MEDICAL BULLETIN

IN THIS ISSUE

The R.P.C.F. Test for Syphilis
The American High School
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Published semi-monthly from October 15 to June 15 at Minneapolis, Minnesota
Staff Meeting Report

Evaluation of the Reiter Protein Complement Fixation Test, A New "Treponemal" Test for Syphilis*

G. H. Binder, Jr., M.D.†

This paper will review the clinical effectiveness of the Reiter Protein Complement Fixation Test (RPCF)§ as determined by a study undertaken jointly by the Minnesota Department of Health and the Division of Dermatology of the University of Minnesota Medical School.

The problem of reactivity to serologic tests for syphilis (STS) is of particularly grave concern when not supported by positive clinical findings in the history or in the physical examination. A considerable number of such positive reactions may actually represent biologic false positive (BFP) reactions due to other illnesses, either obvious or unsuspected. This study, like the serologic surveys reported by others, has sought to determine the usefulness of the RPCF as an aid in the differential identification of patients who are truly syphilitic and those who are BFP reactors.

Two general categories of antibodies are formed by the human in response to infection with Treponema pallidum. One of these is measured by the serologic tests for syphilis (STS) and the other by tests for treponemal antibodies, including the Treponema Pallida Immobilization Test (TPI), introduced by Nelson in 1949, and the RPCF test, introduced by d'Allesandro more recently. These tests are thought to be much more specific for the disease—past, present, or treated—than are the other serologic tests such as the Wassermann, Kline, Kolmer, etc. As performed in a modern laboratory, however, all tests are considered accurate in the sense of being reproducible, specific for the appropriate antibodies, and reasonably sensitive. All the specimens of sera collected and used during this study were

*This report was given at the Staff Meeting of the University of Minnesota Hospitals on October 23, 1959.
†Medical Fellow, Division of Dermatology
§The RPCF test will soon be performed in selected cases of serologic specimens submitted to the Minnesota Department of Health for aid in the diagnosis or exclusion of syphilis. Announcement of the procedure to be followed for testing will be made in the December 1959 issue of Minnesota Medicine.

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tested by the Kahn, Hinton, and Kolmer-Wassermann procedures (i.e., using old-style lipoidal antigens) and the Kline and quantitative Venereal Disease Research Laboratory procedures (i.e., the two cardiolipin-lecithin-cholesterol tests) as well as by the newer RPCF test. In addition, 20 specimens were checked by performance of the TPI test.

Method

Every patient in this study was thought either to have or have had syphilis or to have a possible BFP reaction. That is, all patients reacted to at least one serologic test for syphilis. Group I consisted of 146 patients for whom clinical information was available from records collected by the Minnesota Department of Health since 1918. Group II consisted of 212 University students who manifested primary or accelerated reactions to smallpox vaccine but had little likelihood of having syphilitic infection; each showed some doubtful STS results but only following vaccination.

Patients in group I were classified on the basis of STS and clinical information before the RPCF results were available. Of the 146 patients in the group, clinical evidence indicated that 86 had had syphilis, and 16 patients had had BPF reactions to STS; in the remaining 44 patients, clinical evidence was insufficient to justify either including or excluding syphilis as a diagnostic possibility.

Results

Results of the RPCF test were reported as:

1. Reactive (R). This is equivalent to 1+, 2+, 3+, or 4+ "positive" reactions on STS reports.
2. Weakly reactive (WR). This is equivalent to "doubtful" (±) reactions on STS reports.
3. Nonreactive (NR). This is equivalent to "negative" (−) STS.
4. Anticomplementary (AC). This term is used in STS reports to indicate the presence of substances in the serum which destroy complement and thus produce a false positive result in both serum and control. No prejudice in interpretation is implied.

The serologic data are presented in Table 1, and clinical data in Table 2.

RPCF Reactive Group

Seventy-three of the 146 patients in group I had reactive RPCF results. Of these 73 reactive results, 63 agreed with the evaluation of the STS and clinical history; four of these 63 pa-
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TABLE 1
CORRELATION OF SEROLOGIC AND CLINICAL DATA

<table>
<thead>
<tr>
<th>Patients Reported as Having Syphilis</th>
<th>Patients Presumed to be BFP Reactors</th>
<th>Serologic and Clinical Data Did Not Allow Exact Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPCF Reactive</td>
<td>68*</td>
<td>RFCF 3 R</td>
</tr>
<tr>
<td>RPCF Weakly Reactive</td>
<td>1 R, 1 WR, then NR</td>
<td>RFCF 0 No TPI</td>
</tr>
<tr>
<td>RPCF Nonreactive</td>
<td>7 8 1 NR</td>
<td>RFCF 4 4 TPI</td>
</tr>
<tr>
<td>RPCF Anti-Complementary</td>
<td>2 3 2 NR</td>
<td>RFCF 0 No TPI</td>
</tr>
<tr>
<td>RPCF Inconsistent</td>
<td>3 0 No TPI</td>
<td>RFCF 1 1 R</td>
</tr>
</tbody>
</table>

*Four patients had confirmatory reactive TPI tests.

TABLE 2
CORRELATION OF TYPE OF SYphilIS AND SEROLOGICAL REACTION

<table>
<thead>
<tr>
<th>Type of Syphilis</th>
<th>Reactive</th>
<th>WR</th>
<th>NR</th>
<th>Inconsistent</th>
<th>AC</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Secondary</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Early Latent (E.L.)</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Late Latent (L.L.)</td>
<td>32</td>
<td>6</td>
<td>10</td>
<td>4</td>
<td>4</td>
<td>53</td>
</tr>
<tr>
<td>Congenital</td>
<td>3</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Ulcero Nodular</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Neurological (C.N.S.)</td>
<td>11</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Cardiovascular (C-V)</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Clinically Negative</td>
<td>10</td>
<td>2</td>
<td>35</td>
<td>0</td>
<td>1</td>
<td>48</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>73</strong></td>
<td><strong>9</strong></td>
<td><strong>55</strong></td>
<td><strong>4</strong></td>
<td><strong>5</strong></td>
<td><strong>146</strong></td>
</tr>
</tbody>
</table>

Patients had reactive TPI tests. Of the remaining 10 patients with reactive results, in five the STS was positive but clinical confirmation was lacking; three of these five patients had reactive TPI tests. In the remaining five patients of this group, the STS reports were doubtful and the clinical history inadequate for diagnosis of syphilis; two of these patients had reactive TPI tests; two others were elderly and had serious systemic diseases which may have produced BFP reactions to both types of test.
On the basis of the above results, an RPCF report of "reactive" strongly suggests the presence of syphilis.

