary artery. The lower cardiac
nerve comes off of the vagus with the recurrent laryngeal and goes
down between the pulmonary artery and the aortic arch. Two small
branches are given off of the vagus below the recurrent laryngeal,
one going to the aorta and the other to the base of the pulmonary artery.
The upper and lower cardiac nerves are sectioned and a cannula placed
around the aorta. This dog recovered from the operation and had a
good hypertension, but died from a tear in his aorta, caused by a
rough cannula.

Figure 7 shows the upper cardiac nerve coming off below the
vagosympathetic ganglion. It gives off branches to the aortic arch and
then continues down, ending in a plexus on the base of the pulmonary
artery. It was found to be an efferent inhibitory nerve. A small nerve
comes off of the vagus below the upper cardiac nerves, giving off

6
branches to the aortic arch. The recurrent laryngeal nerve comes off of the vagus and passes under the aortic arch and above the pulmonary artery. The lower cardiac nerves were not observed. They may have come off of the vagus after it disappeared behind the aortic arch, or come off of the recurrent laryngeal nerve farther down. However, two small branches come off of the vagus just before it goes behind the aortic arch. These branches disappear on the aortic arch. The upper cardiac (efferent inhibitory) nerve was cut and this dog developed a temporary hypertension with increased resistance.

Figure 8 shows a branch coming off of the vagus below the vagosympathetic ganglion, giving a small plexus off to the arch of the aorta, then continuing down forming a plexus over the base of the pulmonary artery. The second branch, upper cardiac, comes off of the vagus just below the first branch, disappearing into several fine twigs over the arch of the aorta. Then the recurrent laryngeal comes off of the vagus and passes between the aortic and pulmonary artery. Three small branches come off of the vagus and disappear on the arch of the aorta, just before the vagus goes behind the pulmonary artery and the heart. All of the cardiac branches were cut and the aorta was painted with phenol just above the pulmonary artery so that we could be certain that all the nerves in that area were no longer functioning. This dog produced only temporary hypertension.

Figure 9 shows the upper cardiac nerve coming off of the vagosympathetic ganglion. This branch is an afferent excitatory nerve. It divides into several branches ending on the arch of the aorta. The second upper cardiac nerve comes off of the vagus well below the vagosympathetic ganglion. It gives off twigs to the aorta then ends in a plexus over the base of the pulmonary artery. This nerve proved to be afferent inhibitory. The recurrent laryngeal nerve comes off of the vagus and goes between the aortic arch and the pulmonary artery, and the vagus continues down, going behind the pulmonary artery and heart. Both upper cardiac nerves were cut.

Figure 10 shows the first upper cardiac branch coming off of the vagosympathetic ganglion and going behind the arch of the aorta, dividing into several branches and disappearing on the aorta. The second group of cardiac comes off well below the vagosympathetic ganglion, passing down in front of the aorta, giving off several small twigs, then continuing down and forming a plexus over the pulmonary artery. The recurrent laryngeal nerve comes off of the vagus and goes between the pulmonary artery and the arch of the aorta. The vagus
nerve continues down behind the pulmonary artery and the heart. Both upper cardiac nerves were cut.

The operation for the production of neurogenic hypertension which was described by R. W. Pickering and R. G. Ellison, is divided into three stages. The first stage consists of the bilateral removal of both carotid sinuses, about one centimeter above and one centimeter below

Key
VS - Vagosympathetic ganglia
S - Stellate ganglia
UC - Upper cardiac nerves
RL - Recurrent laryngeal
V - Vagus
AE - Afferent excitatory
AI - Afferent inhibitory
EI - Efferent inhibitory
Ø-OH - Phenol
LC - Lower cardiac nerves
the carotid bifurcation. Figure 11 shows the anatomy of the carotid bifurcation. The second stage is done about 30 days after the first stage. In this operation the cardiac fibers are sectioned in the thorax. It is felt that if the vagal fibres to the heart are sectioned in the chest that perhaps a more controlled response can be obtained because the cardiac vagal fibers can be sectioned without damage to the other vagal fibers. The thorax is opened through the fourth interspace, and artificial respiration is instituted. The arch of the aorta is exposed, the pleura dissected from it, and the left recurrent laryngeal nerve traced to its junction with the vagus. Care is taken not to damage the recurrent laryngeal nerve during this manipulation. After the identification of the recurrent, vagus, and phrenic nerves, the pleura between the vagus and the phrenic nerves is divided for a variable distance and sectioned, as shown in Figure 12. This division of the pleura sections the cardiac vagal fibers, a few of which could not be identified. The nerves chosen for sectioning are identified and cut. The aorta is then mobilized to facilitate the placement of the cannula. The silver band is bent around aorta, with the smooth side toward the heart, just below the ligamentum arteriosum, as shown in Figure 13. This is the best position, as there is no danger of severing the intercostal vessels. The telescoping tube is brought through the fourth interspace, and the ribs are closed with two or three paracostal sutures. The muscle layers are closed as shown in Figure 14. The head of the cannula is brought through a stab wound in the latissimus dorsi muscle. The skin layer is then sutured, leaving the metal plate
of the cannula between the skin and the latissimus dorsi muscle. Pressure recordings are then easily obtained by means of a Hamilton manometer. The need for a device which can be used in taking
central aortic pressures in unanesthetized dogs over long periods of time led to the design of a new type cannula, as shown in Figure 15.

