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The Morehouse Journal of Science

BURWELL T. HARVEY, JR., Editor

Studies on the Physiology of the Accessory Glands
of Reproduction of the Male Guinea-Pig.

Bay of Fundy.

Professional Standards

Who Is George's Best Teacher.

Published Quarterly by

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Atlanta



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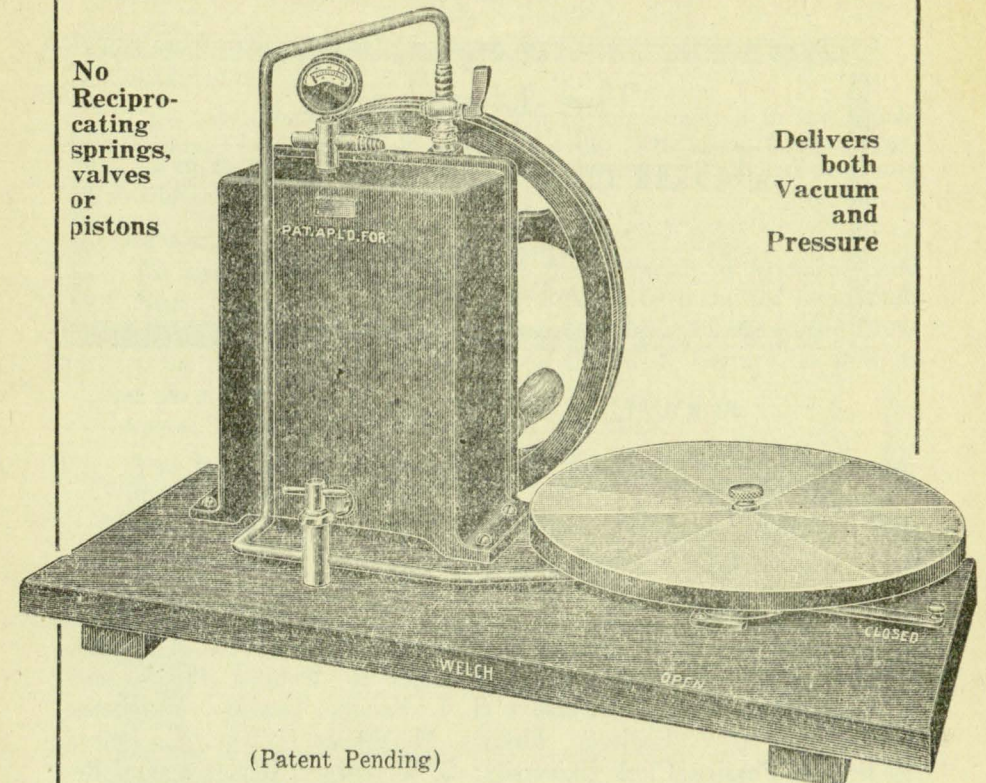
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FEATURES

Studies on the Physiology of the Accessory Glands of Reproduction
of the Male Guinea-Pig.

Bay of Fundy.

Profession Standards.

Who Is George's Best Teacher.

OUR VIEWPOINT

CORRECTIONS.

Two corrections have been brought to our attention in the article "Decimal Classification" in our April issue. On page 75, line seven, insert 7. Education. On page 76, line forty-one, 832 English drama should read 832 German drama.

THANKS.

We want to express our thanks to the Librarian of Arkansas State College, Prof. E. H. Webster and Miss A. E. Germany for their kindness in donating certain copies requested in the last issue of the JOURNAL for the completion of the files of the N. Y. Library, as well as the office files.

JOURNAL OF SCIENCE IN 957 SCHOOL LIBRARIES.

THE JOURNAL OF SCIENCE went into 957 Negro school libraries distributed by states as follows:

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ATLANTA UNIVERSITY, MOREHOUSE AND SPELMAN TO HAVE NEW LIBRARY

Word has just been received from New York of a grant of \$450,000 from the General Education Board for the cost of a site and for the erection of a library for Atlanta University and affiliated colleges.

For more than sixty years Atlanta has been an important center of education for Negroes. No other city has had five colleges for Negroes, each with its own constituency but maintaining friendly relationships and mutual respect. A year ago three of these institutions entered into an affiliation which provided that Atlanta University should be developed as a center for graduate and professional courses and that undergraduate work should be conducted by Spelman College and Morehouse College.

The affiliation itself was a notable step in the advancement of education for Negroes. In the three institutions are enrolled more than seven hundred students of collegiate rank exclusive of the summer session and extension school. All three colleges came to the affiliation with a heritage of honest achievement behind them. They have a total initial plant of eighty-seven acres of land and twenty-eight buildings, and are located in the strategic center of the Southeastern states.

The greatest handicap for doing work of college and university grade was the lack of adequate library facilities. The grant of funds that has been made will make it possible to erect and equip a library which will in size and architectural features command attention. This library will serve Atlanta University and affiliated colleges, Spelman College and Morehouse College, and it is hoped that other institutions at a greater distance may share in its use. It is expected also that the University library will serve the citizens of Atlanta, stimulate their wholesome reading, and provide a center of community culture.

The lot of land that has been purchased for the library is situated on Chestnut Street between Spelman College and Morehouse College. The campuses of all three institutions border on Chestnut Street, and from the library lines will radiate to the three institutions.

The library will bring together colleges and University in a unity of purpose and outlook and give an impetus to the development of the University that could not be provided in any other way.

"No parata," dixit Freshie,
Cum a sad et doleful look.
"Omne recte," Prof. respondit,
Nihil scripsit in her book.

M. H. H., 1929, in *Wellesley College News*.

STUDIES ON THE PHYSIOLOGY OF THE ACCESSORY GLANDS OF REPRODUCTION OF THE MALE GUINEA-PIG*

JOHN WESLEY LAWLAH,
Department of Anatomy, University of Wisconsin.
TWO PLATES (SEVEN FIGURES)

This work is the outgrowth of anatomical researches on the accessory reproductive glands of some of our native squirrels (*Sciuridæ*) (Mossman and Lawlah, not yet published.) A study of the physiology of these glands in the gopher, chipmunk, or fox squirrel would have been undertaken had it not been for the obvious difficulties in working with wild animals. Hence the guinea-pig was selected as the experimental animal.

In spite of the large amount of work that has been done on the male guinea-pig, about the only proved functions of any of these glands are that the secretion of the seminal vesicles furnishes the bulk of the material which makes up the vaginal plug, and that the secretion of the cephalic pair of prostates ('coagulating gland' of Walker, '10) coagulates this vesicle secretion to form the definite vaginal plug. This work has been confirmed by Engle ('26). Except in specific instances, no attempt will be made in this paper to review the literature, as this has been well done by several others: Walker ('10 and '11), Stockard and Papanicolaou ('19), Marshall ('22), Oslund ('23), Armistead ('25), and Engle ('26).

The present work consisted, then, in many cases, of a repetition of experiments which had previously been carried out by others. The main purpose of the author's work was to determine, by means of surgical removal and subsequent breeding and fertility tests, whether any of the accessory glands of reproduction are necessary for fertile coitus. Litter-size effects were not taken into consideration, since, using so few animals, such data would mean little or nothing. However, it is worth mentioning that there was no noticeable litter-size effects in any case. A secondary set of more or less preliminary observations were made upon these animals by means of anatomical and histological examination to see what effects the removal of one set of glands, or castration, or vasectomy would have upon the rest of the reproductive tract. Thirty-one male guinea-pigs were operated upon. Standard surgical procedure under ether anesthesia was used.

I wish here to express my sincere thanks to Dr. W. H. Mossman, of the Department of Anatomy, who assisted with the operations and helped in many other ways during the course of the work. Much of the success of the surgical work was due to the skill of Mr. William Kaplan and his excellently managed animal-surgery equipment.

I. Removal and Ligation of the Seminal Vesicles

The seminal vesicles were removed from three large males, and in

* Reprinted from *The Anatomical Record*, Vol. 45, No. 2, March, 1930.

three other large males they were ligated at their proximal ends. The incision was made in the midventral line just anterior to the symphysis pubis. The glands were dissected away from their connections near the vas deferens, and here ligated with their vessels, and either removed or left in situ. In one case the symphysis was cut through the glands ligated even more proximally where they enter the connective tissue surrounding the urethra. The muscle and peritoneum were sewed as one layer by interrupted catgut sutures. A continuous silk suture was used for the skin. The wound was dressed with collodion.

Upon recovery the animals were placed with females. The observations were essentially the same as those of Armistead ('25); the males in many cases made several unsuccessful attempts to copulate, then went to the corner of the pen, as if entirely oblivious to the proximity of the female. In other cases when apparently normal copulations took place no vaginal plug could be found. In no case were litters produced, although many females were allowed to come to heat in the pen with these males. Steinach ('94), using rats, reported reduced fertility manifest by reduced litter-size after seminal vesicle removal.

Leuckart ('53) expressed the opinion that the vaginal plug of the guinea-pig is secreted by the seminal vesicles and coagulated by the secretion of the prostate. Lataste ('83) believed that it is formed by coagulation of the secretion of the seminal vesicles. Besides confirming the work of Armistead ('25), that removal of the seminal vesicles renders the male guinea-pig sterile, this work also confirms that of Leuckart and Lataste in showing that the source of the bulk of the vaginal-plug material is the seminal-vesicle secretion.

Ivanoff ('00) and others have reported successful artificial fecundation of rabbits, guinea-pigs, and dogs with sperm taken directly from the epididymis diluted with an alkaline physiological salt solution. The conclusions of such experiments have, of course, been that the secretions of the accessory glands are non-essential to reproduction, except in so far as they furnish an alkaline activating and carrying medium for the sperm. The cause of sterility of guinea-pigs from which the seminal vesicles have been removed is not clear. Armistead believed it was due to absence of the vaginal plug. That this cannot be the sole reason as shown by the work of Engle ('26), who removed the coagulating cephalic pair of prostates, thus preventing vaginal-plug formation, yet not producing sterility. Removal of the entire prostate by the author also gave similar results. It is probable that the physiology of the vesicular secretion is more complex and more interesting than has been commonly supposed.

II. Removal of Cowper's Glands

Barrington ('13) removed Cowper's glands from ten guinea-pigs and found that six were able to produce litters. No description of his operative technique was given.

In the author's experiments six robust males were used. The incision was made in the middorsal line above the caudal vertebrae. Retraction of the skin exposed the muscles extending from the sacrum

and coccyx to the coxa and femur. Separation of the muscle fibers laterally, from the third or fourth from the last caudal vertebra, exposed the tips of Cowper's glands. Grasping the tip of the gland with forceps and exerting a slight upward tension, it was easy with a dull probe to dissect out the duct down to its entrance into the fascia surrounding the bulbar portion of the urethra. In three animals the ducts were ligated before removal of the glands, while in the other three the glands and as much of the ducts as possible were picked away without injuring the covering tissue of the urethral bulb.

