The Forerunner of a MANUAL ON THE HIGHWAY TO MASTERY OR HOW TO STUDY
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DEDICATION

Dear Fellow Students of Five-50-One:

FOR a long time I have been trying to put into reasonably finished form some suggestions about Method in Study. Delay after delay has occurred. I am determined to pass on at once for your testing, and I trust for some help, a hurried selection from voluminous notes.

I shall appreciate your cooperation in producing a second, enlarged, and improved edition of this "Bookie" in the not distant future.

The Author.
THE CONVENIENT CONVEYANCE
ON
THE HIGHWAY TO MASTERY
OR
HOW TO STUDY

Called Convenient because:

1. Convenience is commonly consulted even by students.

2. Convenience is generally to be preferred, other things being equal.

3. Convenience means coming together. The fact is that things are together. Relativity is a word not uncommon today. What we need to do is to recognize relationships. "Things do hook and eye together", truly said Dr. Hasbrook to me once.

The Convenient Method is based upon this thesis: *Everything to be remembered and recalled at will should be introduced into the mind in recognized relation to something else.* The relation should be natural; that is, the relation should be according to the facts in the case, and it should be true to the laws of the mind. Note the significance of the word recognized in the thesis sentence above.

What about the laws of the mind? Here is a classification which has helped many.* Of this table one

*Aristotle classifies the laws of suggestion thus:
1. Similarity.
2. Contrast.
3. Contiguity.
All are then condensed to Contiguity.
writes: "I wish some one had given me that when I was in school."

I. Comparison (Resemblance).
   1. In sound—e.g., High, Nigh.
   2. In appearance—e.g., Eagle, Vulture.
   3. In meaning—Road, Way.
   4. In use—Pen, Pencil.

II. Contrast.
   1. In sound—Whisper, Whistle.
   2. In appearance—Giant, Pigmy.
   3. In meaning—High, Low.
   4. In use—Pencil, Eraser.

III. Contiguity.
   1. In time—May, Flowers.
   2. In space—North pole, Lee.
   3. In experience—Thunder, Fright.
   4. In history—Charles V., Henry VIII.

IV. Conjunction (Logical connection).
   3. Whole and part—Apple, Core.

Suggestion: Write down one hundred words in a column just as they come to you beginning with the word Washington. Confine the mind as exclusively to the word Washington as you conveniently can without strain, and write the second word, the word which is suggested to you while thinking of Washington. Then dismiss Washington and think of the second word as exclusively as you did of Washington. Take for the third word the one which comes to you from the second. Proceed in this fashion through to the one hundredth word.

Now look away from the paper and beginning with Washington repeat from memory the entire list.

Then begin at the last word and return to the beginning.

Next classify the relations existing between the words according to the table above, and thus discover what your type of mind is. It might be well to proceed to intelligent mental exercise in the light of your discovery. Judge yourself, asking such questions as: Is there any tendency in me to disproportionate use of any law or laws of suggestion? Am I strong or weak on Conjunction (logical connection)? Does my list of words indicate that I am superficial or limited in my thinking? Have I or have I not a wide range of thought? Has or has not my reading been narrow as indicated by this list? Is there much or little of historical suggestion here? What laws (of the four general laws) are most common in general use? Are these much used by me? Does my list indicate that I have been cultivating my powers of observation? Are ideas, which to most people are unrelated, bound together in my mind?

TO DO NEXT

Beginning at the tenth chapter of the book of Proverbs in the Bible, note the use of the word BUT in the remainder of the book; note also use of the words, AS, SO, and LIKE. What laws of the mind are here employed? Examine the first Psalm also for LIKE and BUT. Look also for Conjunctions. By the way, the part of speech known in grammar as conjunction is a very important one to watch. Check yourself and others mentally on the use of such. There is much inaccurate thinking and in consequence much inaccurate speaking and writing. The Convenient Way properly followed, tends to recognition of reality.

A THING NOT TO DO

Do not try to force yourself to study. Rather direct attention thoughtfully. By so doing you will
observe and consequently you will become interested. Quietly, without anxiety, but with definite objective and firm determination proceed to observe, to describe, to estimate the value of, and to express. Think of study as a privilege and a pleasure, both of which it is, when properly conducted. Interest and concentration are wooed by thoughtfully directed attention. Observe. Observe.

The advice just given is endorsed by Dr. Eliot of Harvard when he says that four elements enter into the process of education, viz.:

1. Exact observation.
2. Correct description.

I should venture to add a fifth—Implicty obedience. We should respond with alacrity to light which comes from whatever quarter.

"Light obeyed increasest light;
Light rejected bringeth night."