The cannula is constructed of silver. The aortic end consists of a band 12 mm. wide, which completely encircles the aorta and can easily be bent around the aorta with the fingers. A telescoping tube is silver soldered to the band at one end and to a circular plate 12mm. in diameter at the other end. When a pressure recording is to be taken, the skin over the cannula is prepared by any convenient antiseptic procedure, and a local anesthetic infiltrated around the silver disc. An eighteen gauge spinal needle is passed through the skin into the 2mm. hole through the telescoping tube. The aorta can easily be felt with the needle which is passed into the lumen of the vessel. The stylet is removed, and the manometer system is connected to the needle, as illustrated in Figure 16. This method has the following advantages:

1.—Central pressures and pulse contours can be obtained and the cardiac output and resistance calculated.

2.—The animal lies in a comfortable position, minimizing its movements.

3.—Puncture of the aorta can be made easily.
4. Using a large needle enables the investigator to remove any clots easily.

The advantage of having a telescopic tube is that with it a number of different length tubes are not needed to conform with various sizes of the animals, and telescoping with respiration lessens the trauma to the aorta. At an autopsy it was found that the cannula was well encased in a fibrous envelope which would not permit bleeding into the chest from multiple aortic punctures.

This cannula was primarily designed for the purpose of recording neurogenic hypertension in unanesthetized dogs. Figure 17 is an example of the type recordings that were taken. The usual method of producing neurogenic hypertension in dogs is to denervate the carotid sinus by either stripping the nervous tissue, and painting the area with phenol, or resecting the carotid bifurcation and sectioning of the moderator nerves in the neck, thereby eliminating the carotid and aortic receptor fibers.

<table>
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<td>40</td>
<td>67</td>
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<td>62</td>
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</table>

**Figure 18**
The procedure so far has described the severing of the afferent connections from three of the pressure sensitive zones: the right, the left carotid sinus, and the left vagus endings on the aortic arch. The blood pressure is now regulated solely by the impulses sent up from the aortic arch over the right vagus. If the other operations have been complete, the cutting of this nerve should release the blood pressure from the depressor control. The operation was completed on seven dogs. One had no hypertension, two had temporary hypertension, lasting about twenty days, and four had lasting hypertension of varying degree. (See table, Figure 18).

The results of the investigations carried out in our laboratories are shown in the table, Figure 18, and an example of the graphic representation is shown in Figure 19.

SUMMARY

1.—A brief description of previous work on the anatomy of the thoracic vagus has been given, as well as illustrated.

2.—The variations of the anatomy of the dogs operated on in this laboratory have been presented; the nerves sectioned were described, illustrated and the resulting effect given.

3.—A three stage operation for the production of neurogenic hypertension has been described.

4.—A cannula that can be used to obtain pressor recordings in dogs has been described. This cannula has the following advantages:
   a. Central pulse contours can be obtained repeatedly in unanesthetized dogs.
   b. Puncture in artery is easily made.
   c. Animals lie in comfortable position, minimizing movements.
   d. Clots can be removed easily.

5.—Preliminary results obtained with the use of the cannula in neurogenic hypertension have been presented.

BIBLIOGRAPHY

A STUDY OF PARASITISM IN A GROUP OF MENTALLY DEFICIENT CHILDREN AT THE GEORGIA TRAINING SCHOOL GRACEWOOD, GEORGIA

by Jack Edwin Birge

Introduction

Following an outbreak of intestinal disturbances in the occupants of one of the dormitories at the Georgia Training School at Gracewood, Georgia, Dr. J. Fred Denton, at the request of the superintendent, examined this group for intestinal parasites. His findings revealed an unusually high incidence of parasitism, both as to variety of parasites and number of individuals infected, suggesting that parasitic infections were, at least in part, responsible for the poor physical condition of most of the occupants of this dormitory. Since the medical staff of the Gracewood school was anxious to improve the situation in this dormitory, this group was selected for further study with the idea of determining the important sources of infection, checking the results of treating individuals for specific infections and possibly discovering other ways by which the parasite problem could be alleviated.

1.—This study was made under the direction of Dr. J. Fred Denton of the Medical College of Georgia, Augusta, Ga., to whom the writer is grateful for many helpful suggestions, guidance, and for the use of data acquired during his survey of the study group. Appreciation is also extended to Dr. J. T. Wright, former Superintendent of the Georgia Training School, to Dr. N. B. Pursley, present Superintendent, and to the other members of the medical staff and attendants who so generously cooperated in making this study possible.