One animal died of unknown cause five days after the operation. The other five recovered and produced litters; one animal, three litters; two animals, two litters; two animals, one litter. Autopsy revealed no macroscopic evidence of regeneration of the gland in any of the animals. It should be kept in mind, however, that the most proximal ends of the ducts were removed, and that microscopic secretions of the penis of normal guinea-pigs show that the whole duct, including even this most proximal portion, has the same glandular structure as the body of the gland itself. Whether the small amount of secretion probably exuding from these duct remnants could compensate for the loss of the bulk of the gland in the reproductive function is an open question. Probably it could not, but so far we do not know.

III. Removal of the Prostate Gland

Six animals were used. A midventral incision was made over the symphysis pubis, the muscles separated, and the penis retracted caudalward to exposed the symphyseal ligament, which was then cut. The pubic bones were then separated about 7 to 10 mm. and the membranous or muscular urethra was lifted slightly out of this opening by means of a small glass hook on the end of a rod of small caliber. The urethra was supported in this position by passing the rod in a transverse direction between it and the symphysis. In this manner the prostatic urethra was kept sufficiently exposed to allow the six lobes of the prostate to be rather easily picked away by means of fine curved forceps. In most cases a whole lobe could be removed at a time; in other cases the lobes were picked away in bits. Considerable care was necessary to avoid injuring the proximal ends of the vas deferens and of the seminal vesicles, both of which are surrounded by the prostatic tubules and are very delicate. After inspection showed the urethra stripped of its prostatic tubules, the glass rod was removed, allowing it to return to the pelvis. Hemorrhage was not very great. The pubic bones were drawn together by a piece of slowly absorbable catgut passed through the obturator foramina. The wound was closed by sewing the delicate subcutaneous tissue carefully with very fine gut, then by a continuous silk suture for the skin. The skin in this operation was unusually prone to open up, but the suturing of the subcutaneous tissue seemed to largely overcome this tendency.

Two of the animals died, one, four days after operation, another, three weeks after. The other four all recovered and produced litters; one animal, three litters; two animals, two litters; and one animal,

one litter. Autopsy revealed macroscopically complete removal of the prostatic tubules and no regeneration. The prostate is not essential for fertile coitus in the guinea-pig.

Walker ('10) believed that he had shown that the cephalic pair of lobes of the prostate of the guinea-pig produces a secretion which causes coagulation of the secretion of the seminal vesicles, thus producing the vaginal plug. Engle ('26) also showed that the vaginal plug was never formed by males from which the cephalic pair of prostates had been removed, although he obtained several fertile matings from these males. As was suggested in section I, this indicates that absence of the copulation plug is not the sole cause of the sterility of the males from which the seminal vesicles have been removed. A vaginal plug was never observed by the author in females mated to prostatectomized males. Still, there is always a possibility of missing the plug unless the animal is examined very soon after copulation.

IV. *Effects Upon the Accessory Glands of Castration, and of Necrosis of the Testis by Ligation of the Spermatic Cord*

Four animals were used, two young but mature males and two old males. The spermatic cords of one young and one old animal were ligated and the testes left in the scrotal sacs to undergo necrosis. The other two animals were castrated. All operations were performed through a small slit in the ventral surface of each scrotal swelling.

At the end of ten weeks the animals were killed and autopsied. In each case atrophy of all accessory glands was clearly seen by gross examination (figs. 5, 6, and 7). Histological sections were also made. Although the general picture was as one would expect, yet there were points upon which accurate judgment was impossible, due to the small number of cases. Similar and much more complete studies of this problem have been made by Steinach ('94), Lode ('95), and Battelli and Martin ('22).

V. *Effects of Ligation of the Ductus Deferens on the Accessory Glands*

Six animals were used, three young but mature males and three old ones. Ligation was performed through a small mid-ventral slit in the abdominal wall just cephalic to the symphysis pubis.

Autopsy at the end of ten weeks showed no macroscopic evidence of atrophy or hypertrophy of any of the accessory glands (figs. 3 and 4). Spermatozoa were alive in each testis.

Steinach ('94) and Oslund ('23) have obtained similar results in much more complete studies of this problem.

VI. *Effects of Removal of the Prostate on the Remaining Accessory Glands and the Testis*

Seven animals were used, four mature young males and three old males. Four of these animals were used in the breeding experiments upon prostatectomized males. The procedure of removal has been described in section III.

At the end of ten weeks the three animals used for this part of work alone were autopsied. The other four were killed after a longer interval, as they were being used in breeding experiments. Macroscopically, there was no evidence of change in testis or the remaining accessory glands.

Serrallach and Pares ('07) and Hada and Goetzl ('14) claimed that prostatectomy produced testicular atrophy and other changes indicating an hormonal secretion of the prostate. Walker ('11), Lichtenstern ('16), and apparently all others who have worked upon this problem have denied such an effect. Some of the effects described by Serrallach and Pares are strikingly improbable. Hada and Goetzl's paper was unavailable.

Conclusions

1. Ligations or removal of both seminal vesicles in the male guinea-pig may somewhat modify their sexual behavior, but they are still capable of the act of copulation.
2. Ligation or removal of both seminal vesicles in male guinea-pigs in each case took away their capacity for forming a vaginal plug, and rendered them incapable of fertilizing the female.
3. Neither the removal of the prostate nor of Cowper's glands has any effect on capacity for copulation or for fertilization in the male guinea-pig.
4. Removal of the prostate had no macroscopic effect upon the testis or the remaining accessory glands of reproduction.
5. Both castration and spermatic-cord ligation produced definite gross degeneration of the accessory glands of reproduction.
6. Vas ligation produced no macroscopically visible change on the testis or the accessory glands of reproduction.

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Plate 1

EXPLANATION OF FIGURES

1. Genital apparatus of normal male guinea-pig. Ventral view (seven-eighths natural size). b., bulb of penis; bl., bladder; b-u., bulbo-urethral or Cowper's gland; e., tail of epididymis; h. e., head of epididymis; h. s., horny stiles; m. v., muscular or membranous urethra; p., penis; pr., prostate; s. v., seminal vesicle; t., testis; t. v., tunics of testis turned back; u., ureter; u. o., urethral orifice; v. d., vas deferens; v. e., vasa efferentia.
2. Genital apparatus of normal male guinea-pig. Dorsal view (seven-eighths natural size.) c. pr., cephalic lobe of prostate ('coagulating gland' of Walker, 'proximal' lobe of Engle); m. pr., middle lobe of prostate; cd. pr., cadual lobe of prostate.

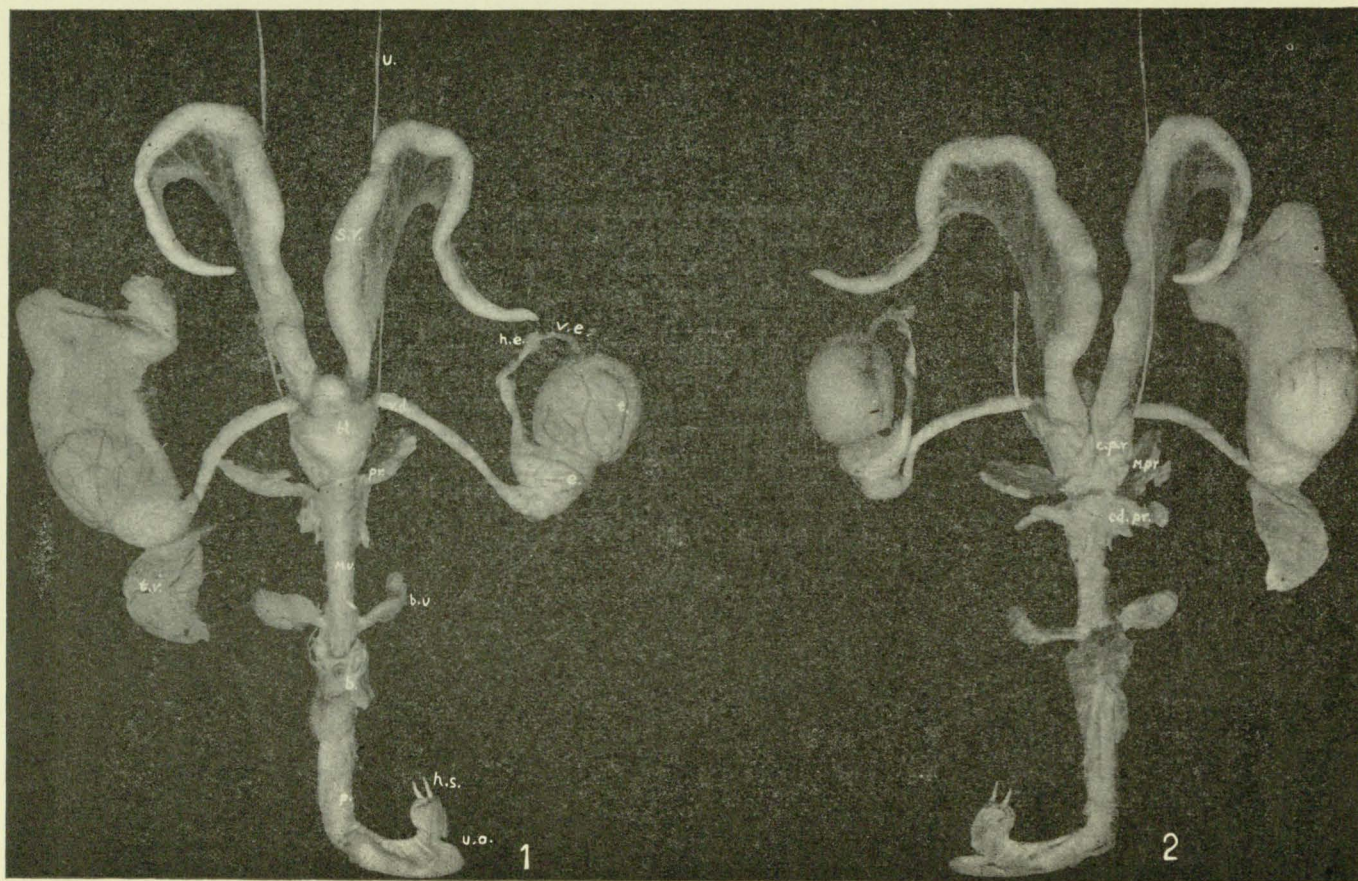


Plate 2

EXPLANATION OF FIGURES

3 to 7 Genital apparatus of experimental guinea-pigs. In these dissections the fascias were not carefully dissected away as in figures 1 and 2. One Cowper's gland has been removed in each case and has been placed at the right of the bulb of the penis. All are dorsal views (*all seven-eighths natural size*).

3. Vas ligation. Young animal.
4. Vas ligation. Old animal.
5. Castration. Young animal.
6. Castration. Old animal.
7. Spermatic-cord ligation. Young animal.

BAY OF FUNDY

EDGAR H. WEBSTER, FAIRHOPE, ALABAMA

The Bay of Fundy is flanked on the New Brunswick side by the Southern Highland and on the Nova Scotia side by Northern Mountain, a trap rock ridge or range. The bay therefore, represents a *rift* valley. The fact that the St. Johns River is drowned at its lowest portion shows that the bay has had a history of elevations and depressions matching the history of the main land. "That this bay was known to Europeans before the arrival of Du Monts and Champlain in 1604 is well established. It was undoubtedly visited by French, Basque, and Portuguese fisherman and traders in the sixteenth century; and is marked on maps of that period. The name probably comes from the first Designation of the Portuguese, 'Rio Fondo' or 'deep river', for thus it is found on their maps. It is found on the Cabot map of 1544, but may be much older."