THE CAMPUS AND THE MARKET AGREE

While dictating these lines, my attention has been directed to an article in The American Magazine for July, 1929, in which the importance of Observation is emphasized in a manner highly significant. The title of the article is, "How Big Men Think and Act." Mr. M. K. Wisehart reports an interview with Mr. Ivy L. Lee who relates experiences resulting from long contact with leading men of affairs. Mr. Lee mentions five traits which are common to business bigness. Here they are:

1. Accuracy of observation.
2. Soundness of judgment.
3. Frankness.
4. Enthusiasm.
5. Faith.

Compare this list with that of Dr. Eliot. By all means read the Article in the July, 1929 American. Here is a paragraph from it:

"I think the achievements of the big men in industry, business, or finance (or for that matter in any other sphere) depends upon these two things: First, accuracy of observation; second, soundness of judgment. They are the great foundation stones. The first inevitably makes for the second; the second cannot exist without the first."

MORE ABOUT OBSERVATION

Following is copied from a letter which I wrote to a friend in Iowa April 24, 1928:

"I have read your letter with deep interest. Your remarks about ‘Observations’ interest me much. Let me quote a few sentences from Dewey’s How We Think, Chapter 14, which I consider very much to the point:

"Thinking is an ordering of subject matter with reference to discovering what it signifies or indicates. . . . Observation and communication of information by others are the channels of obtaining subject matter.

"Observation furnished the material for reflective processes.

"Carry on observations with a definite objective in mind. (Page 191.)

"Scientific men make the accumulation of observation a means to a general conclusion. (Page 192.)

"Observation is exploration. (Page 193.)

"Observation is to be discriminated from recognition, or perception of what is familiar. (Page 193.)

"Do not fail to distinguish between automatic recognition and the searching attitude of genuine observation. (Page 193.)"
"Watch against reducing observation to mere dissection and enumeration. (Page 195.)"

"The native and unspoiled attitude of childhood, marked by ardent curiosity, fervent imagination, and love of experimental inquiry, is near, very near, to the attitude of the scientific mind."

"Will you permit a remark or two about your page on ‘types of valuable observations’? It strikes me that these are mostly generalizations, each based upon a series of observations. Be careful to distinguish between observation, interpretation, impression, generalization, application, conclusion, and the rest. Read carefully the Standard Dictionary or Webster’s; in fact, two or three different dictionaries, on the word observation, and note distinctions which are made. I sometimes distinguish between simple observations, complex observations, and compound observations. A good way to make plain what is meant by an observation is to take a short passage like the first Psalm, read it over, and call attention to what is there, or ask those who listen to you to tell you what is there. I have tried this with the first Psalm on different classes. All kinds of interpretations, applications, impressions, conclusions and suppositions have been suggested. With a bunch up at the Bay, I think it was, last summer, I did this, and after quite a while I asked them to notice that there is a tree in this first Psalm! There is chaff too; and a seat, and ways and a way. There is water and green leaves, and wind, and a congregation!

"It is the scientific mind that we must more and more seek to cultivate in the religious realm in education. The tendency is to take too many things for granted. If we are going to meet the scientific people of the day, we must get right down to the simple cold facts and hold strictly to them and compel conclusions on the facts and the facts alone."

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A CHALLENGING CLUSTER—STOP! LOOK! LISTEN!


How about a few

CHOICE ARRESTING STATEMENTS

concerning study and teaching?

1. "The habit of sound thinking is better than a thousand thoughts."—J. H. Thornwell.
2. Everything to be remembered and recalled at will should be introduced into the mind in a recognized relation to something else.
3. "Out of every thousand who speak there is only one who thinks, and out of every thousand who think there is only one who sees." Observe! Observe! Observe!
4. "The magician does good in various ways, one of which is that he can demonstrate how imperfect are our powers of observation."—Frank Crane.
5. "I give a pupil one corner of a subject and if he cannot find the other three corners, I do not want him as my pupil."—Confucius.
6. Seize the moment of excited curiosity in which to fix knowledge.
7. Guard against the superanalytic tendency of the modern mind, "which often disintegrates what depends for its value on being kept whole and entire."
8. "A practical interest is the highest possible incentive to theoretic knowledge."—George Macdonald.
9. "An accurate knowledge of any subject connected with a carefully matured sense of relativity of that subject to other subjects involves an enormous self-development."—Arnold Bennett.
STOP!
LOOK! LISTEN!
Boys and Girls

"THINGS HOOK and EYE TOGETHER"
(This is Einsteinish. Things are related)

WISE PEOPLE FOLLOW
NATURE'S WAY

ARNOLD BENNETT SUGGESTS MATTHEW ARNOLD

This connection is doubly related because I have at this juncture turned up a diagram in which the fact is emphasized that thoughtfully to read is to study, and on the rim of the picture Matthew Arnold writes to Charles Reade about the Bible. Here is the diagram.*

HOW TO STUDY THE BIBLE
READ — READ — READ
Thoughtfully to read is to study.
Read in the best version obtainable in your mother tongue.
Read thoughtfully.
Read repeatedly. Return often to the beginning.
Read telescopically. In light of whole.
Read aloud interpretatively.
Read patiently.
Read selectively, rapidly. Scan for leading ideas and outstanding features.
Read prayerfully, humbly, open-mindedly.
Read imaginatively, visualizingly, reproducingly.
Read reflectively, unhurriedly, meditatively.
Read purposefully in light of aim of writer and for practical ends.
Read judicially. "It is as hard to reason accurately as to observe accurately."
Read acquisitively, recollectively, with propensity to get and to keep. Record results.