MATERIALS AND METHODS

Four surveys for the detection of intestinal parasites were made on the entire study group. The first was that of Denton made in August of 1950. Fresh saline and iodine smear techniques were used in examining the stools (see appendix). The results were compiled and submitted to the superintendent of the school who administered certain treatments that he felt were indicated (Table II).

The second survey was made in November of 1950. Stools were examined in the same manner as in survey one. The treatment used following survey one was again administered, plus hetrazan and terramycin suggested by Dr. V. P. Sydenstricker.
Survey three consisted of stool examinations employing the zinc sulfate concentration technique (see appendix). It was conducted in March 1951.

The fourth survey, made in April, 1951, was not a general parasitic survey, as were the previous three, but a study of the incidence of Enterobius vermicularis using the scotch tape method of examination (see appendix).

Stools for examination were collected by the attendants at the school in one of the following three types of containers: (1) small screw-capped bottles containing a preservative supplied by the State Department of Health (these specimens were not suitable for cultivation), (2) metal salve boxes two inches in diameter, and (3) half-pint cardboard ice cream cartons. After collection they were sent to the Microbiology Laboratory where they were examined within twenty-four hours after arrival. Stools were examined at the rate of approximately five per day.

In addition to the four surveys when the entire group was examined, many rechecks of stools from treated individuals were made in order to determine the efficacy of the drugs.

During the third survey, a portion of each positive stool was preserved in small screw-capped glass bottles containing five per cent formalin to serve as permanent records. In a few cases with protozoan infections iron hematoxylin smears were made (see appendix). Cultivation was employed as an additional check on identification in cases of suspected Endameba histolytica infection (see appendix.)

Drugs, with the dosages used, administered to the whole group or to selected individuals by the medical staff of the Gracewood school during the course of this study were as follows:

Ferric Ammonium Citrate: 1 gm. tid after meals od #14 days
Hexylresorcinol: .8 gm. (crystoids)
Milibis\(^2\): 1½ gm. tid od #7 days (caps)
Hetrazan\(^3\): 3-5 mgm/kgm. tid od #10 days (tabs)
Terramycin: 1 gm. od #11 days (cap. and elix. form)

2.—Bismuth Glycolylarsanilate by Winthrop-Stearns, Inc.
3.—Diethylcarbamazine by Lederle Laboratories.
The results of the administration of these drugs are discussed below.

Epidemiological investigations of the dormitory to attempt to discover the main sources of infection and the possibility of their eradication seemed desirable. However, on February 5, 1951, just when plans had been perfected for this investigation, the building burned.

**THE STUDY GROUP**

The group on which this study was made consisted of children, all males, ranging in age from 8 to 23. All were classified as imbeciles, the lowest group at the school, with the exception of a few morons assigned to the building as workers. Because of their low mentality, these children were unable to care for themselves in any way. They had to be fed, dressed, and bathed by the attendants. Periodical visits to the bathrooms during both night and day were practiced in an attempt to take care of their elimination habits. However, unscheduled eliminations were frequent requiring extra bathing and clothes changing. There were few, if any, individual sanitary habits. The responsibility of maintaining some degree of sanitation rested entirely upon the attendants. Never-the-less the general cleanliness of the entire dormitory was excellent.

The physical activity of the children varied greatly. Some moved and played similarly to children their mental age, while others were spastic and unable to move about at all. Most of the children mixed well with the entire group though at times it was necessary to restrain the arms of some because of such undesirable habits as pinching others, putting toys in mouth, etc.

At the beginning of the study the children were housed in dormitory nine at the institution. Dormitory nine was a small frame building consisting of two large sleeping rooms, two play rooms, two bath rooms, two dining rooms, and one kitchen, (see Text Figure 1). After this dormitory burned the children were crowded into dormitory eleven along with 120 previous occupants.

The sleeping rooms contained single beds spaced approximately three feet apart. The children were allowed in these rooms only during hours assigned for bed rest and sleeping. The remainder of their time was spent in either the play rooms, bathrooms, or dining rooms.
Text Figure I — Diagrammatical Floor Plan of Dormitory Nine

1. Kitchen 2. Dining Room 3. Play Rooms
The play rooms were approximately 50 feet by 50 feet in area and contained no movable fixtures except a few chairs and toys. The children were amused by simple games and activities supervised by the attendants, all conducted within the playrooms. Only a few of the children were allowed out-of-doors.

RESULTS

The incidence of infection in the study group as revealed by the three general surveys is shown in Table I. The incidences of infection with the various parasites found in the three general surveys are listed in Table II. The incidence of Enterobius vermicularis as determined by examination of a single scotch tape swab is listed in Table III.

Infections with Chilomastix mesnili, Dientameba fragilis, and Balantidium coli were not encountered in this study. An attempt to correlate degree of parasitism with length of residence at the school and amount of activity of the children was made. Neither was successful.