**RPCF Weakly Reactive Group**

Weakly reactive results on the RPCF tests occurred in nine instances (with no opportunity to examine another specimen). In two instances in which the TPI was also used, the results were confirmatory in one and uncertain in the other. In the remainder, the STS report was doubtful in four cases and positive in three. In all but three of the nine patients a diagnosis of syphilis had been made and treatment given years before the RPCF test was performed. Thus the weakly reactive RPCF result probably indicates the presence of syphilis, unless the clinical data strongly suggest the possibility of a BFP result.

**RPCF Nonreactive Group**

Fifty-five of 146 patients had nonreactive RPCF results. In 32 of these 55 patients the STS reports were doubtful, and no clinical evidence of syphilis existed. In five of these 32, the TPI result was also nonreactive, and in one more the TPI was weakly reactive. In another instance the TPCF (Treponema Pallida Complement Fixation) test was variable when performed twice. Five of the remaining 27 patients had clinical conditions which may have caused BFP reactions (pregnancy in three patients, disseminated lupus erythematosus in one patient, and diabetes mellitus in the last patient).

In 13 instances STS reactions were doubtful, but the patients had previously been treated for syphilis. Five of them had had treatment during the primary stage; four had been treated for congenital syphilis; three elderly persons with syphilis of long duration had been treated over long periods; and one young person had had intensive treatment five years previously.

In four instances the STS reports were "positive" but were unsupported by clinical evidence of syphilis. One patient had leukemia, another had arteriosclerotic heart disease, and a third had severe hypertension. The fourth had been treated for syphilis, although a definite diagnosis had never been made; this patient not only had chronic osteomyelitis of the lumbar vertebrae, but he also had lived in tropical areas where he was exposed to various parasitic infestations.

In six additional patients for whom the STS reports were "positive," three had been treated for syphilis of long duration, and three were old people who had had extensive treatment.

On the basis of the above results, a report of "nonreactive"
on the RPCF test suggests the following possibilities, when considered in combination with the STS report:

1. If the STS report is “negative,” the presence of syphilis is unlikely. (Such patients were not included in this study.)

2. If the STS is “doubtful” and (a) there is no other evidence of syphilis, a BFP reaction to the STS is probable and likely; or (b) if there has been previous treatment for syphilis, the nonreactive RPCF report may indicate possible cure after effective treatment.

3. If the STS is “positive” and there is no other evidence of syphilis, the STS reaction probably represents a false positive. If treatment has been given previously, the nonreactivity of the RPCF may reflect the result of treatment of syphilis of long duration.

**RPCF Anticomplementary Group**

In each of five patients for whom only one serologic specimen was submitted, the RPCF result was reported as anticomplementary (AC). Two of these patients had been treated for syphilis some years ago. The other three had no clinical history of syphilis, and two of them had nonreactive TPI tests. All five patients had doubtful STS results. Because the “anticomplementary” report is of no help to the physician, further serologic studies are indicated.

**RPCF Inconsistent Group**

The RPCF test was performed at least once for all patients included in this study. Moreover, for 22 patients from whom further blood specimens were obtained, the test was performed on two, three, or even four specimens. For 18 of these patients the additional tests gave mutually consistent results, while for the other four, they did not. In only one instance could this discrepancy have aroused clinical concern, but the possibility of syphilis was remote even in this case.

**Primary Syphilis**

Six patients were in the primary stage of syphilis. The RPCF did not become reactive until the STS became doubtful or positive. Four months after treatment the RPCF changed from reactive to nonreactive in one patient. In another patient the RPCF remained reactive throughout the course of treatment.

Of the patients who had had early syphilis two to 56 years previously with reasonably prompt therapy, most remained RPCF reactive but STS doubtful. Such data indicate that patients may develop “fastness” or “resistance” to the RPCF even when given prompt and effective therapy. Of three nonreactors
to the RPCF in this group, one had a positive STS reaction and was suspected of serologic relapse; the failure of the RPCF to be reactive might in this case be taken to refute the hypothesis that relapse had occurred.

**Congenital Syphilis**

Seven adult patients who had had congenital syphilis were included in this study; all had had "adequate" antisyphilitic therapy. In four of these patients, the STS results were doubtful or conflicting and the RPCF nonreactive. In the other three the STS results were positive and the RPCF reactive; these serologic data indicate that the patients were serologically "fast," a finding confirmed in each instance by the RPCF results. It is possible that a better index of the response to treatment and possible cure was the nonreactive RPCF results rather than the negative STS results.

**Group II**

Specimens from 212 university students collected following primary or accelerated reactions to vaccinia (BFP from vaccinia) served as a nonsyphilitic control group; they also presented a severe challenge to the RPCF test, because vaccinia frequently stimulates BFP reactions to non-treponemal antigens. BFP reactions to the several STS's for which non-treponemal antigen were used varied from 8 (4 per cent) reactions with the VDRL test to as many as 48 (23 per cent) reactions with the Hinton test. A total of 57 persons (27 per cent) reacted falsely to one or more STS's; none of these persons showed reactivity to the RPCF. One subject with negative STS showed weak reactivity to the RPCF test; a subsequent RPCF test on the same serum specimen was nonreactive. This lack of repeatability suggests two possibilities: 1) The reaction was due to technical error (likely), or 2) the reaction was due to the tendency for vaccinia to produce BFP reactions to the RPCF test with simultaneous BFP to the STS (unlikely).*

On the basis of this experience, at least with vaccinia, the RPCF test is less likely to react falsely than is the STS.