The table on the previous page shows the progressive elevation of the tides from Yarmouth to Moncton. Of these we saw the following: at St. John, the tide flowing out, the high, the low tide and the reversal of the tide; at Digny Gut we observed at least three times the high tide and the wide expanse of flat at low tide; at Parrsboro we saw the tidal flats one and a half mile wide at the low (*at sunset*) and late in the evening the tide half risen while the height of the wharf above low tide gave us a suggestion of the height at the High of the tide; and at Moncton we saw the tide at the height an hour after the tidal bore had arrived.

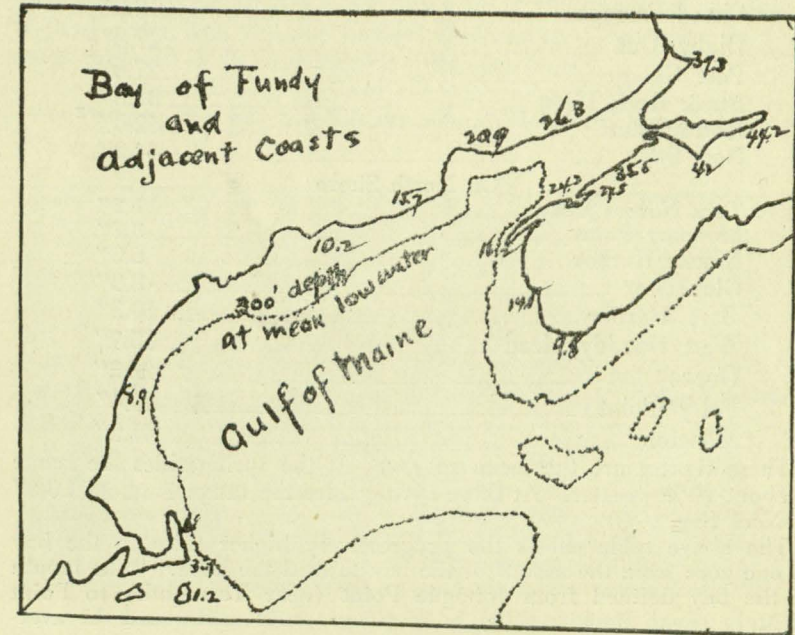
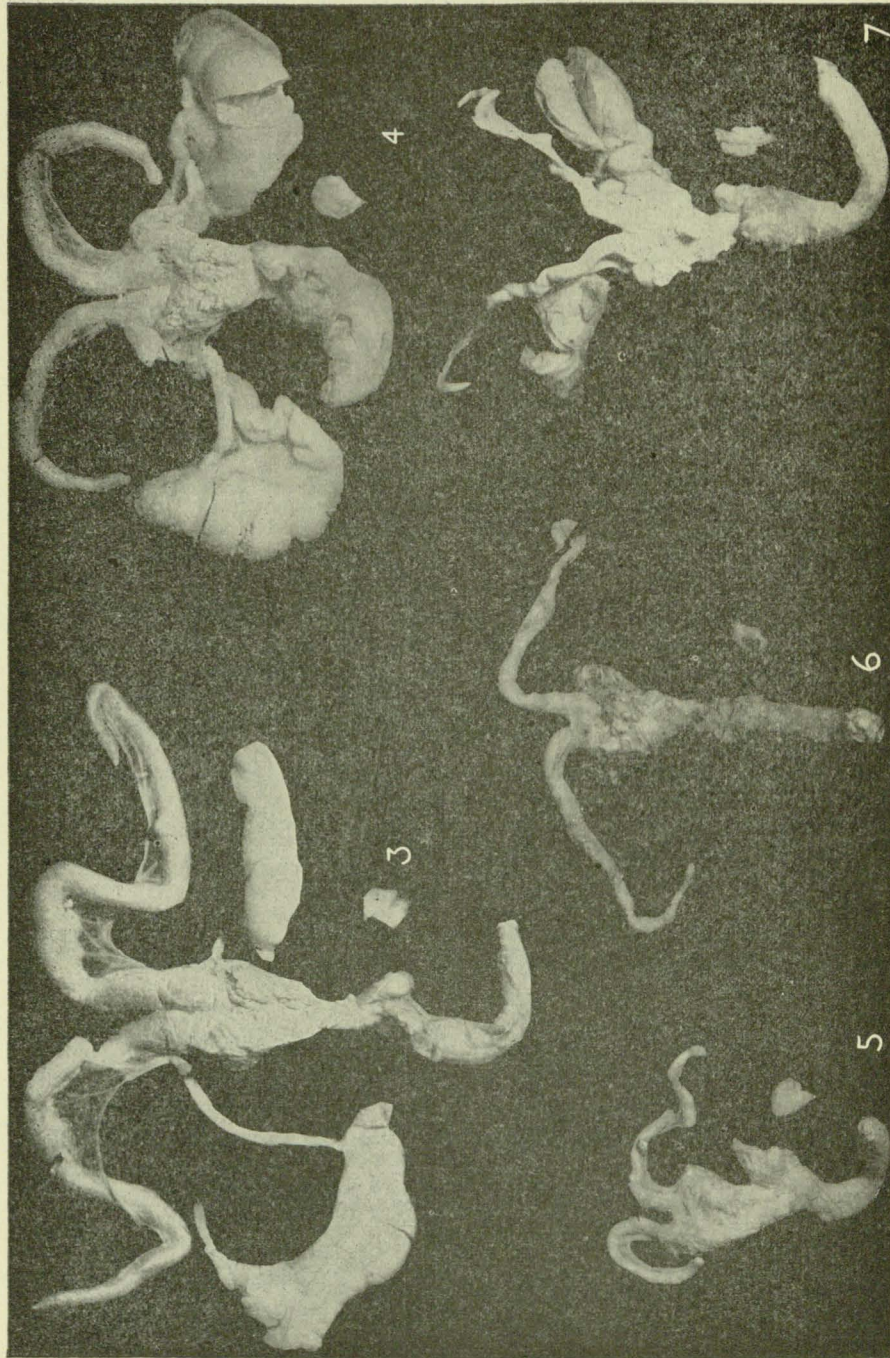


PLATE II.

REPRODUCTIVE GLANDS OF MALE GUINEA-PIG
JOHN WESLEY LAWLAH



An interesting fact is brought out as a further study of the tides is made. "A close examination of the ranges of the tides brings to light that relative to the axis is a point on the southern shore has a greater range of tide than the corresponding point on the northern shore. Thus the tide tables give as mean ranges of the tide 14.0 feet at Yarmouth and 12.9 feet at Starboard Point; 19.3 feet at Petit Passage against 15.7 feet at West Quoddy Head; 27.8 feet at Port George against 26.3 feet at Quaco." This is brought about by the rotation of the earth by which all motion in the northern hemisphere is deflected toward the right and all motion in the southern hemisphere toward the left. That is, "on the flood, tide water entering the Bay of Fundy is deflected to the right; but now the north shore is on the right, and hence low water is somewhat higher on the northern than on the southern shore." This situation is analogous to the "spring" and "neap" tides. The spring tides are the times of highest high and of lowest low tides. The neap tides are the times of lowest high and highest low tides. This condition may be illustrated by the following diagram:-

Spring high tides	South Shore high
Neap high tides	North Shore high
Neap low tides	North Shore low
Spring low tides	South Shore low

Range of the Tides in the Bay of Fundy.
Nova Scotia Shore

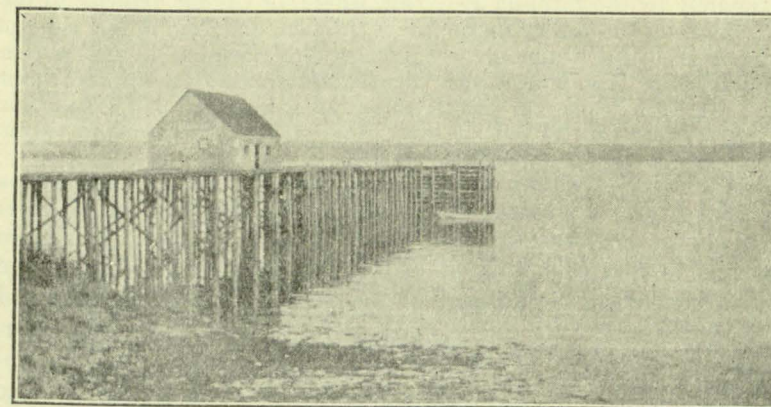
Cape Sable	9.1"
Yarmouth	14.0"
Grand Passage	18.2"
Digby Gut	27.8"
Port George	27.8"
Black Rock Light	31.5"
Horton Bluff	42.0"
Noel Bay	44.2"

On North Shore

Tom Nevers Head	1.2"
Monomy Point	3.7"
Nauset Harbor	6.0"
Gloucester	8.9"
Bass Harbor	10.2"
West Quoddy Head	15.7"
Quaco	26.3"
Folly Point	39.4"
Moncton	41.2"

These figures are the mean ranges. At the spring tides the range is about 14% greater. At these spring tides the range is about 50.6" at Noel Bay.

The above table shows the progressively higher tides in the bay as one goes from the mouth of the bay toward the head. "The mouth of the bay defined from Jobogue Point (near Yarmouth) to Point of Main (near Machias, Mt.) is 76 Geographical miles and the aver-

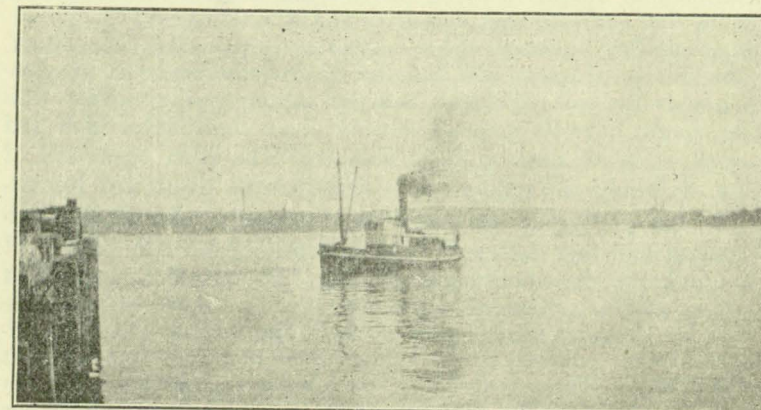


LOW TIDE AT DIGBY, NOVA SCOTIA

age depth is 280 feet, reckoned from mean sea level. At Cape Chignecto where the bay forks, the width is 25 miles and the average depth is 130 feet. . . . It is to this gradual narrowing of the bay and its lessening depth from mouth to head that the very considerable rise and fall of the tide in the upper reaches has generally been described.