Table I.—Incidence of Parasitic Infection in the Study Group as Revealed by the Three General Surveys

<table>
<thead>
<tr>
<th>Survey</th>
<th>Total No. Examined</th>
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<th>Infection With Two or More Parasites</th>
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<td>II</td>
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<td>III</td>
<td>51</td>
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DISCUSSION

Several recent surveys of this type have been made. Caldwell (1930) conducted a survey on 286 mentally defective children in an Alabama home. The children were all mental grades. He found that 60 per cent of them were parasitized. This study was a helminth survey and made no mention of the incidence of protozoa. His results are listed in column one of Table IV.
### Table II—Incidence of Infection with Each Parasite Found in the Three General Surveys

<table>
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<th>Survey I</th>
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</table>
Caldwell found that 7.6 per cent of the morons were infected with *Trichuris* while 77.8 per cent of the idiots were infected. On the basis of these facts he assumed that the lower the mental grade the higher the incidence of parasitism. Thus it can be assumed that the group utilized in this study was probably the most highly parasitized group at the school.

Young (1941) surveyed a group of patients at a mental hospital in South Carolina. This study was made on 142 adult white females of low mentality and untidy habits. He found that 82 per cent harbored helminths and 65 per cent protozoa. The results of this survey are listed in column two of Table IV.

Reardon (1941) conducted a study of parasite incidence in 72 adult white females in a Georgia state mental institution. *Endameba histolytica* was the only protozoan reported upon. Results are listed in column three of Table IV.

Burrows (1943) conducted a survey of intestinal parasites in 1,418 mental patients at the South Carolina State Hospital. His study group consisted chiefly of adults, both colored and white, both sexes, and all mental grades. Included in his results was a study of the untidy habits of the group examined. These habits were comparable to those practiced by the children at the Georgia Training School. Results of this survey are listed in column four of Table IV.

Parasite incidence at the Georgia Training School brought forth many interesting questions. There were no proven answers available for most of them, only logical hypotheses.

The incidence of *E. histolytica* was 13 per cent in the first survey and 12 per cent in the second survey of this paper. This may not have been the true incidence of this parasite in the study group since only a single smear from a single stool specimen was examined from each individual in each survey. According to Sawitz (1942) the
expected number of positives to be found by such an examination is only 28 per cent of the true incidence of infection. The explanation of this is that cysts of *E. histolytica* characteristically appear in showers at approximately 10 day intervals, thus the one specimen examined may have been eliminated between showers. Never-the-less, the incidence of *E. histolytica* was greater than that occurring in the general population, though no higher than the estimated incidence in the general population of Augusta (Denton—unpublished data). Craig and Faust (1951) calculated the incidence in the general population of the United States to be approximately 8.1 per cent.

The incidence of *E. histolytica* in survey three was zero. The elimination of this parasite from children found infected in the previous surveys was attributed to the administration of terramycin between surveys II and III. A wide variation in the incidence of *E. histolytica* was found in previous surveys by other workers. Young found 0.4 per cent infected. Reardon 42 per cent, and Burrows 8.2 per cent.

Table IV—Incidence of Infection With Intestinal Parasites in Four Mental Institutions

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<thead>
<tr>
<th></th>
<th>Survey by Caldwell (1930)</th>
<th>Survey by Young (1941)</th>
<th>Survey by Reardon (1941)</th>
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<tr>
<td>Patients %</td>
<td>286</td>
<td>142</td>
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<tr>
<td>E. histolytica</td>
<td>—</td>
<td>0.4</td>
<td>42</td>
<td>8.2</td>
</tr>
<tr>
<td>E. coli</td>
<td>—</td>
<td>48.0</td>
<td>—</td>
<td>45.2</td>
</tr>
<tr>
<td>I. butschlii</td>
<td>—</td>
<td>9.0</td>
<td>—</td>
<td>3.2</td>
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<tr>
<td>E. nana</td>
<td>—</td>
<td>24.0</td>
<td>—</td>
<td>19.0</td>
</tr>
<tr>
<td>D. fragilis</td>
<td>—</td>
<td>1.0</td>
<td>—</td>
<td>0.1</td>
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<tr>
<td>G. lamblia</td>
<td>—</td>
<td>6.0</td>
<td>—</td>
<td>1.6</td>
</tr>
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<td>T. hominis</td>
<td>—</td>
<td>20.0</td>
<td>—</td>
<td>22.1</td>
</tr>
<tr>
<td>C. mesnili</td>
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<td>8.0</td>
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<td>22.8</td>
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<td>B. coli</td>
<td>—</td>
<td>5.0</td>
<td>—</td>
<td>0.1</td>
</tr>
<tr>
<td>A. lumbricoides</td>
<td>11.5</td>
<td>10.0</td>
<td>12.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Hookworm</td>
<td>45.1</td>
<td>66.0</td>
<td>32.0</td>
<td>19.1</td>
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<tr>
<td>S. stercoralis</td>
<td>—</td>
<td>39.0</td>
<td>6.0</td>
<td>19.8</td>
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<tr>
<td>E. vermicularis</td>
<td>6.5</td>
<td>—</td>
<td>55.0</td>
<td>5.1</td>
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<tr>
<td>T. trichuris</td>
<td>32.9</td>
<td>78.0</td>
<td>63.0</td>
<td>42.0</td>
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<tr>
<td>H. nana</td>
<td>5.9</td>
<td>—</td>
<td>—</td>
<td>0.2</td>
</tr>
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</table>
Although they are transmitted in the same manner, *E. coli* was found to be much more prevalent than either *E. nana* or *E. histolytica* in survey II. Results obtained by Young and Burrows are in agreement with these findings. Calculated incidences from surveys of the general population are also in agreement. The incidence of *E. coli* in the United States was approximated to be 19.6 per cent by Boeck and Stiles (1923), *E. nana* 13.2 per cent by Boeck and Stiles (1923), and *E. histolytica* 8.1 per cent by Craig and Faust (1951). Crowded conditions and mental states of the inmates at the school only seemed to accentuate this ratio. One possible explanation of this phenomenon was offered by Chandler (1949), Chandler stated that *E. coli* has a thicker cyst wall than either *E. histolytica* or *E. nana* enabling it better to resist destruction by the stomach than its sister amebas, thus establishing infection in a greater number of the exposures. No experimental evidence was found to substantiate this theory.