**Comment**

In most cases of reactivity to the RPCF test some confirmatory evidence of syphilis existed. In no case was there strong reason to doubt the presence of syphilis, though the RPCF results could conceivably have included false positive reactions.

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*Additional results and comments on this group of tests were presented before the Society for Investigative Dermatology and will be published in the *Journal for Investigative Dermatology.*
In cases where doubtful or conflicting reactivity to standard serologic tests is accompanied by nonreactivity to the RPCF, several possibilities exist:

1. The RPCF is falsely negative.
2. The STS is falsely positive.
3. Differentiating between 1) and 2) may be impossible without long term observation of the patient.

When in the absence of previous treatment the STS is reported doubtful and the RPCF nonreactive, the latter is probably correct and should be depended upon unless the clinical history (personal or familial) gives evidence to the contrary.

After administration of antisyphilitic treatment: if the STS is more strongly positive than the RPCF, the latter may be a better indicator of satisfactory response to treatment; or if the RPCF is nonreactive, a positive or doubtful STS report may represent false positive reactivity which led to an incorrect diagnosis of syphilis at the time the treatment was instituted.

SUMMARY

In two groups of patients who reacted positively to serologic tests with non-treponemal antigens, these reactions are compared with the results of the Reiter Protein Complement Fixation Test (RPCF), whose antigen is derived from the non-pathogenic Reiter strain of treponeme. As a result of this study, as well as of extensive serologic surveys reported by others, the RPCF test has been demonstrated to be a valuable means of distinguishing truly syphilitic patients from biologic false positive reactors (BFP).
The high school is the one American educational institution not imported. There may be point in recalling this; much of the assessment made of the comprehensive American high school is in terms of contrast with European secondary schools, whose function has been quite different.

Any reminder of the foreign registry of the kindergarten, the elementary school, the college, and the graduate school is parenthetical but worth mention. The first, the kindergarten, and the last, the graduate school, were brought from Germany. It is now common knowledge that G. Stanley Hall, William Rainey Harper, and the few others who organized the first graduate schools in this country had themselves been introduced to postgraduate study as students at Halle, Heidelberg, or in Berlin. The most interesting history, for which we do not have time, attends the debut in St. Louis of the German kindergarten. In recognizing St. Louis as the site of the first kindergarten in the United States, I am overlooking an aborted Boston venture of a few years earlier. It is of greater significance to know that the sponsor of the kindergarten was William Torrey Harris, in 1870 Superintendent of Schools of St. Louis. It would be sporting to suggest that the rejection of the kindergarten by Boston and its adoption in 1873 by St. Louis shows that the intellectual center of gravity had shifted from east to west. There is a case for the intellectual substance of St.

*This report was given October 30, 1959, at a Homecoming Staff Meeting at the University of Minnesota hospitals.
†Professor, History and Philosophy of Education, University of Minnesota
Louis after its influx of German intellectuals fleeing the unsuccessful uprising of 1848. But to make that case, the significance of William T. Harris' backing the kindergarten would be lost.

The point is this: Harris was not only the Superintendent of Schools of St. Louis. Nor was he later simply the first Commissioner of Education in the United States. Harris was one of the leading professional philosophers in the United States. In St. Louis, Harris was the star of the idealistic circle formed by Henry Brokmeyer, Denton J. Snider, Thomas Davidson, and himself. This was the group that initiated the Journal of Speculative Philosophy, today a leading publication in American general philosophy. The Journal had its first issue in 1867 when Harris was Superintendent of Schools in St. Louis. And here is the point. Can you think that today a foremost professional philosopher (Harris probably stood first among American students of Hegel) would be a superintendent of schools? It would be unthinkable. Our philosophers disdain such practical affairs and this minimizes their influence in our life.

The American high school in which many of us received a portion of our education has been the object of sustained disinterest by American scholars since 1905. The rhetoric and grammar of this assertion are questionable; the date, however, may be fixed with precision. It is not that academicians in 1905 abruptly lifted their eyes from the high school and never looked down again, unless down their noses. But it was in 1905 that Nicholas Murray Butler, then President of Columbia University, and bellwether among academicians of his day, walked out of the National Education Association.

Butler's secession from the National Education Association has been noted by historians, but the significance of the withdrawal has not been fully appreciated. It was of the greatest moment for the American high school—and for the elementary school as well.

Butler was a commanding man. When he left the NEA, with him left all the scholars who had previously been members. A prime issue facing the American high school today is how to re-interest scholars in the high school curriculum. Even the elementary school course of study would be improved were educationalists and mathematicians, geographers, historians, biologists, botanists, even physiologists to work in tandem preparing materials for teachers of the elementary grades.

There was such collaboration at the end of the nineteenth century. When the National Education Association set out to study the curriculum of the elementary school it appointed a
Committee of Fifteen for the study. The chairman of that committee was William Torrey Harris, and the committee included a number of college professors.

A Committee of Ten that addressed itself to the reconstruction of secondary education had an even greater number of scholars, including several college presidents.

That was in the 1890's. The collaboration was all over by the end of 1905. The professors of mathematics and their colleagues withdrew into the universities and left the preparation of the elementary and high school curricula to teachers, administrators, and educationalists, like myself.

This is not the time to assess the criticisms that the academicians then began to load onto those who stayed with the task of shaping the American high school. Surely the most justified of the criticisms was that there too were many ad hoc, how-to-do-it methods courses prescribed for future teachers. Less justifiable was the indifference of the scholars to the elementary and secondary schools. If “indifference” is adjudged too harsh, let it be expunged and have the criticism read, rather, that the scholars thought of the elementary school as simply preparatory for the secondary school and the secondary school as simply preparatory for the college.

This was an oversimplification. It was an oversimplification because the American high school was not the German Gymnasium, the French Lycée or the British Grammar School.

Nor was the American elementary school the German Volkschule. Whereas the German Volkschule, or its equivalent elsewhere in Europe, was thought to be a school for the masses who were destined to work by the age of 11 or 12, the American elementary school rapidly evolved into the first stage of an education that forever greater numbers carried on into high school. Today it is the exceptional American youngster who has less than ten years of formal schooling. And the number of students attending high school was great even in 1920. In every decade after 1880 the population of the American high school doubled.