The Bay of Fundy is unique in other ways than the range limits of its tides. The following comparison is made between the Bay of Fundy and Chesapeake Bay. In the latter "the time of tide at Turkey Point Light, which is about 165 miles above the mouth of the bay is 12 hours later than at Cape Charles Quarantine. This gives the tidal wave a rate of 13.75 geographical miles per hour."

The relation existing between the time of tide in the upper and lower reaches of a bay like Chesapeake or Delaware Bay is given ap-



HIGH TIDE AT DIGBY, NOVA SCOTIA

proximately by the formula $V = \sqrt{gh}$, where "V" is the velocity of the tidal wave, "g" is the acceleration of gravity, and "h" is the average depth of the tidal waterway. Applying this formula to the stretch of Chesapeake Bay from Cape Charles Quarantine to Turkey Point Light, we find, since the acceleration of gravity is 32.12 feet per second, a value for "H" of 17 feet. This is an approximation to the average depth of that stretch of the bay.

With the Bay of Fundy, the situation differs. "Thus from Machias Seal Island, near the mouth of the bay to Isle Haute about 77 miles up stream the difference in time of tide is but 4 minutes. This gives a velocity for the tidal wave of 19.25 miles per minute, which in the formula connecting the velocity of the tidal wave with the depth of the tidal waterway, that holds good for most bays and rivers, gives the impossible depth of 100,000 feet. The average depth is approximately 200 feet. Throughout the whole length of the bay the time of tide differs but little. From Grand Passage to Noel Bay at the upper end, a distance of 132 miles the tide comes later by only 1 hour 39 minutes, giving for the tide a rate of advance of $1\frac{1}{3}$ miles per minute which is the formula connecting velocity and depth results in a depth of almost 600 feet."

The above paragraphs indicate two types of tidal movements. This fact is shown in another study. "From observations made over a considerable stretch of the Bay of Fundy, by W. Bell Dawson, we find that the current stopped flooding about one hour after local high water, and ebbing about an hour after low water. The strength of the flood current came about two hours before high water and the strength of the ebb current about two hours before low water."

With a waterway like the Chesapeake Bay, "we find that the strength of the current comes about the time of high or low water, and slack water about three hours before high or low water. Whereas in the Bay of Fundy, the current is swiftest about midway between high and low water, in Chesapeake Bay, the current is slack at that time and the relation that obtains between the tide and current in Chesapeake Bay is one that characterizes most bays and rivers."

Chesapeake Bay illustrates the "progressive" type of tidal movement. Here the tide is progressively later up stream, the range is progressively less as the tide advances, and the accompanying current with the tide should have its greatest velocity about the time of high and low water, with the slack midway between. The other type, that of the Bay of Fundy is "stationary." This may be illustrated by rectangular tank partly full of water. If one end of the tank is suddenly raised and then lowered, "a wave" will be started which will put in oscillation the whole body of water. But it will be noted that high water will occur at one end when it is low water at the other end, and for the body of water as a whole, high water will occur simultaneously for one-half at the same instant that it is low water at the other half. "There will be at the middle of the tank a region where the two tides nullify each other and the range there approaches zero (0).

Now the Bay of Fundy and the Gulf of Maine illustrate on the large the "stationary" type, except that the Gulf of Maine is so large that the stationary wave is negligible against the tidal wave of the Atlantic while in the Bay of Fundy the stationary wave is the marked feature. The Bay of Fundy is then one-half of the tank of the illustration above, supported by the great mass of water in the Gulf of Maine. That is, the large mass of water in the Bay is in oscillation, the time from mouth to head is approximately the same, modified by the shallowing of the bed and the narrowing of the bay.

"In enclosed bodies of water, the stationary wave type of movement has been known and studied under the name "seiche" since the time of F. A. Forel, who began his researches in the early seventies of the last century at Lake Geneva. But nothing had been done with regard to bodies of water opening at one end into a very much larger basin, as exemplified by bays opening into the ocean."

"In 1908 there appeared, independently, two publications in which the oscillation of bodies of water closed at one end was treated. R. A. Harris of the U. S. Coast and Geodetic Survey, investigated the matter in connection with his tidal studies; and, in Japan, Hondu, Terada, Yoshida and Isitani were led to the investigation in connection with earthquake studies. From these investigations, it developed that bodies of water opening at one end into larger bodies of water are capable of sustaining stationary wave movements of the character exemplified in half of a tank (described above) the formula for the period of oscillation in a rectangular basin of uniform depth being

$$T = 4L \div \sqrt{gh}$$

where "T" is the period; "L" the length of the basin; "g" the acceleration of gravity and "h" the depth of the basin. "A modification of the formula introduces an empirical factor due to the width of the bay.

"Hunda and his colleagues found that by taking the mouth of the bay from Cape Sable to Cape Cod and the end of the bay at Port Graville, the period was 13 hours; while by taking the mouth of the bay from Yarmouth to Machias, the period was 11.6 hours. Taking the bay as extending from Grand Manan Island to Sackville, Krummel derived a value of 12.45 hours." The value varies slightly with the length assigned to the bay, but in every case it closely approximates 12.5 hours."

The mean value of the tide is 12.42 hours. That is, the natural period of the bay approximates very closely the period of the tides. "It may, therefore, be concluded that the tidal phenomena of the Bay of Fundy are due primarily to the fact that the natural period of oscillation of the Bay of Fundy corresponds very closely to the period of the tide; and that "some retardation occurs toward the head of the bay is due to some progressive wave movement present."

Summary

This article is the outcome of a visit to the Bay of Fundy, in the summer of 1929. The party was as St. John, at Digby, the Annapolis Valley, and around the Minas Basin, at Parrsboro and at Moncton.

We saw the reversing tides at St. John; the high and low tides at Digby; the tidal flats at several places, most noticeably at Parrsboro; and we failed to see the "bore" at Moncton. In the preparation of this article, large use has been made of a paper in the *Geographical Review* of April, 1922, entitled "Tides in the Bay of Fundy," by H. A. Marmer.

The history of the Bay goes back to that crustal movement that brought up the South Mountain range of New Brunswick and the North Mountain Range of Nova Scotia. Cracks accompanied the uplift which resulted in vertical faults between which the Bay dropped forming a "rift valley." This term has not been explained and illustrated by the makers of college geologies as fully as it deserves. Whether the bay as a portion of the sea floor rose above the surface and then fell, or whether it did not rise to the surface is not important. As the Bay was cut off from the ancient ocean as the result of the uplift, is slowly caught the tidal vibration of the ocean, and its waters rise and fall in sympathy (?) with the ocean tides. In a sense here is a sympathetic vibration.

A normal tidal wave, here called "progressive," is highest and earliest at the mouth of the bay. Here the tidal wave is practically uniform throughout its extent; and the range of the tides is greatest at the head of the bay and not at the mouth. Such a wave is a "Stationary wave." This wave is complicated by the advance of water into the bay at the high tide or its retreat at low; and this gives a light progressive factor to the tide which explains the slight difference in time of the tide as it becomes high or low.

It is also a fair assumption that the unique features of the Bay, namely the "Reversing Tides" at St. John and the "bore at Moncton" are due in most part to the stationary element of the tide rather than to the "progressive" factor.

NOTE: Working out the values of "h" from the formula (supra), the results do not quite tally with those of the article.

$V = \sqrt{gh}$

$$\begin{array}{r} (1) \\ \frac{13.75 \times 5280}{60 \times 60} - \sqrt{32.15h} \end{array} \quad \begin{array}{r} (2) \\ \frac{19.25 \times 5280}{60} - \sqrt{32.15h} \end{array}$$

$$\begin{array}{r} 19.8 - \sqrt{32.15h} \\ 400 - 32h \\ h - 12\frac{1}{2}' \\ (17') \end{array} \quad \begin{array}{r} 1760 - \sqrt{32.5h} \\ 3097000 - 32.5h \\ h - 97000' \\ (100000') \end{array}$$

$$\begin{array}{r} (3) \\ \frac{1.3 \times 5280}{60} - \sqrt{32.15h} \\ 108990 - 32.15h \\ (600') \\ h - 312' \end{array}$$

THE PERISCOPE

NO PERMANENT RACIAL SUPERIORITY SAYS
CHICAGO ANTHROPOLOGIST

Claims of exclusive racial superiority, for Nordics or for anybody else, were scouted by Prof. Fay-Cooper Cole, anthropologist of the University of Chicago and the National Research Council, in a radio talk given over the Columbia Broadcasting System, under the auspices of Science Service.

Claims to racial superiority, Prof. Cole said are quite definite things, and can be definitely investigated. If they are true, history will bear them out. But, he continued, history does no such thing; instead, it shows a procession of "Great Races," who succeeded each other through the ages, each people in its turn imagining itself to be the culmination and apex of all human history.

"In the year 2500 B. C. Egypt led the world," said Prof. Cole. "It was further advanced in all the arts and crafts of civilization. Had you asked the Pharaoh of that period if there was a superior race of people he doubtless would have said 'certainly, and we are it.' At about that time a Mediterranean people were developing a civilization on the island of Crete, but they did not rank with the Egyptians of the time. By the year 1500 B. C. they had progressed far beyond the civilization of the Nile and by every right they could have proclaimed themselves a superior people. This was just at the time the rude barbarians from the north, the tribal kings of the Odyssey and the Iliad, were pushing into Greece. Had you sought to compare these rude herdsmen with the Cretans of the Minoan period you would have been laughed to scorn. Yet they overcame the Cretans, borrowed liberally of their culture, intermarried with them and by the year 500 B. C., this mixed population produced the golden days of Greece. Surely they were the dominant people of that age. By the beginning of our era Rome had wrested the leadership from Greece and was attempting to subdue the rude barbarians of the north. If you wish to learn what the Romans thought of our ancestors in central and northern Europe and in the British Isles, just read again your Cicero and your Caesar. There was no doubt in the mind of the Roman but that he belonged to the great race. But the northern barbarians showed themselves capable of learning, and ere long they overthrew Roman power and are now the leaders of civilization.

"Apparently then the fact that a nation or race is dominant at any particular time is no assurance that it will retain the leadership. Archaeology and history teach us that civilization has shifted from one region and people to another, and that the less advanced people of one period become the leaders in another age.

"The presence of many races and peoples in America does raise real problems, problems requiring the greatest statesmanship and

tolerance. Race mixture will continue, we will become more of a hybrid people than we are at present, but if we scan the history of the past, or consider the known facts of race and race mixture, we need no fear for America of the future." —*Science Service.*

SIXTY-FIVE YEARS AFTER FREEDOM

It has been 65 years since 1865 and Lee's surrender. What progress has the Negro made during these years? Suppose we take Georgia with the largest Negro population and look briefly at some of the evidence of progress.

In 1880, 126,000 white (20%) and 379,000 Negroes (81%) over ten years of age were illiterate. In 1920, 5.5% whites and 29.1% Negroes were illiterate. In 1920, 55,000 whites and 231,000 Negroes over twenty-one were illiterate; 12,000 whites and 29,000 Negroes below twenty-one were illiterate. In 1928, the school census showed 2,343 white children and 7,157 Negro children between 10 and 18 illiterate. This has been still further reduced in the last two years. These figures show that while 81% of those who came out of slavery were illiterate in 1880, less than 5,000 of the great-grandchildren of these are illiterate. In 1928, 230,000 of these great-grandchildren were enrolled in the Georgia schools. This is 69% of the school population, 6-18. Contrast this with the devastation in 1871 when only 42,000 whites and 6,600 Negroes were in school. Georgia's illiteracy is due chiefly to conditions prior to 1900. About 20 per cent of the grandchildren and fully 95 per cent of the great-grandchildren attend school.