Matthew Arnold once wrote to Charles Reade, the novelist: "The old Bible is getting to be to us literary men a sealed book. I wish, Reade, that you would take

* Because of impossibility of securing the diagram in time, the suggestions are put in order as above, with the sentence from Arnold to Reade quoted below.
up the Old Testament and go through it as though every page were altogether new to you—as though you had never read a line of it before. It will astonish you."

"THAT'S ALL TODAY"

Many years ago a young man fresh from Johns Hopkins University was called upon suddenly to take charge of a class in Shakespeare. The Professor whom he succeeded was a veteran of the "scientific" school of literary research, one who could spend an hour discussing the age of Anne Hathaway or whether a punctuation mark on the thirty-third page of the First Folio was a period or a fly speck.

The newcomer faced a class expecting something of the same sort, only more so. But his first question was a surprise: "How many of you have come provided with Shakespeare? None of you? Well, every one in the class must have Shakespeare complete tomorrow. That's all for today."

The next morning the campus saw a curious sight. A procession of students came toiling up the hill loaded down with the Immortal Bard in all shapes and bindings. "Have you all Shakespeare now?" asked the Professor. "Well read him. After that I shall have something to say. Class is dismissed."

The young man who started on his career in this unconventional style is now at the head of the English department in one of our largest universities. He still insists that his students read the books they are talking about. (P. P. C. of Shakespeare, in New York Independent, June, 1916.)

Moulton says: "We have done almost everything with these Hebrew and Greek writings (The Bible). We have overlaid them, clause by clause, with exhaustive commentaries we have translated them, revised the translations, and quarreled over the revisions; we have discussed authenticity and inspiration, and suggested textual criticism with colored type; we have mechanically divided the whole into chapters and verses, and have sought texts to memorize and quote; we have epitomized into handbooks and extracted school lessons; we have recast from the feminine standpoint, and even from the standpoint of the next century. There is yet one thing to do with the Bible—simply to read it."

Remember that thoughtfully to read is to study. Next time, another hint—"That's all today."

(From Christian Leadership, April, 1926.)

"PLEASE COME BACK"

It is a conference. The Teacher, a real Teacher, not a lecturer—had been there for two or three seasons. They thought they wanted a change. So the lecturer came. The results have not justified his continuance. They return to the Teacher; "Please come back", they say. Thus is wisdom justified of her children. What is the difference between the two types? Let Professor Garman answer: "Not what we can give the student, but what we can induce him to get and to give his estimate of, so that we may know how to direct him in further study."

FOR THE TEACHER

1. Gain the confidence of the student.
2. Arouse the interest of the student.
3. Stimulate the attention of the student.
4. Impart impetus to the student.
5. Induce the activity of the student.
6. Give direction to the student.

"Why not begin by showing him the object itself."—Rousseau.

"Allow for a voice from within as well as a fact from without."—Alonzo Smith.
"Most of the elements contained in the cognition of an observed object are not known immediately through the senses, but are mediately known through instantaneous ratiocination."—H. Spencer.

CERTAIN STADIA IN THE HIGHWAY TO MASTERY

<table>
<thead>
<tr>
<th>1. &quot;Image the Whole&quot;</th>
<th>Synopsise</th>
<th>Imagination</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. &quot;Execute the Parts&quot;</td>
<td>Katathesise</td>
<td>Observation</td>
</tr>
<tr>
<td>(Take apart)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Relate the Parts</td>
<td>Analyze</td>
<td>Association</td>
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<tr>
<td>(Note relation of parts)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Group the Parts</td>
<td>Syllableise</td>
<td>Relation</td>
</tr>
<tr>
<td>(Bring into groups of parts)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Group the Groups of Parts</td>
<td>Synagogise</td>
<td>Construction</td>
</tr>
<tr>
<td>(Bring the groups together. Secure concept of the unity of the manifold.)</td>
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<td></td>
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<tr>
<td>6. Reimage the Whole</td>
<td>Symmetricise</td>
<td>Super-inspection</td>
</tr>
<tr>
<td>(Distinguish synthetic unity)</td>
<td></td>
<td></td>
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<tr>
<td>7. Test the Whole</td>
<td>Synergetise</td>
<td>Transaction</td>
</tr>
<tr>
<td>(Prove accuracy by action)</td>
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<td></td>
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<tr>
<td>8. Resurvey the Whole</td>
<td>Pantathesise</td>
<td>Perspective</td>
</tr>
<tr>
<td>9. Select THE Part</td>
<td>Thesthesise</td>
<td>Valuation</td>
</tr>
<tr>
<td>(Discover the mainspring)</td>
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<td></td>
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<tr>
<td>10. Subordinate the Parts</td>
<td>Palinthesise</td>
<td>Revaluation</td>
</tr>
<tr>
<td>(Comparison)</td>
<td></td>
<td></td>
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<tr>
<td>11. Condense the Whole</td>
<td>Metathesise</td>
<td>Comprehension</td>
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<tr>
<td>(Involving ability to omit.)</td>
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<tr>
<td>12. Elaborate some part</td>
<td>Anástasise</td>
<td>Presentation</td>
</tr>
<tr>
<td>(Do so with every part)</td>
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<tr>
<td>13. Reconsider the Whole</td>
<td>Deuteromópsise</td>
<td>Retention</td>
</tr>
<tr>
<td>(Review)</td>
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If the above should not make special appeal to you, try thinking of becoming thoroughly acquainted, especially down through the first nine steps, with the construction of a watch or an automobile.