The large numbers of students in the high school turned the high school from being solely college preparatory. This never happened to the continental European school, though it has happened in England as a consequence of the Butler Act of 1944. It is happening in Sweden where today all children have the same schooling for nine years.

Earlier than World War II the European secondary school was thought of as the school of general education preparatory for the specialization of the university. By 1910 it was clear
that the American high school was in fact comprehensive, comprehending those who would go on to college—and now almost 30 per cent of high school seniors do—and others who would leave either the tenth or twelfth grades for marriage or employment, or both.

As the academicians return to an interest in the high school they can be realistic only if they recognize that the comprehensive high school is here to stay. They may be most interested in the college-bound student, but even this degree of concentrated interest will not be easy to indulge. After all, our colleagues are not interested so much in those who in fact do go on to college. They are concerned with the preparation of students who should move into college. At the time of this writing half of the most promising high school seniors do not attend college. It will require the ingenuity of economists and sociologists—at least these students of the behavioral sciences—to learn why these able young people snub the college and how they can be persuaded to undertake further training.

Such research will be a long time coming. Happily, direct involvement of substantive scholarship—such as mathematics, physics, and, I believe, geography—in working out high school syllabi has appeared once again. Nicholas Murray Butler is dead; the scholars are not back in the National Education Association, but under the prodding of Sputnik, the scientists, rather more pressed than the humanists, have returned to work on what the high school shall teach. Some will have heard of the Bowling Green Conference of some three years ago. At Bowling Green, Ohio, educationalists, other professors, and high school teachers or administrators met together for the first time since 1905 for the purpose of discussing the preparation of teachers and the curriculum of the lower schools.

On this campus the interest taken by Paul Rosenbloom, Professor of Mathematics, in the mathematics taught in the elementary school and in the high school signals the renascence of professional concern for the lower schools.

The Conant Report

The American High School Today, the title Dr. Conant has given his report on the comprehensive American high school, leads the field as an example of the scholar taking seriously his obligation to improve the high school. Without doubt the Conant report will make a difference. Unhappily it will make the least difference where the greatest difference has to be made. My reference is to the small rural high school, the school with less than one hundred in its senior class. There may be as many
as ten or twelve thousand of these. True, they do not educate a large proportion of high school students. Nevertheless, these small schools are the least adequate of our high schools. Consolidation and reorganization of school districts is the most effective way of weakening this barrier. Unfortunately, as we will see when dealing with the local and lay control of education, eliminating weak and inadequate school districts is difficult indeed.

The reason for the academic inadequacy of the small high school is that it cannot offer enough history, geography, English, foreign language, mathematics, and science. Its library will be inadequate; there probably will not be enough, if any, laboratory space.

Recognizing this situation brings one to an intimate view of what is basic in the Conant report. The core of this report lies in two theses. The first is that there shall be adequate general education for all students. By general education Conant means that there shall be at least four years of social studies—with history—four years of English, with a good deal of prose composition, one year of science, and one of mathematics. All students are to take this general education. Those who have the promise of being "good college risks," as someone has put it, are to take four years of one foreign language, four years of mathematics, and three of science together with three years of social studies and four years of English. This is the first part of his second point. The second part looks to the bright student; for the more able student, able in any subject offered by the school, there are to be advanced sections or classes.

The third essential element of the Conant report is that for students who wish to prepare for employment on leaving high school and for the girls who look forward to the career of housewife, there shall be vocational and other courses available for election.

For the sake of brevity, grant that vocational and avocational courses should be possible by election. Grant Dr. Conant, too, that there shall be electives even for the boy or girl who plans to enter college. I am afraid even with all this granted, which many will not grant, that Dr. Conant's program will not re-make the American high school where it needs to be reconstructed.

Weakness In The Curriculum

Think only of general and college preparatory education. Dr. Conant's recommendation is sound; it should be adopted. Yet it is limited, perhaps comparable with emergency treatment to reduce symptoms. It goes no more profoundly into the ills of
American secondary education. Dr. Conant actually may not be at all satisfied with what parades under the label of mathematics or science or literature and language study today. But he has not voiced his dissatisfaction, perhaps feeling that our first need is to have these subjects widely studied even without trying to improve their quality.

Dr. Conant is realistic. He knows that it will take tremendous effort to get his program across. Imagine, if you will, that he succeeds. At the point of success the entire course of study will need review. The old content is not viable. Consider English and American literature. American students often are not being taught, and are not reading, the best American and English literature—within their ability to comprehend literature. That which they are permitted to read and count for credit all too often will offer them no insight into the comedy and tragedy of the human condition, as poets and prose writers have depicted the choices that men make and the ideals that move some. But young people need these reviews of alternative choices. They need to know of great expectations, of perennial frailty. Literature should practice them in compassion, in comprehension that forces a distinction between sentimentality and sympathy.

As it is, almost any writing is acceptable as creditable or credit-bearing reading. The course itself may be called English Language Arts. I believe that to be a useful title, denoting what is to be learned. But the course rarely lives up to its title. One of the language arts to exercise and perfect is that of communication. One must admit that excellence in communication is difficult to achieve in school when outside school it has become acceptable to use “real” as an adverb and when the American truck-transport industry for years was torn between labeling vehicles carrying gasoline “inflammable” or “flammable.” The industry finally settled on “flammable,” which is clearly in error. What they meant was “inflammable.” When something does not burn readily it is “noninflammable.” They were like Humpty-Dumpty, making their words mean what they wished, and, one hopes, paying them extra, as Humpty-Dumpty did when his meanings were tortured. It is difficult to combat the wretched English used in our magazines, over the radio and TV, and in movies. It can be done, if it can be done, only when schools require students to speak correctly and to write a great deal. It is not enough to require so many years of history or science, if only in the English class is the teacher literate and demanding of correct handling of meanings.