The results of survey III indicate that the administration of terramycin, through an effective treatment for *E. histolytica*, was not effective in eliminating *E. coli*. Therefore, the incidence of *E. coli* was relatively greater after the administration of terramycin.

The results of all previous surveys consulted showed a much greater incidence for hookworms than for *Strongyloides stercoralis*. Contrary to these previous surveys, the results of this study showed *S. stercoralis* infections to be much more common than hookworm infections. The main fact believed to be responsible for the low incidence of hookworms was the periodic treatment with hexylresorcinol. Statistics show it to be 75 per cent effective in eliminating hookworm (Craig and Faust, 1951), but ineffective in combating strongyloidiasis. Thus most of the hookworms were removed while *S. stercoralis* remained unaffected. The small amount of outdoor activity combined with the cleanliness of the dormitory practically eliminated any possibility of acquiring hookworm and *Strongyloides* larvae at the institution. Therefore, the question arose; how did *Strongyloides* maintain itself? The answer was believed to be as follows; all of the infections were infections of long standing (probably acquired before entrance into this group), and that they maintained themselves through auto-infection. This theory was based on the fact that the incidence of *Strongyloides* was constant throughout the three surveys and was found in the same patients each time.

*Ascaris lumbricoides* and *Trichuris trichiura* are parasites with similar epidemiologies. Previous reports showed the incidence of
Trichuris to be from 32 per cent to 78 per cent, and Ascaris from 10 per cent to 12 per cent. The results of this study show the incidence of Trichuris to be similar, 52 per cent to 74 per cent, while that of Ascaris is lower, 2 per cent to 0 per cent. In attempting to explain the differences in the incidence of the two worms in this survey, treatment is again suggested as the basis. Ascaris was effectively treated with hexylresorcinol (90 per cent effective by statistics) while there is no available drug which is effective against Trichuris. Thus the incidence of the effectively treated parasite was low, the ineffectively treated one high. A fact of minor importance is the much longer life span of the adult Trichuris than the adult Ascaris.

Hymenolepiasis nana is widely accepted as the most common tape-worm in the Southern United States. It occurs in about 1 per cent of the general population, being more common in children than adults. The incidence in the study group was found to be much higher than that of the general population; being approximately 14 per cent. This was confirmative evidence of the fact that H. nana thrives in institutional groups. This increase in incidence in such groups is thought to be due to excessive exposure. H. nana is the only tapeworm that doesn't require an intermediate host or an incubation period outside the definitive host to complete its life cycle, allowing it to be transmitted directly from person to person. Therefore, probability of infection is much greater in an institutional group, especially a mentally deficient one, than in the general population.

Thirty-two per cent of the study group was found to be infected with Enterobius vermicularis. It is probable that the incidence was even greater than the survey indicated since only one scotch tape swab was made on each of the 60 patients. Sawitz recommends that a suspected case of oxyuriasis not be declared negative until seven consecutive swabs have been examined. Another factor which may have lowered the incidence was the necessity of bathing many of the children during the night, prior to the morning of the survey.

The incidence of E. vermicularis was higher in this survey than in the surveys by Caldwell and Burrows, but lower than in the study by Reardon. E. vermicularis incidence varies greatly over the United States. The suspected incidence of infection may vary from 0 per cent to 100 per cent depending on the group surveyed.

The incidence of some of the parasites, especially the protozoa, varied greatly from survey to survey. Most of this fluctuation was
believed to have been caused by the various chemotherapeutical agents administered between surveys and the tendency of the protozoan cysts to appear in intermittent showers, and not due to any inaccuracy in examination. The constant incidence of H. nana and S. stercoralis, which were not specifically treated, is believed to be substantiating evidence of the accuracy of examination techniques over the three surveys.