A LEGALLY TRAINED VIEW

(Excerpt from letter of a lawyer dated May 2, 1928)

"To my mind an 'Outline Study' of a substantive subject has three purposes to fulfil. First, an acquaintance with the subject (dissection); second, a summation of the subject (examination of its constituent parts); and third, values (a) as a basis of knowledge, (b) as a thought builder for the worker, and (c) consequent possibilities to those with whom the worker comes into contact. These are the things which I have had in mind in the examination of these papers."

FIVE SUGGESTIONS ABOUT METHOD

1. The spirit of investigation.
2. The habit of observation.
3. The process of formulation.
4. The action of verification.
5. The fruitage in realization.

"It is the formula that counts."

ANOTHER PUTTING OF IT

FIVE STEPS LEADING TO ACQUISITION

1. The will to attention.
2. The thoughtfulness to observe.
3. The recognition and discovery of relationships.
4. The clutch and glow of interest.
5. The detachment of concentration.

*The occasion of the above statement was the examination of certain analysts of the Epistle to the Romans.
A DOUBLE HANDFUL
For Boys and Girls—and Everybody else, or
TEN HANDY HINTS ABOUT HOW TO STUDY

1. Who?
2. What?
3. Where?
4. When?
5. Whence?

Wherefore?

Why?

Whither?

Which?

How?

The Six Fingered Prodigy
Suggested by Kipling in "Just So Stories"

"I keep six honest serving men;
(They taught me all I know.)
Their names are WHAT and WHERE and WHEN
And HOW and WHY and WHO."
RUSKIN'S NINE LAWS OF CONSTRUCTION

1. Principality.
2. Repetition.
3. Continuity.
5. Radiation.
6. Contrast.
7. Interchange.
8. Consistency.

Suggestion: Test the construction of the eighth chapter of the Gospel by John by these laws. Composition in architecture and composition in language and literature have common laws.

FOR BOYS AND GIRLS SOME DAY

I may not now proceed much further. I am trying to select from rather extensive notes and experiments in study and in teaching, some things which may be most helpful to the average student, especially to boys and girls in the early school grades.

My eye just now falls on an attempt once made to put into form

TWELVE EASY LESSONS ABOUT HOW TO STUDY

The plan, a try out, fell into this shape:

I. The fact that "things hook and eye together".

II. How a good many things do "hook and eye together".

III. How many other "things hook and eye together".

IV. How yet other "things hook and eye together".

TEN HANDY HINTS

About How To Get Your Lessons

For Boys and Girls and Everybody Else

1. Who? Whom — to, for, by, from, with, before, etc. (person)

2. What? To, for, by, from, with, before, etc. (things)

3. Where? (place)

4. When? (time)

5. Whence? (origins)

See the other hand for the other five

AN OPEN HAND

Look for the other handful

Where the other hand is usually found

(You will probably make a mistake here. So I'll guide you. Look on the last page. Do not look on the next page)
V. How to get things to "hook and eye together".
VI. How to keep things hooked and eyed together.
("See that hump?")
VII. Yet further about how to keep things hooked and eyed together.
VIII. Imagination and hooking and eyeing things together.
IX. A definite objective and hooking and eyeing things together.
X. The will and hooking and eyeing things together.
XI. The feelings (interest) and hooking and eyeing things together.
XII. The senses (seeing, hearing, etc.) and common-sense in hooking and eyeing things together.

Would you like to have some suggestions along these lines? Perhaps I may be able to offer some some day. In the meantime, work along paths suggested above and see what may come of it.

CONCERNING METHOD
(To Read as Soon as Possible)
1. The Student, The Fish and Agassiz.—See Appendix No. 1.
2. James Russell Lowell and The Divinia Commedia.—See Appendix No. 2.
3. The latter part of the Introduction to Browning Study Programs, by Helen Clark and Charlotte Porter.
4. The Scientific Method, by Milton Fairchild.—See Appendix No. 3.

5. The Humanizing of Knowledge, by James Harvey Robinson.
6. How We Think, by John Dewey.

IN CONCLUSION FOR THE PRESENT
"Image the whole, then execute the parts. 
Fancy the fabric
Quite ere you build;
Ere steel strike fire from quartz;
Ere mortar dab brick."
—Browning in The Grammarian's Funeral.