If the study of science engrosses you more, think of what
courses in science might achieve in the high school. It really
does not matter whether the example be taken from the physics
course designed for the most able students in mathematics or
physical science, or from the so-called "general science" course
that Dr. Conant wishes to have as part of the general education
which no student can avoid.

What shall the course do? Shall it eventuate in helping a
student to be a more able gadgeteer? Shall its purpose be to
memorize the formulation of physical 'laws'? May it not be that
conventionally we have trusted in loading and overloading the
memory to the neglect of disciplining students in the art of care­
ful observation, analysis, and logical inference? This interjection
may warrant more than an aside. I do not know the experi­
mental literature on memory, not, at least, since being bemused by
Ebbinghaus' wry suggestion that human beings, students in­
cluded, tended to forget quite rapidly that which had been
memorized without submission to the organizing force of logical
reasoning. Being out of touch with the work on human memory,
I can but ask myself the rhetorical question; Is there an appli­
cation for education in the fact that knowledge is accumulating
at a rate that is faster and faster, leading from bulk to such bulk
that is unmanageable in terms of remembering what is important
in the aggregate?

I believe that we are being forced to attend more to analyti­
cal faculties than to machine-like remembrance. And this must
touch the thoughts of those attending to the future of high
school education. I am suggesting that we attend more to facts
than to data. I would not wish to make too much of the distinc­
tion but the terms etymologically reviewed make a point. 'Data'
looks back to the pluperfect of the Latin verb do, "to give."
Datus-esse is the pluperfect and, of course, is translated, "to have
been given." Quite proper; data are given. Fact, for its part,
works back to the pluperfect of facio, "to make." Factus-esse
translates, "to have been made." A fact is "made" and data are
"given." I would urge increasing attention to accurate data
gathering and reliable factual inference. Neither calls for a super­
abundance of memory. After all, we have books and increasing
numbers of machine feedbacks.

T. S. Eliot was worried about our everlasting data collecting.
And he wrote of that concern in two fine lines:

What knowledge have we lost in information?
What wisdom have we lost in knowledge?

The point is labored. But I must emphatically say that all
the assumptions underlying the curriculum and organization
of the school desperately need careful review by experiment and research. There is all too little money and effort being invested in research into education. Happily, in this region, we have the Hill Family Foundation which has underwritten fundamental study of the educative process.

I would pass on to three other points: first, the need for more sequential study, then, to an imaginative distinction recently made by the anthropologist, Margaret Mead, and, for a third point, the neglect in education—at all levels—of the “teaching machine.” A fourth point will be a simple plea for more time in school.

**Sequential Study**

One of the more impressive characteristics of education in the Soviet Union is the fact that Soviet educators had decided to carry instruction in physics and chemistry, for example, through four or five years of school. We, on the other hand, usually lump all the physics in one year, all the chemistry in another, all the biology in a third. I am persuaded that the Soviet pattern is superior, and I would urge sequences of five or six years in mathematics and science, in the social studies—history, geography, some economics and political theory—and in the fine arts. Clearly, no such suggestion should be acted upon until there is research to back the suggestion. Then, too, some compromise would be had with this sequence for the student who intended to move from high school to a job. He might wish to have more industrial arts, more mechanical and architectural drawing. Girls with the same expectation might need more practice with office machines and with homemaking—a subject that I think of as including the sociological study of the family and of fine art. Unfortunately, for lack of time, we must forebear extending this reference to other than the college-bound.

I admit to uneasiness in so cavalierly dismissing the need for revision of the curriculum followed by the two-thirds who do not go on to college. Nor is it satisfactory to omit all reference to athletics, student newspapers, dramatics, band and orchestra. But I shall, hoping that there will be time for discussion. Nor am I unaware that these suggestions will cost a good deal of money. It is my opinion that in order to raise the funds necessary, federal aid to education is a necessity.

**Imaginative Distinction**

Margaret Mead last November published in the *Harvard Business Review* an essay titled, “Thinking Ahead: Why Is Education Obsolete?” Miss Mead always is provocative, some-
times making more of a point than properly can be made of it. In her essay this formidable lady anthropologist looks at the educative process and finds it underscoring "vertical transmission" of knowledge—passing it along from an older to a younger generation after the fashion necessary in primitive groups not blessed with books or electronic memories. She favors "lateral transmission" of knowledge, whereby a knowledgeable person instructs another—sometimes older than he—in a skill. The young specialist in programming digital computers instructs the older man, who has limited his skill to operating conventional machines.

Miss Mead is certain that today a very impressive amount of instruction takes place outside the school—in the armed forces, in business and in industry. She would have schoolmen be aware that the high school graduates who have not been in standard college preparatory programs will go on with their schooling while on the job. Our habit has been to think of these young men and women as ending their schooling with high school graduation. All education, therefore, has had to be accomplished by the school. Doubtless Miss Mead is correct, and we shall have to look at the high school curriculum asking what is to be done to prepare almost all youth for education beyond the high school. In a word, Dr. Conant's college-bound boy or girl is but one of three who will be schooled after the twelfth grade.

What is to be done to increase the effectiveness of the preparatory instruction of those who will continue their schooling, though not in a liberal arts college or technical school? Frankly, I have no convincing ideas of my own on this point and am not persuaded to honor thoughts of others I have read. It is an area of issue to whose analysis I would engage you. Here, again, we need research.

The Teaching Machine

We teachers feel threatened at the mention of mechanical substitutes. It is as disturbing to us as the deistic cosmology summed up in deus ex machina was to the eighteenth century theist. TV may supplement our instruction, as the older audiovisual aids abetted the lecture; that much we concede grudgingly, but no more. Machines cannot hear faulty reasoning or clumsy phrasing. True enough. But much learning is learning of correct computation, correct pronunciation, correct grammatical structure, and so on. The Air Force and some industries, I have been told, for some time have found teaching machines effective. Professor B. F. Skinner, a psychologist now on the Harvard
faculty and formerly at the University of Minnesota, has recently been discovered by the New York Times using a teaching machine in his more elementary psychology courses.

Why not? If able scholars have designed a course and divided it finely into consecutive units, why cannot a machine flash "correct" to student's response, "2 x 2 = 4"?