Five drugs were administered during the course of this problem with varying effectiveness. Hexylresorcinol was used as a general anthelminthic. It is the drug of choice in the treatment of ascariasis and mixed infections of Ascaris and hookworm and has been reported to be slightly effective in the treatment of Enterobius, Trichuris, and H. nana (Krantz and Carr, 1949). The results of these surveys indicate that it was very effective in the control of Ascaris and hookworm, but had little effect in removing Enterobius, Trichuris, or H. nana. It is considered to be the safest effective anthelminthic available.

Ferric ammonium citrate was used primarily to combat trichuriasis. Results show that it had little effect in removing the worms. However, it was effective in improving the general health of the patients.

Milibis is a patent compound (15 per cent arsenic and 42 per cent bismuth) which was used in the treatment of amebiasis. It was administered after survey I. The results of survey II showed little reduction in the incidence of E. histolytica. Milibis was effective in alleviating acute symptoms, but was thought to be only a temporary cure.

Hetrazan was administered as an experimental treatment for trichuriasis to 11 infected individuals. The drug was given after the second survey and results were determined by rechecks and the third survey. The incidence of Trichuris in survey II was 52 per cent and in survey III 74 per cent. This increase in incidence of Trichuris was probably due to the greater efficiency of the concentration method of examination in detecting light infections. It is doubtful that hetrazan was at all effective in eliminating Trichuris infections.

An experimental course of treatment of amebiasis with terramycin was tried on 15 individuals. This antibiotic apparently produced phenomenal results. Terramycin was given after survey II and its effectiveness was measured in survey III. The incidence of E. histolytica dropped from 12 per cent in survey II to 0 per cent in survey III.
SUMMARY

1. Four parasitic surveys were conducted on approximately 55 mentally deficient children residing in the Georgia Training School.

2. A high incidence of parasitism was found.

3. Surveys of similar institutions have obtained similar results.

4. Five drugs were employed in the treatment of the various infections with varying efficiency.

5. Hexylresorcinel was found to be effective in controlling Ascaris and hookworm infection.

6. Terramycin was found to be effective in eliminating E. histolytica.

REFERENCES

Text-books and Manuals


JOURNALS


**TECHNICAL APPENDIX**

**Fresh Saline Smear Technique:** A drop of physiological saline is placed upon a clean glass slide. Using an applicator stick, enough of the feces to be examined is emulsified in the saline to form a smear through which print can just be read. The smear is then covered with a coverslip and examined under a microscope. Trophozoites and cysts of protozoa and ova, larvae, and adult worms can be observed employing this technique.

**Protozoan Iodine Smear Technique**

**Formula:**

- Potassium Iodide ........................................ 5.0 gms.
- Iodine .................................................. 2.5 gms.
- Distilled Water ......................................... 192.5 cc.

A drop of protozoan iodine is placed upon a clean slide, feces is added as above to form a smear and the smear is covered with a coverslip. The preparation is then examined microscopically. Protozoan cysts, larvae, and ova can be observed to advantage employing this technique.

**Zinc Sulfate Centrifugal Flotation Concentration Technique**

This technique is based upon the difference in specific gravity between the parasites and the fecal matter. The zinc sulfate solution is prepared so that its specific gravity (1.180) is between that of the
parasites (1.050 to 1.150) and the feces. Thus the parasites float while the heavier fecal matter is thrown to the bottom.

Procedure:
1. Make suspension of feces in tap water using approximately 1 gram of feces.
2. Filter through one layer of wet gauze to remove the large particles.
3. Centrifuge for two minutes at high speed and pour off the supernatant fluid.
4. Add approximately 2 ml. of tap water. Break up sediment by shaking, fill the test tube with water, and repeat process of washing and centrifuging until the supernatant fluid is fairly clear.
5. Add a small amount of zinc sulfate solution of specific gravity 1.180. Break up the sediment by shaking, add zinc sulfate to fill the tube, and centrifuge.
6. Remove the surface film and examine for parasites. This technique is useful in the examination for protozoan cysts and helminth eggs and larvae. After concentration, fresh saline and protozoan iodine smears are employed for identification of the parasites.

Scotch Tape Swab Method of Examining for Enterobius vermicularis

A piece of scotch tape, approximately 2 in. long and 1 in. wide is applied several times to the perianal region of the patient with the aid of a tongue depressor, then placed "sticky-side" down to a microscopic slide. At the time of examination one end of the tape is loosened and a drop of toluene is allowed to run under it to remove air bubbles and clear the debris. Pinworm ova are easily detected under the low magnification of the microscope.

Cultivation Media for Endameba histolytica

Constituents:
1. Whole egg (whites and yolks) .................. 270 ml.
2. Lockes solution ........................................ 75 ml.
3. Sterile rice powder

Feces are placed into the culture media and incubated at 37°C for 48 hours. Transfers are necessary every 48 hours. This technique is adequate for diagnostic purposes but the organisms never survive the second or third transfer. This culture media was developed at the National Institutes of Health, Bethesda, Maryland.