"Angels ... who perceive
With undistempered and unclouded spirit
The object as it is; but for ourselves,
That speculative height we may not reach."
—Wordsworth in The Excursion.

I close with the question to William Wordsworth—
WHY NOT?

Faithfully yours,
WILBERT W. WHITE.
APPENDIX NO. 1

THE STUDENT, THE FISH, AND AGASSIZ

BY THE STUDENT

[This bit of experience with a great teacher is an excellent example of right method—going directly into the subject itself instead of into books about the subject of study. Its application to Bible study is obvious.]

It was more than fifteen years ago that I entered the laboratory of Professor Agassiz, and told him I had enrolled my name in the scientific school as a student of natural history. He asked me a few questions about my object in coming, my antecedents generally, the mode in which I afterwards proposed to use the knowledge I might acquire, and finally, whether I wished to study any special branch. To the latter I replied that while I wished to be well grounded in all departments of zoology, I purposed to devote myself specially to insects.

"When do you wish to begin?" he asked.

"Now," I replied.

This seemed to please him, and with an energetic "Very well," he reached from a shelf a huge jar of specimens in yellow alcohol.

"Take this fish," said he, "and look at it; we call it a Hamulon; by and by I will ask what you have seen."

With that he left me, but in a moment returned with explicit instructions as to the care of the object entrusted to me.

"No man is fit to be a naturalist," said he, "who does not know how to take care of specimens."

I was to keep the fish before me in a tin tray, and occasionally moisten the surface with alcohol from the jar, always taking care to replace the stopper tightly. Those were the days of all the old students will recall the huge, neckless glass bottles with their leaky, wax-beeswaxed corks, half-eaten by insects and ichthyology, the example of the professor who had been infected; and though this alcohol had "a very ancient and fish-sacred perfume," and treated the alcohol as though it were pure water. Still I was conscious of a paralyzing feeling of disappointment, for gazing at a fish did not commend itself to an ardent ichthyologist. My friends at home, too, were annoyed, when they discovered that no amount of eau de cologne would drown the perfume which haunted me like a shadow.

In ten minutes I had seen all that could be seen in that fish, and started in search of the professor, who had however, left the museum; and when I returned, after lingering over some of the odd animals stored in the upper apartment, my specimen was dry all over. I dashed the fluid over the fish as if to reanimate it from a fainting-fit, and looked with anxiety for a return of the normal, sloppiness appearance. This little excitement over, nothing was to be done but return to a stoical gaze at my mute companion. Half an hour passed, an hour, another hour; the fish began to look listless. I turned it over and around; looked it in the face—gladly; from behind, beneath, above, sideways, at a three-quarters view—just as listlessly. I was in despair; at an early hour I concluded that lunch was necessary; so with infinite relief, the fish was carefully replaced in the jar, and for an hour I was free.

On my return, I learned that Professor Agassiz had been at the museum, but had gone and would not return for several hours. My fellow students were too busy to be disturbed by continued conversation. Slowly I drew forth that hideous fish, and with a feeling of desperation again looked at it. I might not use a magnifying glass; instruments of all kinds were interdicted. My two hands, my two eyes and the fish; it seemed a most limited field. I pushed my fingers down its throat to see how sharp its teeth were. I began to count the scales in the different rows until I was convinced that that was nonsense. At last a happy thought struck me—I would draw the fish; and now with surprise I began to discover some features in the creature. Just then the professor returned.

"That is right," said he; "a pencil is one of the best eyes. I am glad to notice, too, that you keep your specimen wet and your bottle corked."

With these encouraging words he added—

"Well, what is it like?"

He listened attentively to my brief rehearsal of the structure of the fish, whose names were still unknown to me: the fringed gill-arches and movable operculum; the pores of the head, fleshly lips, and lidless eyes; the lateral line, the spiny fin, and forked tail; the compressed and arched body. When I had finished, he waited as if expecting more, and then, with an air of disappointment:

"You have not looked very carefully; why," he continued, "you haven't seen one of the most conspicuous features of the animal, which is as plainly before your eyes as the fish itself. Look again; look again!" and he left me to my misery.

I was piqued; I was mortified. Still more of that wretched fish! But now I set myself to the task with a will, and discovered one new thing after another, until I saw how just the professor's criticism had been. The afternoon passed quickly, and when, towards its close, the professor inquired,

"Do you see it yet?"
"No," I replied, "I am certain I do not, but I see how little I saw before."

"That is next best," said he earnestly, "but I won't bear you now; put away your fish and go home; perhaps you will be ready with a better answer in the morning. I will examine you before you look at the fish."

This was disconcerting; not only must I think of my fish all night, studying, without the object before me, what this unknown my new discoveries, I must give an exact account of them the next day. I had a bad memory; so I walked home by Charles river in a distracted state, with my two perplexities.

The cordial greeting from the professor the next morning was reassuring; here was a man who seemed to be quite as anxious as I that I should see for myself what he saw.

"Do you perhaps mean," I asked, "that the fish has symmetrical sides with paired organs?"