As with earlier observations, I am pinching this one from my friend, Morris L. Cogan, of the Harvard Graduate Department of Education, who will soon, I trust, publish an excellent monograph on the high school curriculum. Teaching machines, as Cogan, E. Paul Torrance, Director of this University's Bureau of Educational Research in the College of Education, and others have been quick to remark, will free teachers from much routine work that is better done by a machine. Consider only the application of the reasonably well-established principle of "reinforcement" in learning—whether the learning of mice or of men. The principle would have you persuaded that a student who has a correct response "rewarded" tends to repeat that response or to "remember" it. A student responding in class, "reciting" as we put it, may be gun-shy; his teacher may react unpleasantly to incorrect responses. A machine, which puts questions in a carefully graded sequence of fine grain, neither smiles or frowns and never clowns. An incorrect response is caught at once and without punishment. The student has an opportunity to correct himself just as soon as he errs. His correct responses are noted immediately, too, and he can practice them, thus reinforcing his learning.

There is nothing overly mechanistic about these machines; they can be seen in action in any language laboratory where students hear tape recordings of languages correctly spoken, record their own pronunciation and play back their recordings, contrasting them with the correct rendition. These language laboratories, as they are called, are undoubtedly efficient.

Why should we teachers feel shouldered aside when a teaching machine is mentioned? We will be left with important teaching. What a machine can do, it will do. There is little intelligence displayed in ignoring technology. But again, we need research, more research into both the learning and teaching processes.

More Time in School

An observer of the high school easily appreciates the need of teaching machines when there is an absolute shortage of teachers and evident preoccupation of the teacher's time with drill and check on rote learning. No more taxing of the imagina-
tion is the need for a longer school week—perhaps a half-day on Saturday and for a shorter summer vacation. Even with homework up to some 15 hours a week, as Dr. Conant recommends for the college-bound, and with shorter class periods—perhaps limited to 45 minutes, permitting more subjects to be taught—there will not be time enough. It might be well to offer some subjects only two or three times a week, as in Europe. But this expedient is no more than an expedient. More time must be allotted to school. To me this surely entails reducing the summer holidays to six weeks and offering summer instruction to those who wish to have it. Will you pardon my asking, yet once again, for research that may suggest whether 45 minute periods or 55 minute periods are effective. We may not have the answers to many of these practical elements of school organization.

WHO SHALL CONTROL PUBLIC EDUCATION?

Any bill of particulars on what shall be done in American public schools must be “passed” by a local, lay school board. In no other country is there similar decentralization of control or so little professional determination of educational policy. We all know that the policy declared by a school board usually is formed, if not actually constructed, by the superintendent of schools and his professional staff. Nonetheless, the professionals are not sufficiently responsible for the design of educational policy. Is this a good thing? As men and women closely associated with a profession whose professional standing is unquestioned, you might give the matter attention. One of the more thoughtful and provocative students of the professional status of education, Professor Myron Lieberman, feels certain that teachers and school administrators of the public elementary and secondary schools never will be professionals—and educational policy for the public schools never will be well-designed—until they, together with representatives of college and university faculties, have greater responsibility for promulgating policy. His reasons are varied but they may be summarized as holding that the schoolboard, if it remains exclusively a board of laymen, is more sensitive to the opinions and desires of community groups and to individuals of status and power in the community, than it is to research and reflection on what constitutes desirable

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1 In cities there usually is an “administrative advisory council” but in smaller communities, the superintendent is apt to be in a lonely position as the professional representative.


educational practice and policy. I agree with Professor Lieberman, though not with all of his arguments or recommendations.

If you will indulge me, I would wish to present a few suggestions that might lead to the improvement of secondary—and elementary education—based on greater professional involvement in planning educational policy. Unhappily I have no experimental data to back my speculation. By training I am a would-be philosopher. What I shall suggest in what follows requires a philosopher's license. As preface to these remarks it might be in order to recall that in the United States the several states have been thought to have major responsibility for providing public education. This is construed from the fact that the Constitution does not specifically name public education as a responsibility of the federal government. At the moment I do not choose to argue the case for or against greater participation of the federal government in either the direction (control) or support of public education. Rather, the point is that the several sovereign states have accepted the responsibility for directing public education and have written laws to this end at the state level.

Indeed, all those who have to do with public education are directed by the states. School board members, for example, may be elected locally, but they are under the direction of the state legislatures and not of the local communities. This last is a point of which many of us are unaware, a fact that troubles me; it indicates the common belief that educational policy for public schools does, and perhaps should, originate in, and rest with, the laymen of a local community. It diminishes the role of the state acting through the state department of education. Indeed, I believe that the regrettable attrition of responsibility for education throughout a state by the state department of education is largely due to the belief that the design of educational policy should be lodged with a local community.

May I suggest that if the legal responsibility for public education is the responsibility of the several state legislatures, the executor of the legislator, which is the department of education, should have greater scope. If the department is to be associated—I hesitate to say "controlled"—by a state board of education, not more than half of the board's members should be laymen. But I see a reduced role for the state board of education.

If one were afraid of bureaucratic control of public education by a state department of education, the most effective means of insuring against it would be to substitute for the present lay state board of education, a board composed of both laymen and representatives of the following: colleges and univer-
sities in the state, and professional educational associations, who would delegate classroom teachers as well as administrators for service on the state board. When I refer to a professional educational association, my denotation, in Minnesota, for example, is the Minnesota Education Association, which has integral sections devoted to the elementary school, to secondary school mathematics, and to all other subject matter areas found in the high school course of study. Here and in the institutions of higher education are those who have the greatest professional preparation for thinking out desirable education for the public schools.

**How the States Would Discharge Their Responsibility for Public Education**

Tentatively, and with no pretense at completeness of description, I would see the several states discharging their responsibility for public education at the elementary and secondary levels in the following manner: The state legislatures, as today, would have responsibility for enacting legislation setting the extent of educational opportunity within the states—for example, the minimum age at which a pupil may drop out of school, the amount of state aids to be given school districts, and the rules governing the licensing of teachers for practice within the state.