In 1928, 6,561 Negroes were enrolled in accredited high schools or 5.7 per cent. In Georgia Negro colleges 1,316 were enrolled in college classes; 2,391 in preparatory classes and 2,124 in summer classes. The value of their college property, state and private, is \$4,600,000. The state support is \$185,000 and private income \$474,000.

In 1880 the assessed property tax values of the negroes was six million, 2.3 per cent. In 1927 the Negroes returned for taxation \$50,000,000 or 3.75 per cent.

In 1927 the Negroes operated 84,000 farms or 33 $\frac{1}{3}$ % and produced \$380,000,000 of produce, 28% of the total.

There are no communities not accessible to Negro churches, built and maintained by their people. In their own schools, churches and places of amusement, they have found freedom to develop. There is also freedom of employment and good feeling between the races.

To one who has lived through this period of adjustment, development and growth, the present status is cause for congratulations and praise and is proof of the good endeavors of both races in the past and a promise of greater good for the future.

—*The High School Quarterly.*

HOWARD PROFESSOR HONORED

Dr. A. B. Jackson, Professor of Bacteriology and Public Health, at Howard University, has been invited by the Washington Council of

Social Agencies to be a member of an advisory committee to conduct a survey of all hospitals and public health facilities of Washington, for the benefit of the Community Chest, as an aid toward the determination of the proper allotment of funds.

Dr. Jackson was selected by the American Medical Association a year ago to make a national survey of Negro hospitals and nurse training schools. A report of that survey appeared in the *American Medical Journal* of last April.

An article by Dr. Jackson on the practice of sociological medicine appeared in the *"Medical Journal and Record"* for August in which emphasis was placed upon the fact that physicians need to think more in terms of health, rather than in terms of disease.

During the Summer, Dr. Jackson did work in vital statistics at Columbia University. Dr. Jackson was formerly superintendent of the Mercy Hospital and a surgeon in Philadelphia.

CHICAGO CONSULTING CHEMIST

Lloyd A. Hall, research and consulting chemist of Chicago, works in his laboratory. He has an extensive practice among large white manufacturers, and is a member of the American Chemical Society, the American Association for the Advancement of Science and other noted scientific bodies.

THE SLIDE RULE

Chemists have a rule that slides,
Multiplies, subtracts, divides,
Adds, and squares, and finds the logs,
Cubes, and halves, and clears the fogs
From a problem quite abtruse.
If you make the proper use
Of this instrument complex,
Even though your brain it wrecks.
To the right you slide a stick
Till you hear a little click.
Next you look into a glass,
Watch the figures as they pass,
Count them as they go and come
Till you have a working sum.
Now you think your work is done;
Heavens, no, it's just begun.
Slide and slide, just slide along
You will never know you're wrong
Even if you learn by heart
How to slide the rule apart.
After we the task have viewed
We are ready to conclude
For this rule the simplest place
Is inside its leather case.

—LYMAN C. NEWELL.

NEWS FROM HERE AND THERE

STONELIKE PRODUCT MADE FROM CORNCOBS

Maizolith, a substance hard as stone and stronger than most kinds of wood, is one of the newest products of chemical magic working on cornfield wastes. It can be made from any part of the corn plant, but most advantageously from corncobs. It is one of the things that has been made by the chemists of Iowa State College at Ames, and has recently been undergoing tests on a semi-commercial scale at the U. S. Bureau of Standards here.

It is prepared by chemically digesting the corncobs, reducing them to a uniform jelly-like pulp in certain standard paper-mill machinery, and pressing the jelly in a mould. The resulting solid material is a dense, hard, bonelike substance, ranging in color from a golden tan to a deep ebony. It is somewhat stronger than the hardwoods, and is a good electrical insulator. It can be machined and polished into non-metallic gears, washers, panels and other objects such as are now made from hard rubber and bakelite.

It is estimated that a commercial plant with a production capacity of five tons per day could manufacture it at a cost of about \$240 a ton. The cost might be cut if it is manufactured as a by-product in other cornstalk industries.

Its trade name, maizolith, englishes into "corn-stone."

Science Service.

ANIMAL EXPERTS CONDEMN GORILLA FILM "INGAGI"

A protest against the film "Ingagi" widely shown throughout the country was made by the American Society of Mammalogists, it was announced by Dr. William K. Gregory of the American Museum of Natural History.

The formal resolution adopted read: "That in accordance with the facts brought out in the discussion of the film 'Ingagi', which has been viewed by many of our members, the American Society of Mammalogists hereby expresses its utter disapproval of this film, which grossly misrepresents the natural history of Africa, while pretending to be a truthful record of a scientific expedition."

A statement issued on behalf of the society further stated:

"The American public should understand that certain animals shown in the film have never been found in the wild state in Africa. Also that a man made up as a gorilla is represented as carrying off a native woman. In response to many protests and letters, certain members of the American Society of Mammalogists who have done field work in Africa have viewed the film and are unanimous in deploring its numerous fictitious features which are misleading mingled with genuine natural history records."

The American Society of Mammalogists is the leading organization

of specialists on mammals of which great group of animals man and the higher apes are the most advanced members. The resolution on "Ingagi" was sponsored by Dr. Gregory, Harold J. Coolidge, Jr., assistant curator of mammals, Museum of Comparative Zoology at Harvard College; H. E. Anthony, curator of mammals, American Museum of Natural History; and James L. Clark, in charge of taxidermy and animal restoration at American Museum of Natural History.

—Science Service.

ASSIGN PATENTS ON SEX HORMONE

Patent rights on the female sex hormone recently isolated by Drs. E. A. Doisy, C. D. Veler and S. A. Thayer have been assigned by these scientists to St. Louis University. The product, which was first announced at the Physiological Congress in Boston, has been called "Theelin." This hormone is responsible for the development of feminine characteristics in women and has been likened in its effects to the "love potion" of old romances. It may be used in treating disorders of women and girls.

Ever since the announcement of the isolation of the hormone, the scientists and the university have been faced with many troublesome problems. Quack remedies of various kinds have used the discovery in various unjustifiable advertising appeals.

In the interest of public health, ethical advertising and recognized standards of pharmaceutical manufacture, the president of St. Louis University has created a Committee on Grants for Research to deal with the problem. The Committee is composed of the dean of the School of Medicine, the associate dean and the professor of biochemistry.

One manufacturing concern in the United States has been given the exclusive right to manufacture and sell the new product for eighteen months. By the terms of the agreement between this firm and the Committee on Grants for Research, all developments in the preparation of the new product, its practical applications, and the discovery of its properties must be shared alike by the university and the licensee or licensees under the patent rights. In this way cooperative research by all those interested in the manufacturing and sale of the product seems assured.

In assigning the patent rights to the university, the scientists provided that the eventual income if any, is to be used entirely for the furtherance of research in the School of Medicine.

This action on the part of Drs. Doisy, Veler and Thayer and the university is similar to that taken by Dr. Harry Steenbock and the University of Wisconsin. Dr. Steenbock assigned to that university the patent rights to his process of irradiating ergosterol for the production of the rickets-preventing vitamin D. These patent rights are administered by the University of Wisconsin Alumni Research Foundation. The income is used to further research in the university. Several firms are manufacturing food products containing vitamin D under the Steenbock patent rights.

Isolation of this hormone has also been reported by a German scientist, Dr. M. Butenandt, but Dr. Doisy claims priority for his product on the ground that it was reported first. More recently, isolation of a female sex hormone was reported by Prof. J. B. Collip and Dr. A. D. Campbell of McGill University, Montreal. This hormone is either identical to or related to the Doisy hormone, according to the Committee on Grants for Research.

—*Science Service.*

CARNEGIE SCIENTISTS REPORT THREE KINDS OF WATER IN OCEAN

There are three different kinds of water in the ocean, scientists of the Carnegie Institution of Washington, one of whom belonged to the staff of the ill-fated, non-magnetic ship, *Carnegie*, reported to the American Geophysical Union meeting.

Results of some of the deep sea determinations of the *Carnegie*, which was destroyed with the loss of Captain Ault and the cabin boy in Western Samoa last November were commented on by H. W. Graham, biologist and chemist, in a paper presented by Dr. J. A. Fleming, as follows:

"These samples show that the waters may be divided into three general layers. An upper layer where an active plant and animal life is maintained, a middle layer in which a decomposition of organic remains is taking place, and a lower layer which represents water which has been conducted from polar regions. The upper layer shows high values of dissolved oxygen but low values of phosphates, silicates and hydrogen ion concentration. The middle layer is low in oxygen but is high in phosphates and silicates and is relatively less alkaline. The lower layer tends toward conditions at the surface with again higher values of dissolved oxygen and lower of phosphates, silicates and hydrogen ion concentration."

How a shotgun and a stop-watch were used to determine the distance to the bottom of the ocean when the sonic depth finding apparatus broke was told by Floyd M. Soule of the ship's staff of scientists, and C. C. Ennis. The depth finding apparatus, which was borrowed from the U. S. Navy, is an electrical device for accurately measuring the time it takes to travel to the bottom of the ocean and return. Knowing the speed of sound in water, the scientists could then quickly calculate the depth of the ocean.

"A steel breech just long enough to hold a 16-gauge shotgun shell was screwed into one end of a length of brass pipe," the paper said. "The pipe acted as a holder and also as a guide for a heavy steel firing pin which was dropped into the upper and open end of the pipe, the shell end being held a foot or two below the surface. The hydrophones were used to pick up the echo and a stop-watch used to measure the elapsed time. Soundings were taken in this manner twice a day. These were only roughly approximate because of the inac-

curacy of the stop-watch measurement and because of the uncertainty of the velocity of a sound set up by an explosion. However, it was a case of half a loaf being better than none, and the device materially assisted in the routine occupation of oceanographic stations."

Sound sent to the ocean's floor behaved strangely and in ways unaccountable by the scientists. Sometimes the reflection would be loud from depths and weak from shallows. Again loud echoes and faint echoes would come from places where all known conditions were similar and even where bottom samples were very much alike. The echoes from five-mile soundings were stronger than those often heard from less than one mile.

In water sound travels almost a mile every second, more than four times as fast as it does in air. On several occasions signals were picked up after travelling 25 miles back and forth between the bottom of the ocean and the surface, and once they had gone nearly 50 miles, having been reflected 15 times when last heard.

—*Science Service.*

FROZEN EGGS IN BULK CONTAIN BACTERIA

The housewife of the future will go to market and buy eggs in a frozen mass instead of in the shell. This is the way they are bought for manufacturing purposes, according to D. Q. Anderson, fellow in bacteriology, Iowa State College.