His thoroughly pleased, "Of course, of course!" repaid the wakeful hours of the previous night. After he had discoursed most happily and enthusiastically—as he always did—upon the importance of this point, I ventured to ask what I should do next.

"Oh, look at your fish!" he said, and left me again to my own devices. In a little more than an hour he returned and heard my new catalogue.

"That is good, that is good!" he repeated, "but that is not all; go on." And so for three long days he placed that fish before my eyes, forbidding me to look at anything else, or to use any artificial aid. "Look, look, look," was his repeated injunction.

This was the best entomological lesson I ever had—a lesson whose influence has extended to the details of every subsequent study; a legacy the professor has left to me, as he left it to many others, of inestimable value, which we could not buy, with which we cannot part.

A year afterwards, some of us were amusing ourselves with chasing outlandish beasts upon the blackboard. We drew prancing star-fishes; frogs in mortal combat; hydro-headed worms; bellowing fish, standing on their tails, bearing aloft umbrellas; grotesque fishes, with gaping mouths and staring eyes. The professor came in shortly after, and was as much amused as any at our experiments. He looked at the fishes.

"Hemulons, every one of them," he said; "Mr. drew them."

True; and to this day, if I attempt a fish, I can draw nothing but Hemulons.

The fourth day a second fish of the same group was placed beside the first, and I was bidden to point out the resemblances and differences between the two; another and another followed, until the entire family lay before me, and a whole legion of jars covered the table and surrounding shelves; the odor had become a pleasant perfume; and even now, the sight of an old, six-inch, worm-eaten, cock brings fragrant memories.

The whole group of Hemulons was thus brought into review; and whether engaged upon the dissection of the internal organs, preparation and examination of the box framework, or the description of the various parts, Agassiz's training in the method of observing facts and their orderly arrangement, was ever accompanied by the urgent exhortation not to be content with them.

"Facts are stupid things," he would say, "until brought into connection with some general law."

At the end of eight months, it was almost with reluctance that I left these friends and turned to insects; but what I gained by this outside experience has been of greater value than years of later investigation in my favorite groups.—From Appendix American Poems, Houghton, Osgood & Co. 1880. Reprinted here from The Bible Record, October, 1905.

APPENDIX NO. 2

METHOD IN STUDY

BY JAMES RUSSELL LOWELL

(From the original manuscript)

One is sometimes asked by young men to recommend to them a course of reading. My advice would always be to confine yourselves to the supreme books in whatever literature—still better to choose some one great author and grow thoroughly familiar with him. For as all roads lead to Rome, so they all likewise lead thence, and you will find that in order to understand perfectly and weigh exactly any really vital piece of literature, you will be gradually and pleasantly persuaded to studies and explorations of which you little dreamed when you began, and will find yourselves scholars before you are aware. If I may be allowed a personal illustration, it was my own profound admiration for the Divina Commedia of Dante that hied me into what little learning I possess. For remember that there is nothing less fruitful than scholarship for the sake of mere scholarship, nor anything more wearisome in the attainment. But the moment you have an object and a center, attention is quickened, the mother of memory, and whatever you acquire groups and arranges itself in an order which is lucid because it is everywhere in intelligent relation to an object of constant and growing interest.

Thus as respects Dante, I asked myself: What are his points of likeness or unlikeness with the authors of classical antiquity? In how far is either of these an advantage or defect? What and how much modern literature had preceded him? How much was
he indebted to it? How far had the Italian language been subdued and supplied to the use of poetry or prose before his time? How much did he color the style or thought of the authors who followed him? Is it a fault or a merit that he is so thoroughly impregnated with the opinions, passions, and even prejudices not only of his age but his country? Was he right or wrong in being Gibelline? To what extent is a certain freedom of opinion which he shows sometimes on points of religious doctrine to be attributed to the humanizing influence of the Crusades in enlarging the horizon of the Western mind by bringing it in contact with other races, religions and social arrangements? These and a hundred other such questions were constant stimulants to thought and inquiry, stimulants such as no merely objectless and, so to speak, impersonal study could have supplied—From "541" (for May, 1915), published by the students of The Biblical Seminary in New York, 235 East 49th Street, New York City.

APPENDIX NO. 3
THE SCIENTIFIC METHOD

In its evolution, this statement has gone through many revisions. Its present form is approved by so many who have done successful research work that its acceptance as a true description of the scientific method is justified.

This statement will be of utility in all departments of science in high schools and in colleges as a means of instruction. Students can place on their science note books for frequent reference. It will be useful in scientific method, and to all research workers in planning and carrying through experiments, also in evaluating the scientific quality of the researches of others.

MILTON FAIRCHILD.

10 May, '26.

The scientific method necessitates intensive, systematic and persistent brain work under control against misunderstandings, superficiality and bias, and in complete loyalty to reality and the truth.

None but those having aptitude, instruction and training can be successful in the use of the scientific method of thinking.