It would be the responsibility of the state department of education to set *standards* for public education in the state. And the state department would be authorized to *enforce* standards. For example, if a school district is too sparsely populated and too poor to support the standards that have been established by the state department of education, it should be possible for the state department of education to order a redistricting, based on careful survey, and possible appeal by petitioning the courts for review.

I would wish, now, to come to grips with the local board of education. In my opinion the local board of education may be ineffective and in the next 25 years well may be seen to be a hindrance to more and necessary centralization of planning for public education within the several states. May I suggest only one reason why decentralized control exercised by local lay schoolboards is undesirable? It is a financial reason. Few local districts furnish a sufficiently broad base for financing schools. The state as a whole is the requisite base.

But I would not wish to be misinterpreted as advocating "statism" or as overlooking the importance of communicating with the citizens of our communities. My feeling is that too few
school boards now do an effective job of leading their communi­ties to a greater appreciation or understanding of superior pub­lic education.

If there are to be local school boards, I believe it would im­prove their function to include representatives of elementary and secondary teachers. Should one respond by protesting that teachers are employees of the boards and, therefore, ineligible to share in planning policy, I would suggest that our teachers no longer must be looked upon as hired hands. A more realistic view holds them trustees of impressive responsibility. Granted, we have a long way to go in the matter of selecting teachers and holding them to high standards, both for admission to training, and in the program of their professional and general preparation, as well as in their classroom or administrative per­formance. Progress is being made on the front of selecting and preparing teachers. Institutions undertaking the education of teachers are being held to very high and more realistic stan­dards. To match this forward move in accrediting colleges and universities, the professional standing and responsibilities of teachers must be enlarged.

Clearly, I do not believe that we will advance in elemen­tary or secondary education until the responsibility of our pro­fessionals has been enhanced. If I were to select from the fore­going recommendations the one I feel most important to under­score in bringing these remarks to a close, it would be that of strengthening the state departments of education and moving to a greater centralization of planning in the program of public education within our several states. Obtaining professionals on school boards, however, would crowd for a place close to the top of the list of recommendations.
DERMATOLOGY

Dr. Francis W. Lynch, Director of the Division, has been elected a director of the American Cancer Society, and presented a paper at the Society’s annual scientific sessions in October.

Dr. Henry E. Michelson, Professor Emeritus of the Division of Dermatology, recently participated in the sessions of the Pacific Dermatologic Society and was made an honorary member of the Society.

CANCER BIOLOGY

Dr. John J. Bittner, Director of the Division, spoke on “Recent Studies on Mammary Cancer in Mice” at scientific programs highlighting the dedication of the Roswell Park Memorial Institute’s new biological building in Springville, New York, Sept. 25. Dr. George E. Moore (Med. ’46), formerly of Minnesota, is Director of the Institute.

SURGERY

Dr. Richard L. Varco, Professor of Surgery, has received a $20,000 grant for two years of research on “Delayed Bacterial Hypersensitivity and the Homograft Rejection Pattern” from the National Science Foundation.

Dr. Vincent L. Gott, Instructor, and Dr. Stacev B. Day, Medical Fellow, presented papers at the scientific sessions of the American Heart Association meeting during October in Philadelphia. Dr. Gott spoke on “Glycogen, Lactic Acid and High Energy Phosphate Levels During Hypothermic Arrest of the Human Heart.” The title of Dr. Day’s paper was “Intractable Angina Pectoris with Obliterating Arteriosclerotic Heart Disease in Man Treated by the Operation of Left Atrial Pulmonary Artery Anastomosis.”

PEDIATRICS

Dr. John A. Anderson, Professor and Head, presented a thesis titled “Ammonia Metabolism in Infants and Children” at the regular meeting of the Minnesota Academy of Medicine Oct. 14.

Dr. Lewis W. Wannamaker, Professor, and American Heart Association career investigator in cardiovascular research, was named President-elect of the newly formed Central Society for Pediatric Research. The group held its first annual meeting in October at the State University of Iowa, Iowa City, Ia.
Dr. Warren J. Warwick has returned to the Department following duty with the U. S. Army, and has been awarded a Research Fellowship by the Minnesota Heart Association.

Dr. Robert Ulstrom, Associate Professor, received a U. S. Public Health Service grant for research on the production and metabolism of adrenal cortical hormones in the human newborn infant.

Dr. Howard Worthen received a USPHS grant for research on renal tubular enzymes.

Dr. L. Emmett Holt, Professor and Head of the Department of Pediatrics, New York University College of Medicine, delivered the annual Irvine McQuarrie Lecture at the University of Minnesota on Sept. 23 titled “Protein Economy in the Growing Child.”

MEDICINE

Dr. Wesley W. Spink, Professor, participated in a three day meeting of U. S. Air Force national consultants and command surgeons during October at the USAF hospital, Lackland Air Force Base, Texas. Also attending was Dr. Wallace D. Armstrong, Professor and Head of Physiological Chemistry, who is also a national consultant to the Air Force.

BACTERIOLOGY AND IMMUNOLOGY

Dr. H. C. Lichstein, Professor of Bacteriology and Immunology, presented the annual I. M. Lewis Lecture at the meeting of the Texas Branch of the American Bacteriologists on Oct. 30 in Houston, Tex. Title of his lecture was “Physiological Control Mechanisms in the Bacterial Cell.”

MEDICAL SCHOOL

Dr. Robert B. Howard, Dean of the College of Medical Sciences, and Dr. H. Mead Cavert and Dr. Richard Magraw, Assistant Deans, attended the annual meeting of the Association of American Medical Colleges in Chicago, Nov. 1.
PRESIDENTIAL WELCOME — Dr. Virgil J. P. Lundquist (right), president of the Minnesota Medical Alumni Association, greeted special guest Kenneth P. Manick, senior medical student, at the MMAA Homecoming program October 30. Lundquist is a Minneapolis surgeon. Manick is president of the University of Minnesota Medical Student Council, and president of the senior class.