Mr. Anderson has found in his research that there is a reduction of over 50 per cent. of the organisms in two weeks time. That is, eggs which give a bacterial count of 300,000 per gram, after having been frozen for two weeks give a count of 150,000 per gram. This is a ratio of 2.15 to 1 between fresh and frozen eggs.

The eggs are candled, broken into sterile containers, and each is individually tested by smelling. Then they are churned into a homogeneous mass and frozen solid for storage. Sometimes the yolks and the whites are frozen separately. The yolks are usually more heavily contaminated by bacteria than the whites.

"Frozen eggs are now selling for manufacturing purposes on the basis of their bacterial count," says Mr. Anderson. "The sellers agree to furnish eggs which contain less than a certain number of bacteria per gram."

—*Science Service.*

STUDENT'S CORNER

A CORNER OF SCIENCE

CHAS. A. PROCTOR, '30

Morehouse College, Atlanta, Ga.

The general field of natural science and mathematics is, and is becoming more so, one of greatest importance. The importance of this field is not only rising above its already dizzy heights within its own bounds, but its influence is of such weight that it is molding and directing the policy of almost every phase of human endeavor of this age. This general field includes so many particular fields that it would be folly to attempt a general discussion of it as such in this short space. I shall only discuss very briefly the very closely interwoven fields of biology and organic chemistry from the view-point of their vocational possibilities.

These two fields have such closely related interests that one can scarcely attain any degree of efficiency in one without a rather comprehensive knowledge of the other because there is, and is becoming more and more, a pronounced overlapping, one of the other. This fact of overlapping holds true generally through the scientific field for that matter, as is well known. One is pretty safe in predicting an exceedingly tough time or even failure for the chemist or biologist who attempts to achieve in his field without a broad comprehension and a working knowledge of the principles of physics and mathematics, or vice versa. But viewed from the angle of organic chemistry there are three possibilities worth considering. The first is teaching; second, commercial analysis; third, research.

With reference to the first; there is still and has been for a long time a need for teachers of chemistry who are broadly enough trained to be able to give, in addition to the rather isolated subject-matter, the field in its proper relationship to its allied fields. As for the second; the Harlem Laboratories of New York City are an inspiring example of this type of pioneer endeavor. This example might well be studied, not only by those interested in this particular work, but others who would no doubt receive educational benefits therefrom. The field of commercial manufacturing chemistry offers little or no possibilities due to cut-throat competition of immense, organized capital. But within the realm of organic research, there is, and always will be, a welcome chamber awaiting a member of any group who seeks the joy and fascination of spending his energies unto complete exhaustion in quest of the hidden truth of organic chemistry.

The great forces of biological conquest are for the most part directed toward general physiology. So that physiological research offers the greatest attractions in this field. Of course anatomy and other phases come in for their share of emphasis, but even there

a physiological interpretation is called into play. From what I can see, the field of medicine is not suffering from a deficiency in its number of converts; unless it is the type of scholar who will rise above the common level of physicians. And to do that would of course entail biological research. The field of dentistry, perhaps, makes a little better offer while pharmacy gives even better promise. To me this field of biological research offers a thrill which is nothing short of romantic. Of course it makes a great exaction of time, energy, and study; but the end-products of self-satisfaction, self-development, and probable achievement, colored by the unconscious motive of human service, are ample reward for labor spent.

Although research is the chief attraction, it is by no means the only one of interest. More than in the field of chemistry, there is in biology a need for broadly trained instructors. All over the country institutions are in need of men capable of directing their biological departments, men who are wholly saturated with their field and who are at home in practically any scientific atmosphere. This type of man is still greatly lacking in this group, and the demand is persistently increasing.

To testify to the interlacing interests of these two fields of biology and chemistry, a comparatively young field, bio-chemistry, has developed which treats of principles in common to the two branches of science. This is an intensely fascinating line of work with a considerable promise and great possibilities for those adaptable to it.

As for these two principal fields discussed, they both offer unique inducements for development and service and into which I should like to see men of my group enter. In these fields, greater joys of conquest await them as well as the economic return which goes along with them.

WHY I HAVE CHOSEN ARCHITECTURE AS MY VOCATION

CHARLES GAINES

*Senior, B. T. Washington High School,
Atlanta, Georgia*

"Charles," asked Elsie, "What vocation have you chosen?"

"I shall be an architect," said Charles.

"Of all things," remarked Elsie. "What chance will you have to render service to humanity; to make a definite contribution to civilization, in a field which requires, genius, capital, and a chance?"

"Really, Charles, I believe you have forgotten the race barriers."

"I have, Elsie, for in Art, there are no barriers of race, color or creed. Have you forgotten Mr. Jackson's lecture to the Seniors, in which he pictured the economic ladder of success? I am filled with the urge of that economic picture. I see the laborer, using material manufactured by the Negro; Negro transportation, Negro contractors and foremen, erecting a structure of art and beauty created by a Negro architect, and financed by a Negro banking corporation. Ah,

Elsie, nothing is impossible. Glance back through the ages, to the present time.

"The lowly ant and spider have taught man how to provide himself with shelter.

"Architecture is an integral part of a race or nation. Are we different? The Egyptians made a distinct contribution to the architectural world by building the pyramids with accurate precision. They are known by their architecture. The Greeks gave to the world a style of architecture unparalleled except by Gothic Architecture. The Grecian Parthenon is one of the world's greatest masterpieces of structural art. Every nation has contributed to the structural world. Even the Chinese pagoda, the Esquimo igloo, the Indian hogan, and the Phillippine hut are characteristic of these nations.

"Man has an hereditary instinct to build. The Creator designed and built the world; man had to build for himself, and his style of architecture has stamped the ages. America, the youngest nation in the world, has given many things to the world, among which is modernistic architecture, a style which bespeaks the spirit and carefree attitude of the younger generation. As a member of this generation, I desire to make a distinct contribution to the world in the field of architecture.

"While money does not dominate my purpose, a certain kind of work may be esthetic, but little money is to be received from it. Taking into consideration the fact that man will always need shelter and will be just as fastidious as ever about the style of his homes and public buildings, I conclude that money can always be made, and God's highest achievement as an architect, man will be blessed, from the humblest to the greatest, yea the whole world.

"Yes, I have chosen architecture as my vocation because it is an hereditary instinct in man to build; there is opportunity for development, universal recognition and benefaction, wealth, a factor not to be despised, for it opens the doors of prestige and power and there is fame and honor. And both my race and I, its representative will have that which demands recognition from the greatest of earth, the reward of a life of service, wealth, fame, and honor."

PROFESSIONAL STANDARDS

J. B. EDMONDSON,

Dean, School of Education, University of Michigan

In order to encourage a discussion of the professional standards for teachers, the Michigan Educational Association arranged this year to have the theme "Professional Standards" presented at the nine district meetings of the State Association. It was believed that the teaching profession of Michigan would be benefited by a critical discussion of a series of questions relating to their work as a profession. It was also anticipated that the public could be made more appreciative of the work of teachers through a discussion of the professional character of teaching.

In presenting the subject of professional standards use was made of an eight-page outline, copies of which were placed in the hands of all of the teachers in attendance at the district meetings. This outline was designed to focus attention on certain questions, and to stimulate discussion. Since last fall thousands of these outlines have been distributed to the teachers of the state for use in their meetings, which fact is evidence of the serious consideration that our teachers are giving to problems of the profession.

The first question presented in the outline reads: "What is a Profession?" This question was raised because there is more or less common belief that teaching has not achieved and may never attain the rank of a profession. One humorist recently spoke of teaching as a "proession" referring thereby to the rapid change in the personnel of the profession. The question: "What is a profession?" requires a consideration of some of the differences between those callings which may be described as trades, and those which may be classified as professions. It is not difficult to recognize one distinction between a trade and a profession. In a trade a worker is usually concerned with material things, such as brick, stone, wood, various metals, and other things. In a profession one usually has to do with human relationships. A professional man is one who has mastered a considerable portion of the knowledge of some broad field and has acquired skill in applying that knowledge. The compelling motive in the life of a professional man is or should be service rather than personal gain.

The following definition¹ of a profession may help to answer the question, "Is Teaching a Profession?"

"A profession is a group of individuals possessing certain scientific and technical knowledge, together with the skill requisite to utilize this knowledge for the welfare of society. The public expects a vocation, dignified by the title of profession, to measure up to at least four re-

¹Edmonson, J. B., and Waldo, D. B.—Professional Standards.

ments:

1. "The vocation must render a highly specialized type of social service.
2. "Its personnel must have had abundant training for its work and should be comparatively permanent.
3. "It must provide income sufficient to enable its members to maintain a cultural standard of living.
4. "Its members must be dominated by a professional spirit."

It is interesting to measure teaching in the terms of the foregoing standards. I am certain that any fair-minded person will agree that teaching meets requirement one, in that it renders a very valuable type of social service. As for the requirements two and three, there is evidence that some progress has been made in the last few years in the direction of meeting the proposed standards. It must be admitted, however, that teachers in general do not have an adequate amount of training, a desirable degree of permanency of tenure, or salaries sufficient to meet the standard proposed in requirement number three. In a later part of this paper attention will be called, however, to some definite facts showing that efforts are being made to satisfy these requirements more completely.

The last requirement of a profession, namely, that of "professional spirit" is now more generally satisfied than was formerly the case. The marked increase in strength of professional organizations, the development of codes of professional ethics, by national and state organizations of teachers, and the growing interest of teachers in professional problems can be cited as evidence of the fact that the members of the teaching profession are becoming dominated by a real professional spirit.

It seems to me that the answer to the question, "Is Teaching a Profession?" must be an affirmative one, with, of course, the concession that there is need for further improvement in terms of the standards of the profession.

The second question raised in the outline reads: "What Evidence Is There That the Public Wants Teaching To Become More Highly Professionalized?" It would be extremely difficult for any group of workers to make progress in the direction of increased professionalization if the public were opposed to it. I believe there is convincing evidence that the public wants teaching to become more highly professionalized. A part of this evidence is summarized in the outline¹ as follows:

1. The growing tendency of the public to express its criticisms of the shortcomings and failures of the schools.
2. The remarkable degree of interest exhibited in educational problems by all classes of people.

¹Ibid. p. 131.

3. The marked willingness of the public to support generously the expense of an enlarged program of education.
4. The increasing tendency of society to look to the schools for aid in the solution of the problems of modern civilization in such fields as health, character training, thrift, conversation, international understanding, vocational efficiency, civic ideals, etc."

May I direct attention to item four in the above list. It is a matter of great significance that leaders turn to the schools for the assistance in solving of some of the most perplexing problems of community life. In certain quarters, the schools are being urged to place increased emphasis on character building, health, and thrift because other agencies seem to be unable to solve these problems satisfactorily. Society seems to concede the truth of Dewey's assertion—

"By law and punishment, by social agitation and discussion, society can regulate and form itself in a more or less haphazard or chance way. But through education society can formulate its own purposes, can organize its own means and resources, and thus shape itself with definiteness and economy in the direction in which it wants to move."