Description of the Method

(1) GATHER DATA on the problem or within a selected field according to an adequate, sound plan by means of numerous and accurate observations made with the human senses, assisted and corrected by instruments of precision. The observations are usually with a well-defined purpose but sometimes for information according to opportunity. Observations must be recorded in definite terms and measurements and in specific statements. Many observers may collaborate in gathering data.

(2) CLASSIFY AND ORGANIZE DATA on the basis of similarities, variations, activities, processes, causes, results. Distinguish between essential and superficial characters.

(3) GENERALIZE to get principles and theories into tentative form. Use constructive imagination, discernment, known principles to formulate reasonable generalizations that solve the problem or explain the known facts in the selected field. Many researches accept a mass of classified data and verify generalizations and then proceed to solve some problem by formulating hypotheses thereon and verifying these, without including general gathering of data and classification work.

(4) VERIFY generalizations by controlled experiments, by tested predictions of results, by repetition of experiments and the gathering of additional data. Appraise data by coefficients of variations and of correlations, and by probable error. Determine sources of error in method and apparatus, and evaluate by auxiliary investigations. State all assumptions and include them in the conclusions.

(5) REPORT the research in full and subject results of criticism and verification by others competent to collaborate.

(6) ANNOUNCE the results of the research to the general public for practical use.

THE CHARACTERISTICS OF THE SCIENTIST

(1) Sincere and open-minded; not diverted by personal interests.

(2) Alert and alive to truth, vital; not complacent.

(3) Poised; not excitable, hysterical or melancholy.

(4) Discerning and thorough; not superficial.

(5) Accurate; not indefinite.

(6) Inventive and constructive; not lacking initiative.

(7) Independent; not suggestible.

(8) Thoughtful and persistent; not merely impulsive.

(9) Industrious and energetic; not lazy and dilatory.

(10) Executive; not haphazard.

(11) Purposeful; not led merely by likes and dislikes.

(12) Self-confident; not timid.
RESEARCH ON HUMAN BEINGS

A science is any area of knowledge which has been defined and assigned by common consent for intensive study to a group of scientists who by accurate and thorough observation accumulate a mass of applicable data which they classify and organize and knowledge constituting their science. Some of the human sciences are: anthropology, sociology, psychology, physiology, education. The nature sciences are very numerous and new subdivisions are created when intensive research in a restricted area is inaugurated.

It takes many generations of scientists to mature a science by the use of the scientific method, cooperating from generation to generation. The evolution of the sciences is a perpetual undertaking of which are knowledge and the use of knowledge for human welfare, the maturing and perfecting of civilization.

All the basic principles of scientific research must be fulfilled in human research in order to achieve verified generalizations. A "survey" results in a description of a situation, a discussion of the same and advice for use in view of the situation, but a "research" to be positively successful has to produce knowledge theory which has been gotten by induction on reliable data. Research work is the basis of human science as well as of nature science.

The characteristics necessary for success in nature science research and the intellectual immorality listed as obstructions in nature science research must be avoided in human research with even more care, personal judgment of the observers and the reasoning has to deal with very complicated situations.

THE HUMAN BEING A UNIT OF LIFE

A human being is a unit of life, and even though made up of nature material differs in one respect, radically, from a chemical active brain of developed powers furnishes this unit of life a self-direction which interferes with the simpler sequences of research. Causes active in pre-natal life, in childhood or in youth may not produce their effects on a human being completely until elements are being carried out. Children are born into organized groups—home, town, city, state and nation—and are profoundly influenced during development in conduct and character by the culture of these groups. Dormant brain powers come out into full activity late in life sometimes, and there appears sometimes a group stimulation of action involving many persons. In human life the results of causes influencing one generation may not appear until the following generation is in control.

GATHERING DATA IN HUMAN SCIENCES

Data in the human sciences can be gathered with reasonable reliability by using trained discernment in observations by the human senses. Any given research must be under the leadership of a specialist with knowledge and experience in the field of science in which the problem lies, and with research ability. Photography, the dictograph and various testing apparatus can be used to assist the human senses. Interviews and introspections can supplement observations of action, emotions, purposes, restraints and urges. Verifications of data by repeated observations and inquiries are essential to reliability. Statistical treatment of data should be allowed only when classes of data are definitely distinguished and the amount of data is adequate and the individual items reliable. Data relative to many individual persons must be accumulated, classified and organized as large masses of data, in order that adequate bases may be established for generalizations in the human sciences.

HUMAN VARIABLES TO BE TAKEN INTO ACCOUNT

1. Native abilities variables—mechanical skills, intellectual aptitudes, etc.
2. Physical make-up variables—size, height, weight, strength, race, etc.
3. Instincts variables, 13 centers in body organs.
4. Curiosities variables, 6 spheres through the senses.
5. Urges variables, 12 objectives—possessions, knowledge, honors, etc.
6. Characteristics variables, 92 in all—just, sociable, poised, etc.
7. Maturity of personality variables—physical, psycho-development, etc.
8. Personal experiences variables—responsibilities, love affairs, hardships, etc.
9. Information variables—observation, reading, conversation, etc.
10. Convictions and beliefs—religion, politics, morality, etc.