MEDICAL ALUMNI GATHER FOR HOMECOMING

Two hundred twelve members of the Minnesota Medical Alumni Association, wives, and guests celebrated a Homecoming Reunion Oct. 30 which paid special honor to the 25th Anniversary of the Class of 1934, University of Minnesota Medical School.

Dr. Virgil J. P. Lundquist, president of the reorganized alumni group, served as master of ceremonies, for the event held at the Radisson hotel, Minneapolis. Between the delicious dinner and reunion dance which ended the evening, the Association's annual business meeting was conducted. An amended constitution and set of by-laws were adopted which allowed election of four additional members to the Board of Directors, and provides for direct election of the Association officers by the Board of Directors. Membership on the Board of Directors is now seventeen—12 elected and five ex-officio.

Named to two year terms on the Board were Dr. James C. Mankey ('43); and Dr. Sheldon M. Lagaard ('43), both of Minneapolis; Dr. Charles J. Beck ('41), St. Paul; and Dr. Arthur C. Aufderheide ('46), Duluth. Named to three year terms were Dr. Neil M. Palm ('51), St. Paul; Dr. Virgil J. P. Lundquist ('43), Minneapolis; Dr. Robert H. Monahan ('43) and Dr. Byron B. Cochrane ('38), both of St. Paul. Holdover members include Dr. E. Harvey O'Phelan ('45), Minneapolis; Dr. Clarence J. Rowe, Jr. ('43), St. Paul; and Dr. Norman F. Stone ('45), Minneapolis.

The business sessions were conducted by Dr. Robert H. Monahan, ('43), and Dr. Robert O. Quello, ('36). Drs. Wayne
S. Hagen, ('34), Minneapolis, and James A. Blake, ('34), Hopkins, spoke for the Silver Anniversary Class, and Dean Robert B. Howard ('45) spoke for the Medical School. Mr. Ted Rowell of Baudette, Minn., was host at a social hour preceding the dinner.

A group of 73 Association members attended the Minnesota-Vanderbilt football game in a body the next day. The Medical Alumni Association now has nearly 2,000 members.

FORMER RESIDENTS HONOR DR. PEYTON

Dr. William T. Peyton, Professor and Director of the Division of Neurosurgery, was honored Oct. 22-24 when every one of his former neurosurgical residents reassembled at the Medical School for three days of scientific conferences and reunion.

Now located throughout the United States, these neurosurgeons traveled to Minneapolis to pay respects to their former chief, who has been director of the Division since its establishment in 1937. A banquet was held, at which Dr. N. Logan Leven, St. Paul surgeon, was speaker.

The reunion was arranged by Dr. Lyle French, Professor of Neurosurgery. The present staff of neurosurgical residents also attended. Each member of the visiting group presented a paper on some clinical or research problem encountered since leaving the University of Minnesota.

Attending were:

Dr. Leonard A. Titrud, Minneapolis ('46); Dr. Lyle A. French, University Hospitals, Minneapolis ('46); Dr. Donald R. Simmons, Detroit, Mich. ('47); Dr. Jules D. Levin, Milwaukee, Wis. ('48); Dr. C. Kent Olson, Minneapolis ('50); Dr. Robert L. Merrick, St. Paul ('50); Dr. Paul S. Blake, Minneapolis ('51); Dr. Martin E. Feferman, South Bend, Ind. ('52); Dr. Gerald L. Haines, Schenectady, N. Y. ('52); Dr. Carrel M. Caudill, Charlotte, W. Va. ('53); Dr. David R. Johnson, Minneapolis ('54); Dr. Shelley N. Chou, Bethesda, Md. ('55); Dr. William S. Ogle, Memphis, Tenn. ('55); Dr. Purdue L. Gould, Lakeland, Fla. ('56); Dr. Howard C. Chandler, Jacksonville, Fla. ('56); Dr. Ralph L. Suechting, Neenah, Wis. ('57); Dr. James E. McIntosh, Missoula, Mont. ('57); Dr. Harold Buchstein, Minneapolis ('33); and Dr. Wallace Ritchie, St. Paul.

Present residents attending were Drs. Max Zarling, Joseph Galicich, Richard Strassburger, John Serbu, Erich Wisiol, and Lucien Hodges.
NEUROSURGEONS ATTENDING REUNION

Back Row (left to right): Strassburger, Caudill, Ogle, Blake, Haines, Feferman, Hodges, McIntosh, Wisiol, Chandler, Johnson, Suechting, Chou, Gould, Merrick, and Zarling.

Front Row (left to right): Olson, Buchstein, Levin, Peyton, French, Titrud, and Simmons.
**THE MEDICAL BULLETIN**

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**Progress Report**

**Class of 1959 Scholarship Fund**

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*To underwrite a “Class of 1959 Scholarship” for a meritorious medical student in September 1963.
Coming Events

at the

University of Minnesota Medical School

Courses in Continuation Medical Education During 1960

January 21-23 . . . Surgery for Surgeons
February 8-10 . . . Cardiovascular Diseases for General Physicians and Specialists
February 15-19 . . . Pediatric Neurology for Specialists
February 29-March 2 Pediatrics for General Physicians
March 14-16 . . . . Internal Medicine for Internists
March 19 . . . . . Trauma for General Physicians
March 28-April 1 . . Endocrinology for General Physicians
April 7-9 . . . . . Emergency Surgery for Surgeons
April 11-13 . . . . Radiology for General Physicians
April 21-23 . . . . Otolaryngology for General Physicians
May 2-6 . . . . . Intermediate Electrocardiography for General Physicians and Specialists
May 16-18 . . . . Office Psychotherapy for General Physicians
May 23-27 . . . . Proctology for General Physicians

Courses are held at the Center for Continuation Study or at the Mayo Memorial Auditorium on the campus of the University of Minnesota. Usual tuition fees are $10 for a one-day course, $40 for a three-day course, and $65 for a one-week course. These are subject to change under certain circumstances.

Register early. For further information write to:

Director
Dept. of Continuation Medical Education
1342 Mayo Memorial — University of Minnesota
Minneapolis 14, Minnesota
Join the
Minnesota
Medical Foundation
Today!