The third question presented in the outline¹ reads: "How May Teaching Be Made a Profession?" During the past decade much progress has been made toward elevating teaching to the professional level. However, present gains would be conserved and additional progress made if more emphasis were placed on certain ideals, attitude and policies. The following suggestions for making teaching a profession are given in the outline:¹

1. Teachers possess training comparable to the newer requirements in law, medicine, dentistry, and other recognized professions.
2. Teachers must continue to grow professionally after entering the service.
3. Teachers must become more conscious of the importance of the service rendered by them in the schools and be loyal to the task undertaken.
4. Teachers must co-operate in efforts to show the public the folly of employing poorly equipped teachers who may be available at low salaries.
5. Teachers must learn to treat that non-conforming or exceptional pupil in the same professional manner as the specialist in medicine treats a patient.
6. Teachers must support the code of ethics agreed upon by the professional group.

¹Ibid. p. 132

7. Teachers must recognize the obligation to support the programs of the local, state, and national organizations of teachers and must cease to be individualistic in their attitudes toward movements for the betterment of the profession."

It would be difficult to pick out the most important suggestion from the foregoing list, and the chances are that it would probably be difficult to secure agreement from any considerable group as to the relative importance of the seven suggestions. However, that suggestion five relating to the necessity of teachers taking the attitude of a specialist toward those problems that present special difficulties is one of great value. The more intelligent patrons of our schools are expecting the well-trained teacher to know enough about individual differences and the laws of mental and physical growth to take a professional interest in the non-conforming pupil. The time has passed when more intelligent patrons will be satisfied with casual explanations of failure. The time has come when there is a real demand for careful adjustment to the needs of each individual pupil.

Individualization in education is one of the outstanding trends of the present age and there is an increasing demand that aims, methods and materials be adjusted to the individual. This is the ideal which has been so aptly described by Rugg in the phrase, "the child centered school." It is hopeless to seek greater individualization of teaching unless teaching becomes more highly professionalized.

The fourth question raised in the outline is as follows: "How Would Children Benefit from the Professionalization of Teaching?" It would be difficult to justify efforts to professionalize teaching that would not yield some valuable compensation to children. It would likewise be difficult to defend the increased professionalization of law or medicine unless it could be shown that society would be benefited. The answer to question four, as given in the outline¹, reads:

- "1. More children would succeed in their school work in terms of their potential abilities.
2. More children would find happiness and satisfaction in their school life.
3. More children would find their special talents conserved and utilized.
4. More children would have teachers of broad training, sympathy and interest."

We can scarcely be wrong in assuming that children will find greater happiness and satisfaction with the increased professionalization of teaching. There has certainly been a marked degree of improvement in the attitude of children towards school, especially within the last two decades. Many cartoonists still picture the school as a place that is feared or hated by all pupils. The attitude of children in a well-managed school, however, is sufficient evidence of the inaccuracy of the point of view of some cartoonists. Probably no group of workers in a community is in a position to contribute more to the increase of happiness of the children and the parents than the teachers. If the

increased professionalization of teaching will add to this happiness, the public will be only too glad to share any additional expense that may be involved.

The fifth question in the outline¹ relates to the professionalization of teaching. It reads: "How Would the Public Benefit Through the Professionalization of Teaching?" All of the arguments advanced in answer to question four regarding the benefits accruing to pupils could be used in answering the question as to the benefits accruing to the public. In addition to these, the following statements are submitted:

- "1. Teachers would become more expert in helping children to make adjustments to their physical and social environments.
2. Teachers would become more expert in conserving the talents of children.
3. The public would receive more efficient aid in solving perplexing problems in such fields as health, vocational training and civic betterment."

The present period has been amply described as the period of the child. In every community there are numerous civic societies that devote much time, effort, and money to the protection of the interests of children. Large sums of money have been bequeathed to institutions and foundations that are interested in the problems of child welfare. We have reached the happy period in our country's development when people are willing to discuss social and economic problems in terms of children. The question, therefore, of the benefits accruing to the public through the professionalization of teaching is one that needs to be discussed very freely with leaders of public opinion. If the public can be convinced that professionalization of teaching will result in teachers becoming more expert in helping children to grow, or to develop normally, to find greater happiness, and to develop potential abilities, it will be comparatively easy to get the public enthusiastically interested in the professionalization of teaching. The question as to how the public will be benefited through the professionalization of teaching should be a challenging one to the members of the teaching profession and we should take advantage of opportunities to discuss it before groups of our patrons.

The sixth question relates to the benefits likely to accrue to the teaching profession. The question reads, "How Will Teachers Benefit Through the Professionalization of Teaching?" Our profession could not justify the placing of emphasis on professional standards solely for the purpose of benefiting the members of the profession. Every profession has a well-defined responsibility to society. Any profession that fails to recognize this responsibility is certain to discover that society has ways of protecting itself through legislation and organized opposition. Some of the advantages likely to be gained by teachers through the professionalization of teaching are as follows¹:

¹Ibid. p. 134.

1. More genuine satisfaction will be experienced by the teacher.
2. Greater respect will be accorded the opinions of teachers on educational, social, and civic problems.
3. Better salaries for teachers will follow the giving of more expert service.
4. More permanent tenure will follow when the public ranks teaching as a profession.
5. Better retirement legislation for teachers will be granted by an appreciative public."

I am a firm advocate of a state system of pensions for teachers because of my belief that a well-devised plan would contribute to an increase in the efficiency of the schools. I know that there is opposition of the proposal of pensions for teachers. However, I served for fourteen years on the Michigan Board that had charge of the administration of our state law for pensions for teachers and my experience has convinced me of the value of a pension system. It is my opinion that adequate pension systems, better salaries, and more satisfactory tenure will be readily secured when our profession attains higher standards.

The seventh question in the outline reads: "What Evidence Is There That Teaching Is Becoming a Profession?" This question gave the authors of the outline an opportunity to present some very encouraging information. In fact they devoted more space to this question than any other because valuable evidence was readily secured. Their answer as given in the outline¹ reads:

1. Within the past five years there has developed a demand for the preparation of state and national professional ethics and for the creation of committees or commissions to interpret and to apply these codes in specific cases.
2. Within the past ten years thousands of dollars have been expended on research in the field of the curriculum and in other educational fields.
3. Within the past few years experimental schools and educational laboratories have been established in such universities as Yale, Columbia, Chicago, Peabody, Minnesota, Iowa, Wisconsin, and Michigan.
4. Within recent years many normal schools have changed from two-year institutions to four-year teachers' colleges.
5. Within the past ten years the Michigan Education Association has grown from a membership of a few thousands to a membership of more than 30,000.

¹Ibid. p. 135.

6. The following summary recently issued by the National Education Association furnishes much evidence that teaching is becoming a profession:

A Decade of Achievements

Then 1919		Now 1929
\$639	Average salary of Teachers	\$ 1,300
High School	Average Certification Requirements — 2 Years	Normal
40,000	Summer School attendance	250,000
25	Teachers' Colleges	100
330,689	College and University Enrollment	664,266
1,600,000	High School Enrollment	4,000,000
\$750,000,000	Expenditures for Public School Education	2,000,000,000
5	State Tenure Laws	14
5	State Retirement Laws	22
10,000	Members in the N. E. A.	193,000
200,000	Members in State Education Association	650,000

7. Within the past five years there has been an increased demand that well-trained educational specialists be employed in our schools (vocational counsellors, psychologists, supervisors.)"

There is a tendency within our profession to be pessimistic about the possibilities of getting high professional standards. The review of the facts given above should create a spirit of optimism and confidence. It is my recommendation that certain of the statements in the foregoing summary should be discussed before teaching groups.

Question eight on the outline reads: "How Do Some Teachers Retard the Development of Teaching as a Profession?" This question has been raised because of the commonly acknowledged fact that the professional advancement of teaching has been retarded by harmful activities within the ranks. We teachers have not, in the past, presented a solid and united front. We have acted very much like a flock of sheep. We have lacked aggressive leadership. A summary of the ways in which some teachers have retarded the advancement of teaching as a profession is as follows¹:

1. By treating lightly any discussion of professional topics.
2. By entering teaching with a minimum preparation and continuing to teach without further training.
3. By thinking of teaching as a makeshift occupation or as a job for misfits in other professions.
4. By neglecting to become acquainted with the recently created scientific literature in the field of education as reported in professional magazines.
5. By bringing criticism on the profession as a whole through their careless treatment of contracts and other professional obligations.

¹Ibid. p. 136.

6. By rendering such inferior service that the public becomes dissatisfied and disgruntled with the profession as a whole.
7. By opposing without good cause the efforts of educational organizations to build a profession of teaching.

I am strongly of the opinion that Dr. Cooper is quite right when he declares¹:

"The poor standing of the teaching profession in social esteem has been largely due to the teachers themselves. It can be corrected only by a change in the attitude of those of us who enter it. So long as we do not respect our own calling others will not respect it."

The ninth question is designed to bring out the fact that there are certain contributions that every teacher can make towards the improvement of our profession. The question reads: "What Are Some of the Immediate Contributions That a Teacher Can Make Toward Making Teaching a Recognized Profession?" In the opinion of the authors of the outline¹ a few of the possible contributions are:

1. Study the programs of the local, state, and national professional organizations and become an intelligent and aggressive supporter of their programs or offer constructive criticism of the programs.
2. Seek to become familiar with the scientific literature that may be applied to one's specific task as a teacher.
3. Help to acquaint the public with the fact that the professionalization of teaching will mean better training for the boys and girls in the schools.
4. Aid movements to increase the requirements for admission to the teaching profession.
5. Act in such a manner as to cause the public to feel that a teacher is proud of his membership in the profession of teaching.

It would be possible to add many other suggestions to the foregoing list. We omitted one of the most important contributions that can be made by every well-trained teacher. This suggestion may be stated as follows: "Strive to do such a quality of work in the class room as will cause the patrons to recognize that you possess a degree of skill, and a quality of professional spirit, that will compare favorably with that possessed by leading members in other professions." I do not know of any more certain way of making teaching a profession than through emphasis on this recommendation.

The last question relates to the question of leadership in activities designed to improve professional standards. The question reads:

¹Ibid. p. 137.

"Upon Whom Does the Heaviest Responsibility Rest for Developing Teaching as a Profession?" A partial answer to this question is as follows¹:

1. Upon the faculties of teacher-training institutions.
2. Upon the officers of local, state and national organizations.
3. Upon the members of state departments of public instruction and educational boards.
4. Upon those occupying positions as county commissioners, superintendents, principals, and supervisors.
5. Upon those members of the profession who have served sufficiently long to become impressed with importance and significance of the work of the teacher."

Teaching is in need of better leadership. There are too many in the places of leadership mentioned in the foregoing summary who do not measure up to the requirements for competent leaders. Leadership calls for enthusiasm, ability, and force of a kind that will enable one to incite others to action. To qualify as a leader a person must be thoroughly interested in his work or cause and must have such faith in it as will prevent discouragement or a suggestion of failure. We need more aggressive leaders in our profession; and the members of the teaching profession can help to secure better leaders by showing greater appreciation of the contributions of those who are now furnishing aggressive and competent leadership.