Iron-hematoxylin Smear Technique

The technique outlined by Craig and Faust in their text-book Clinical Parasitology was used.
RECENT ADDITIONS TO THE FACULTY

Since the days that many of your footsteps echoed through the halls of the Newton Building, and more recently through those of the Dugas and Murphey Buildings, there have been many additions and deletions in the Faculty of the Medical College. However, to cover all these changes would be beyond the space and scope of this little journal. On the other hand, we would like to keep all of you abreast of the news here on the campus. So, in this first issue of this year, let's begin here by speaking a few words of welcome to some of our recent Faculty members and at the same time acquaint you with some of the new faces.

Of course, there could be many reasons why Dr. Louis O. J. Manganiello wished to come to Georgia to practice Neuro-Surgery, but one might be inclined to say that perhaps his wife, also an M. D., the former Carol Pryor, had quite a bit to do with his choice. Previous to his arrival here he had done graduate work at the University of Maryland, having been a graduate from there in 1942.

For many, our Alma Mater is like a magnet drawing her sons back to herself. Such is the case, probably, of Dr. Hoke Wammock who returned to Georgia in 1948, after having spent nearly two decades at the Graduate School of Medicine and Surgery, University of Pennsylvania. Even though his time was mostly spent in Surgery, his main interest centered on cancer and for this reason, we feel very fortunate to have him back as Professor of Oncology and Surgery. During the years since his graduation from the Medical College of Georgia, Dr. Wammock has earned many honors, of which being a Diplomate of the American Board of Surgery and a Fellow of the American College of Surgeons are two of note.

Speaking about the cancer program here, it is well now to mention Dr. George F. McInnes, who was welcomed back here in 1951. Following his residency at the University Hospital, he joined the Staff of Memorial Hospital in New York in 1947. For four years there, he took advantage of probably one of the most modern and complete research centers for the study of cancer and related neoplasms that the scientific world can offer. This background enabled him to return to the University Hospital and the College, and as Assistant Professor of Surgery, to pass on to others the fruits of his experience. To both Dr. Wammock and Dr. McInnes, will many a patient of the Cancer Clinic be forever grateful.
Another valuable addition to the Faculty is Dr. Chester H. Heuser who arrived in 1950. He received his Ph.D. from Harvard in 1913 and for approximately twenty-five years was Curator of the Embryological Collection of the Carnegie Institution of Washington, Department of Embryology. Besides carrying part of the teaching load in Microscopic Anatomy, he has continued his work with young human embryos. This collection will no doubt be a great contribution to the Medical College in the future.

Also among the newcomers to our ranks is Dr. Richard S. Owings who assumed the duties of Assistant Professor of Pediatrics. Being a native Charlestonian and having graduated from the University of South Carolina, he is not a total stranger to these parts. Prior to Dr. Owings's arrival, Dr. Harry O'Rear, formerly of Duke University School of Medicine, had replaced Dr. Philip Mulherin as Professor of Pediatrics, so for that department, there is a complete new staff. Dr. O'Rear is limiting his practice to referred cases and even that will be a heavy load considering the increased demands on his pedagogical time.

It may seem that we have been partial by saluting only the above doctors, but we are sure that you will bear with us through the succeeding issues while we introduce to you all the neophytes on the campus of the Medical College of Georgia. (M.P.H.)
ALUMNI AND FACULTY NEWS

Dr. Braswell Collins, '34, Waycross ophthalmologist, was elected president of the Atlantic Coast Line Railroad Surgeons' Association at an annual meeting in Charleston, S. C. in January.

Dr. Billy S. Hardman, '43, of Gainesville, announces that he will limit his practice to obstetrics and gynecology.

Dr. Frank Hoffman, '45, opened offices at 4 W. Liberty St., Savannah, for the practice of ear, nose and throat.

Dr. and Mrs. J. M. McElveen, '02, of Brooklet, held open house at their home on January 13, in observance of Dr. McElveen's 75th. birthday. The doctor has practiced in the Brooklet community for 50 years.

Dr. H. D. Meaders, '41, of Newnan, has limited his practice to obstetrics, gynecology and abdominal surgery.

Dr. and Mrs. John W. Mobley, '26, of Thomasville, were injured in an automobile accident on January 6, at Ridgeland, S. C. while driving home from a hunting trip in North Carolina.

Dr. Fenwick T. Nichols, Jr., '43, has returned to Savannah to resume the practice of internal medicine at his offices at 102 E. Gwinnett St. He was only recently discharged after serving a year and a half in the Navy.

Four Macon physicians moved into new offices in January:

Dr. Milford B. Hatcher, '35...........................................781 Spring St.
Dr. Samuel Patton, '37..................................................797 Spring St.
Drs. Chas. Benton, '44 and E. L. Fry, '45..................Hatcher Building

Dr. Thomas H. Lamson, '49 has accepted the position of Administrator of the Arlington City Hospital and has moved his offices there.