11. Personal interest variables—engineering, science, human welfare, fine arts, etc.

12. Environment influences variables—climate, friends, nation, etc.

It is impossible to isolate one phase of a human being’s life from the totality of its life, and it is unscientific to conduct experiments on one phase in disregard of active causes and variables operative in other phases during the experiments. “Native intelligence” cannot be isolated from personal experiences, acquired knowledge, physical conditions, etc., for purposes of measurement. Comparable groups of human beings cannot be arranged on the basis of “intelligence tests” alone, even assuming that these are reliable for the individual, since variables in curiosities, urges, personal interests, etc., are inadequate by these tests of intelligence, and these variables are active in changing intensity and quantity as causes during the course of experiments. The method of “multiple correlations” cannot eliminate variables which have not been measured and are unknown quantitatively, nor is it applicable when causes are not measurable mathematically, as is the case with human characteristics such as will-power. The “effective intelligence” of an individual at a given moment and under the circumstances can be measured relative to standard tests, but the results will not distinguish from each other the numerous component causes of brain power nor be reliable for other times and circumstances. “Controlled experiments” after the type of nature science experiments are as yet impossible on the major human problems.

**Collaboration Necessary**

There are numerous human sciences, which have been developed in accordance with teaching and research requirements, but these have not yet been organized into a complete system for research work on human problems. The interaction of causes producing human conduct may be illustrated by combining the action of several pendulums in directing the motion of one central stylus. The innumerable variables active in the human personality are a set of harmonic pendulums all swinging at once, with varying speeds and directions, to produce the action of the individual at any given moment. These human variables represent even a higher level of complexity than mechanical pendulums, since a self-active brain is a part of the human mechanism. Because the human being is a unit of life and cannot be divided into isolated and independent fields of research, it will be necessary to arrange for thoroughly organized collaboration among human science research workers, so that the interaction of causes within the human personality may be appreciated relative to all human problems—physiological, psychological, sociological, genetic, ethnological, educational, et cetera. Collaboration among human scientists is essential to successful human research in order that knowledge of these many pendulum combinations of causes may be available during experiments on human problems. The different areas for the gathering of data which belong to the various human sciences should be defined, and basic problems chosen in each of the human sciences for persistent research—the collection or data, the classifying and organizing of data, the discovery of tentative generalizations and the thorough verification of theories.

**Verification in Human Sciences**

Tentative generalizations must be valued merely as opinions until verification has been accomplished. Experiments on a small scale, carried out under trained leaders, on scientific plans, and prolonged for a sufficient time, under normal conditions, and when real motives are operative, repeated again and again with uniformly desirable results, will constitute a verification of plans for human welfare. These small-scale experiments should be planned on thorough studies of the situations to be improved, and according to mental calculations on all the discoverable causal factors of human welfare.

**Intellectual Immoralities**

1. Carelessness in observations, “sloppy work.”
2. Inaccuracy in determining units to be counted in statistical research.
3. Slovenliness in logic, fantastic explanations.
4. Generalizing beyond one’s data.
5. Confusing opinions with knowledge.
6. Confidence in the results of research in disregard of weakness in proof and verification.
7. Contentment with “discussion.”
8. Poor judgment in research plan and procedure.
9. Wavering interest, shifting attention, attracted by peculiar superficialities.
10. Egoism allowed to crowd one to the invention of “new” theories for personal distinction.
11. Inventing interesting theories for the sake of selling them in books, articles, lectures and conversations.
(12) Pride allowed to result in persistent belief in a theory for which one has been given credit.
(13) Formulating an hypothesis on weak bases of facts, and then becoming blind to facts in opposition.
(14) Emotionalism during research, "I believe" instead of "I have proved."
(15) Adjusting theories to popular likes and dislikes.
(16) Opposition to proof of another's theories because of jealousy.
(17) Opposition to a theory merely because of ignorance and stupidity, "I can not see how."
(18) Rushing into print with a report of research work that justifies no conclusions.
(19) Degenerating into a propagandist of an unproved hypothesis, instead of being true to the research purpose of discovering the truth.
(20) Cowardice in supporting a verified generalization because it is unpopular and conflicts with selfish interests.
(21) Impatience, unwillingness to proceed step by step through a research.
(22) Indulgence in dense verbiage for the sake of appearing superlearned.
(23) Ignorance of the mechanism of instruments of precision, which results in their use when out of order.
(24) Popularizing tentative generalizations for the sake of personal publicity.
(25) Resort to the authorities, or to sarcasm and ridicule, against data, arguments and verifications.

Letters of advice are asked from all interested, especially covering ways and means for controlled experiments and other verifications in the human sciences.

CHARACTER EDUCATION INSTITUTION,
(Cherry Chase), Washington, D. C.

ABOUT HOW TO STUDY

Look for the other hand—
Where the other hand ought to be

N.B.—Look also for THE SIX FINGERED PRODIGY suggested by Kipling in "Just So Stories"