In closing, may I call your attention to the tribute paid the teaching profession by President Hoover. On one occasion he said¹:

"The public school teacher cannot live apart; he can not separate his teaching from his daily walk and conversation. He lives among his pupils during school hours, and among them and their parents all the time. He is particularly a public character under the most searching scrutiny of watchful and critical eyes. His life is an open book. His habits are known to all. His office, like that of a minister of religion, demands of him an exceptional standard of conduct. And how rarely does a teacher fall below that standard; How seldom does a teacher figure in a sensational headline in a newspaper; It is truly remarkable, I think, that so vast an army of people—approximately 800,000—so decently behaves itself, as to be almost utterly inconspicuous in a sensation-loving country. It implies wealth of character, of tact, of patience, of quiet competence, to achieve such a record as that.

¹Ibid. p. 138.

"In the formation of character you have played a great and increasing part. And I am less interested, as you are really, in what you put into young folks heads than in what you put into their spirits. The best teaching is not done out of a book, but out of a life; and I am sure that measured by this standard, it will be agreed that American teaching has been marvelously productive.

"In all those great tests of your work—the maintenance of your national ideals, the building of character, the constantly improving skill of our people, the giving of that equipment which makes for equality of opportunity, the stimulation of ambition to take advantage of it—no greater tribute can be paid you than to say that you are succeeding better than was ever done before in human history."

The foregoing tribute to teachers expresses opinions commonly held by leaders in public life. Teachers are a highly respected corps of public servants, and we have little cause to complain of the support given us by our statesman and other molders of public opinions. We can, and should, however, increase our prestige with the general public. In my judgment, one of the most effective ways to do this is through continued emphasis on policies and standards designed to raise teaching to a higher professional level.

PROFESSIONAL STANDARDS

A Summary Presented at the District Meetings of the Michigan Education Association, October, 1929

I. What is a profession?

This question is answered as follows in the Code of Professional Ethics of the Michigan Education Association:

"A profession is a group of individuals possessing certain scientific and technical knowledge, together with the skill requisite to utilize this knowledge for the welfare of society. The public expects a vocation, dignified by the title of profession, to measure up to at least four requirements:

1. "The vocation must render a highly specialized type of social service.
2. "Its personel must have had abundant training for its work and should be comparatively permanent.
3. "It must provide income sufficient to enable its members to maintain a cultural standard in living.
4. "Its members must be dominated by a professional spirit."

II. What evidence is there that the public wants teaching to become more highly professionalized?

1. The growing tendency of the public to express its criticisms of the shortcomings and failures of the schools.
2. The remarkable degree of interest exhibited in educational problems by all classes of people.

3. The marked willingness of the public to support generously the expense of an enlarged program of education.
4. The increasing tendency of society to look to the schools for aid in the solution of the problems of modern civilization in such fields as health, character training, thrift, conversation, international understanding, vocational efficiency, civic ideals, etc.
5. (To be supplied after discussion.)

III. How may teaching be made a profession.

Teaching is rapidly acquiring rank as a profession. However, much emphasis must be placed on certain ideals and requirements before teaching can truly become a profession.

Among these are the following:

1. Teachers must possess training comparable to the newer requirements in law, medicine, dentistry, and other recognized professions.
2. Teachers must continue to grow professionally after entering the service.
3. Teachers must become conscious of the importance of the service rendered by them in the schools and be loyal to the task undertaken.
4. Teachers must co-operate in efforts to show the public the folly of employing poorly equipped teachers who may be available at low salaries.
5. Teachers must learn to treat the non-conforming or exceptional pupil in the same professional manner as the specialist in medicine treats a patient.
6. Teachers must support the code of ethics agreed upon by the professional group.
7. Teachers must recognize the obligation to support the programs of the local, state and national organizations of teachers and must cease to be individualistic in their attitude toward movements for the betterment of the profession.
8. (To be supplied after discussion.)

IV. How would children benefit through the professionalization of of teaching?

1. More children would succeed in their school work in terms of their potential abilities.
2. More children would find happiness and satisfaction in their school life.
3. More children would find their special talents conserved and utilized.
4. More children would have teachers of broad training, sympathy and interests.
5. (To be supplied after discussion.)

V. How will the public benefit through the professionalization of of teaching?

1. Teachers would become more expert in helping children

to make adjustments to their physical and social environments.

2. Teachers would become more expert in conserving the talents of children.
3. The public would receive more efficient aid in solving perplexing problems in such fields as health, vocational training and civic betterment.
4. (To be supplied after discussion.)

VI. How will teachers benefit through the professionalization of teaching?

1. More genuine satisfaction will be experienced by the teacher.
2. Greater respect will be accorded the opinions of teachers on educational, social and civic problems.
3. Better salaries for teachers will follow the giving of more expert service.
4. More permanent tenure will follow when the public ranks teaching as a profession.
5. Better retirement legislation for teachers will be granted by an appreciative public.
6. (To be supplied after discussion.)

VII. What evidence is there that teaching is becoming a profession?

1. Within the past five years there has developed a demand for the preparation of state and national professional ethics and for the creation of committees or commissions to interpret and to apply these codes in specific cases.
2. Within the past ten years thousands of dollars have been expended on research in the field of the curriculum and in other educational fields.
3. Within the past few years experimental schools and educational laboratories have been established in such universities as Yale, Columbia, Chicago, Minnesota, Iowa, Wisconsin and Michigan.
4. Within recent years many normal schools have changed from two-year institutions to four-year teachers' colleges.
5. Within the past ten years the Michigan Education Association has grown from a membership of a few thousands to a membership of more than 30,000.
6. The following summary recently issued by the National Education Association furnishes much evidence that teaching is becoming a profession:

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200,000	Members in the State Education Association	650,000

7. Within the past five years there has been an increased demand that well trained educational specialists be employed in our schools (vocational counsellors, psychologists, supervisors).

8. (To be supplied after discussion.)

VIII. How do some teachers retard the development of teaching as a profession?

1. By treating lightly any discussion of professional topics.
2. By entering teaching with a minimum preparation and continuing to teach without further training.
3. By thinking of teaching as a makeshift occupation or as a job for misfits in other professions.
4. By neglecting to become acquainted with the recently created scientific literature in the field of education as reported in professional magazines.
5. By bringing criticisms on the profession as a whole through their careless treatment of contracts and other professional obligations.
6. By rendering such inferior service that the public becomes dissatisfied and disgruntled with the profession as a whole.
7. By opposing without good cause the efforts of educational organizations to build a profession of teaching.
8. (To be supplied after discussion.)

IX. What are some of the immediate contributions that a teacher can make toward making a recognized profession?

1. Study the programs of the local, state, and national professional organizations and become an intelligent and aggressive supporter of their programs or offer constructive criticisms of the programs.
2. Seek to become familiar with the scientific literature that may be applied to one's specific task as a teacher.
3. Help to acquaint the public with the fact that the professionalization of teaching will mean better training for the boys and girls in the schools.
4. Aid movements to increase the requirements for admission to the teaching profession.
5. Act in such a manner as to cause the public to feel that a teacher is proud of his membership in the profession of teaching.
6. (To be supplied after discussion.)

- X. Upon whom does the heaviest responsibility rest for developing teaching as a profession?
1. Upon the faculties of teacher-training institutions.
 2. Upon the officers of local, state, and national organizations.
 3. Upon the members of state departments of public instruction and educational boards.
 4. Upon those occupying positions as county commissioners, superintendants, principals, and supervisors.
 5. Upon those members of the profession who have served sufficiently long to become impressed with the importance and significance of the work of the teacher.
 6. (To be supplied after discussion.)

WHO'S WHO IN AVIATION

The First American Woman Licensed to Fly.....	Bessie Coleman
First Negro in America To Receive A Commercial License.....	J. Herman Banning
First Negro Aerial Navigator.....	Lieut. William J. Powell
First Negro Parachute Expert.....	Ed. Smith
First Negro Licensed Airplane Engine Mechanic.....	"Ace" Foreman
First Negroes To Fly Across an International Border.....	Lieut. William J. Powell and J. Herman Banning
Negro Holding Highest Number of Flying Hours.....	J. Herman Banning
First Negro To Organize an Aero Club.....	Lieut. William J. Powell
First Negro To Enter an Airplane Race.....	J. Herman Banning
First Aero Club To Honor Congressman DePriest	Bessie Coleman Aero Club
First Negro Physician Licensed To Fly.....	Dr. A. Porter Davis
First Minister To Fly in Bessie Coleman Planes.....	Rev. L. H. Owens
First Negro Pilot To Fly a Congressman.....	J. Herman Banning

—From Bessie Coleman Aero News.

WHO IS GEORGE'S BEST TEACHER?

By JAMES H. DILLARD

This is an intriguing question and bids for an attempt to reach a happy answer. I have my own answer, but do not ask that it be accepted by anyone without taking thought. Any teacher, for example, who would accept, without thinking, anyone's say-so on such a matter, I should be inclined to set down at once as not being a candidate for the honor roll. I think we might say to any teacher, if any idea can be "sold" to you, or if any propaganda or "cunjer word" can catch you, without your doing some thinking on your own account, you can hardly be a best teacher.

How great is the need for people who can and will think. Of course we need people who are called "good" but there is all the more

need for "good people" to think. Thinkers are needed all the time and everywhere. They are needed in nation and community, needed in statesmanship and business, needed in religion and education. There is no sort of occupation, from farming to preaching, there is no occasion, no project, no program, no crisis in all our human endeavors when the pressing need is not for men who can think straight.

It is often said that schools should train for citizenship, and by this it is often simply meant that some text-book should be used that deals with government. Far more important it is for the making of a good citizen that he should be a man who thinks well, than a man who may be informed about legislative statutes and county organizations, facts which may change in a year. A good citizen is primarily one who forms an intelligent judgment and registers a right decision on any public or social problem with which the community is faced. It is not enough that he have good information and good intention, he must have good sense.

There is a sharp line between the person who has the power and habit of thinking things through and the person who has not such power and habit. Some are naturally gifted with the disposition and ability to think. All of us, gifted or not, can be helped by education. But the education must have education in view. It must put the emphasis on this rather than on curriculum or any other question. The character of curriculum has importance, but not the importance of work done with the constant purpose of begetting and aiding the power and habit of thinking. What George learns is important, but certainly not so important as the discipline of grasping intelligently and accurately what he does learn.

We all say that it is not a string of facts in the head that makes education. General knowledge is good. Special knowledge is good. But information is not necessarily education. It is steady, accurate thinking that marks an educated person. It seems to me that we cannot get away from this.

So, no matter what George's vocation is going to be, is it not the best wish for him that he should be able to give it intelligent thought? And is not the best teacher, therefore, the one who does most to beget the habit of thinking? How to do this is the highest of all problems in education. One solution of the problem seems pretty sure. Day by day George must be brought to use his head, and to work hard, if you please, over the subjects that are set before him in his school. So, I think we may answer our question by saying that George's best teacher is the one who gets out of him the most of willing work, and never, under any circumstances, allows him credit for work he has not done. Such teacher, by holding him to accurate work, is leading him to the habit of thinking. He may sometimes growl a bit about strictness, but in the long run this is the kind of teacher that he respects the most and likes the best.

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