Dr. Henry Levington, '19, was elected president of the medical staff of the Warren A. Candler Hospital at its December meeting.

Dr. Ernest H. Hutchings, age 65, died Dec. 2 in Columbia, S. C. where he had been taken for treatment after suffering a heart attack several weeks earlier. A 1913 graduate of the Medical College of Georgia, he practiced first in Linton, then in Cornelia, before moving to Sparta. Ill health forced him to retire some time ago.
Dr. James D. Bozemaii, '50, a native of Andalusia, Ala., has entered practice in Franklin, Ga. in association with Dr. George Fisher.

Dr. J. W. Garner '49, formerly of Ashburn, has moved to Crawfordville, Ga., giving Taliaferro County its only physician.

Dr. J. T. Giles, '43, formerly of Griffin, has moved to Valdosta and entered general practice. He has taken a suite of offices over the Giles Drug Co., which is operated by his brother, G. N. Giles.

Dr. R. B. Greenblatt, Professor of Endocrinology, participated in three meetings in January: the Southwestern Ohio Society of General Physicians in Cincinnati; the Elizabeth Steel Magee Hospital in Pittsburgh, and at the New York Academy of Science. He presented papers on MANAGEMENT OF THE MENOPAUSE, MANAGEMENT OF FUNCTIONAL UTERINE BLEEDING and TREATMENT OF LYMPHOGRANULOMA VENEREUM AND GRANULOMA INGUINALE WITH ANTIBIOTICS.

Dr. Perry P. Volpitto, Professor of Anesthesiology, recently was appointed co-chairman of the program committee of the American Society of anesthesiologists.

Dr. Marvin Greene, '49, has opened offices in Monticello, Ga.

Dr. Lawrence Salter, '43, formerly of Hampton, S. C., has moved to Savannah, Ga. and is doing general practice at 2427 Abercorn St.

Dr. Albert M. Deal, '39, of Statesboro, has been appointed a member of the State Board of Medical Examiners.

Dr. Irving Victor, '45, has opened offices in Savannah for the practice of Urology.

Dr. Ira Goldberg, '48, Lt. j.g., is serving with the Navy aboard the USS Buttineau.
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<td>*Battle, J. F.</td>
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<td>Alden, Herbert S.</td>
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<td>Boggs, L. K.</td>
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<td>3 W. Garden St., Pensacola, Florida</td>
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*Deceased
1924  Kennedy, H. T.  Warrenton, Georgia
1924  Martin, E. E.  Haines City, Florida
1924  Martin, Leldon W.  Sebring, Florida
1924  McGahee, R. G.  1345 Greene St., Augusta, Georgia
1924  McGee, Harry H.  7 W. Gordon St., Savannah, Georgia
1924  Oliphant, J. B.  Adel, Georgia
1924  Poole, W. L.  215 E. Market Street
                Johnson City, Tennessee
1924  Powell, Albert H.  212 W. Main Street
                Durham, North Carolina
1924  Smith, P. H.  3 E. Gordon Street
                Savannah, Georgia
1924  Steinberg, David  88-06 Parsons Blvd.
                Jamaica, New York
1924  Wilkinson, Benjamin A.  101-½ S. Monroe Street
                Tallahassee, Florida
1924  Winfield, Perino B.  Yellow Springs, Ohio
1925  Bartoli, Joseph F.  11 E. 93rd. Street
                New York, New York
1925  Battey, Colden R.  921 Greene Street, Augusta, Georgia
1925  Blanchard, H. H.  1545 S. Layton Blvd.
                Milwaukee, Wisconsin
1925  Brown, G. W.  201 S. Monroe Street
                Tallahassee, Florida
1925  Bryant, Verlin L.  Bartow, Georgia
1925  Burdashaw, William J.  718 Monte Sano Avenue
                Augusta, Georgia
1925  Dobyns, William F.  VA Hospital, Hines, Illinois
1925  Fowler, A. H.  Marietta, Georgia
                Veterans Hospital
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<td>Lamon, J. Daniel</td>
<td>1050 Hendricks Avenue San Jose, California</td>
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<td>Morgan, Thomas E.</td>
<td>Jacksonville, Florida</td>
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<td>Richardson, George W.</td>
<td>117 W. Duval Street Jacksonville, Florida</td>
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<td>Roberts, T. H.</td>
<td>328 Florida Ave., Lakeland, Florida</td>
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<td>Savage, C. P.</td>
<td>Montezuma, Georgia 178 Victoria Road</td>
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<td>Warren, Earl L.</td>
<td>515 Broadway, Paterson, N. J.</td>
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<td>Weeks, Percy D.</td>
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<td>Wilson, James R.</td>
<td>Veterans Administration, 35 Bull St. Savannah, Georgia</td>
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<td>1925</td>
<td>Wright, Lewis H.</td>
<td>745 Fifth Street Great Neck, New York</td>
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