IF IT BE admitted that any stimulus which causes activity on the part of individuals in their group life is to be considered as a social force, it must follow that an idea in the mind of a man is to be included in this category. But, says Professor Giddings,

“A true and complete description of anything must include measurements of it. . . . There has been a good deal of unprecise talk among sociologists and social workers about ‘social forces’ . . . Social forces there are; obvious in manifestation or detected by accident, subtle in working or terrific in explosion, and so far known; but they are not yet brought within scientific description, certainly not within the quantitative formulation characteristic of our familiar description of thermo-dynamic, chemical, and electro-magnetic forces.

In measuring forces it is necessary to remember that it is impossible to measure them directly. We can measure them only in terms of what they do. For example, the kinetic energy of water falling from a height through a turbine, of an uncoiling spring, of superheated steam back of a piston head, of an electric current, is measured by the number of pounds it can lift one foot in one second, or by any equivalent work. The intellectual or moral force of a man is measurable to the extent, and only to the extent, that he ‘does things,’ which can be described in terms of units of accomplishment.”

The difficulty of attempting to measure the force of an idea, though it has the potentiality of being transformed into an important social stimulus, is obvious. It is relatively easy to measure the amount of energy contained in a ton of coal, but who would attempt to measure the amount of social energy contained in the doctrines of a Karl Marx, whose theories have been all-important in determining the trend of modern societal development? Perhaps it is this difficulty that accounts for much of the speculative and philosophical nature of the science of sociology at the present time. Sociologists are willing to admit that advance in their field will come with the application of more exacting methodology—possibly through statistical research—and yet in this direction they have as yet accomplished but little. Generalization has been all too unfounded; speculation has been rife—with the result that while much theorizing has been done, tangible and substantiated results are wanting in most instances. Attempts at exact measurement of social forces, the writers feel, are urgently needed; and it is this belief which has led them to offer the following as an effort in the direction indicated.

The ideas which in this experiment are being regarded as social forces center themselves on the one hand in what is commonly known as “fundamentalism” and on the other in what is usually referred to as the scientific movement. Perhaps the most outstanding exponent and ardent advocate of the former is William J. Bryan. Among the leading formulations of the scientific movement is the doctrine of organic evolution. This is not the place to examine the essential contradictions between fundamentalism and science, or to ask whether an opposition to the doctrine of evolution is a necessary corollary to the fundamentalist beliefs. It need only be pointed out that in Mr. Bryan’s opinion the conflict exists. Thus, in a recent exposition of fundamentalism he says:

I venture to assert that the unproven hypothesis of evolution is the root cause of nearly all the dissension within the church. . . . “Liberalism,” however you define it, is built upon the guess to which the euphemistic name of “evolution” has been given.

And again:

The evolutionary hypothesis is the only thing that has seriously menaced religion since the birth of Christ and it menaces all other religions as well as the Christian religion, and civilization as well as religion,—at least, this is the conviction of a multitude who regard belief in God as the fundamental of all beliefs, and see in Christ the hope of the future.

When Mr. Bryan ventures, as he frequently does, to appear before a student audience and to openly challenge the doctrines taught in the class room, especially in the class rooms of the pure sciences, he is raising an issue which has to be fought out in the minds of the young men and women who constitute his audiences. Both Mr. Bryan and the teachers whom he thus directly challenges are devoting themselves to the attempt to mould the beliefs of the students, and having stated their cases, both sincerely hope that com-
violation in the belief of their respective, and inherently contradictory teachings will follow.

Such an occasion will therefore constitute a situation of the kind we have described at the beginning of this paper: here is the impenetrable upon the minds of individuals of two opposing forces each of which may rightly be called a social force. The important question then becomes: what is the resultant?

The opportunity to answer this question in a measure was presented to the writers recently with Mr. Bryan's visit to Dartmouth College. This occasion was all the more unique since Dartmouth is the one college in this country in which all students during their freshman year are required to take a full semester course in evolution. The course covers the evidences for and against the doctrine. It is to be assumed that at this one institution at least, all members of the three upper classes have the background which would enable them to weigh the arguments for and against opposing beliefs regarding man's creation.

No visitor in recent years had been awaited with more expectancy at Dartmouth than was Mr. Bryan. The topic of his talk, “Science vs Evolution,” quite naturally struck a responsive chord in the minds of the students. For a week before his arrival the college paper, The Dartmouth, had been framing the issue; and when Mr. Bryan actually appeared every available inch in the college auditorium had been taken. For a week after he had gone, the problems which he had raised were the chief topics of conversation whenever Dartmouth men came together.

In an effort to measure the results of this unusual intellectual upheaval, which obviously included not alone Mr. Bryan's address, but the subsequent discussion as well, the writers submitted to their students the following questionnaire, the introduction of which is intended to be a fair statement of the generally accepted principles of the evolutionary point of view:

With reference to the doctrine that man evolved from lower animal forms in harmony with general principles of organic evolution:
1. I reject the doctrine completely.
2. While I do not reject it completely I do not believe that the evidence favors it.
3. I am undecided whether to reject or to accept it.
4. While I do not accept it completely I believe the evidence favors it.
5. I accept the doctrine completely.

Those students who heard Mr. Bryan were then asked to indicate which of these statements coincided most nearly with their own beliefs both before and after hearing Mr. Bryan. No classroom discussion was permitted until after the questionnaires had been returned.

Among the students to whom this questionnaire was submitted and all of whom had heard Mr. Bryan, were 39 members of the freshman class, none of whom at the time had taken the compulsory course in evolution. The remainder, numbering 136, were sophomores, juniors and seniors. While the number of cases, a little less than 10 per cent of the entire student body, is not large it may fairly be regarded as an adequate sample of the relatively homogenous college enrollment.

The net results of Mr. Bryan's visit upon the minds of members of the three upper classes may be summarized in the following table:

| NET EFFECT OF MR. BRYAN IN CHANGING BELIEFS AMONG SOPHOMORES, JUNIORS AND SENIORS |
|---|---|---|---|
| | Before hearing | After hearing | Net change in numbers |
| Mr. Bryan | Mr. Bryan | Mr. Bryan |
| Number | Percent | Number | Percent | |
| 70 | 51.6 | 48 | 35.7 | -11 |
| 48 | 35.7 | 15 | 11.0 | +8 |
| 15 | 11.0 | 10 | 7.3 | +5 |
| 10 | 7.3 | 5 | 3.7 | +2 |
| 5 | 3.7 | 2 | 1.5 | +1 |
| 2 | 1.5 | | | |
| Total | 136 | 136 | 100.3 |

Thus before hearing Mr. Bryan, 70 of the men in the above table accepted without reservation the doctrine of organic evolution (Proposition 5). After hearing him this number had been reduced to 59. Before the lecture only two of these men rejected the doctrine completely; after, four men rejected it completely, etc. The column of Net Change shows that a net number of 8 men who were previously on the side of evolution were drawn to a position of doubt; and 7 others were drawn over to the side of non-acceptance.

Some facts of outstanding interest are observed when the above table is compared with the similar returns obtained from the members of the freshman class, who, it should be remembered, had not at the time taken the course in evolution. The freshman table is as follows:

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2 December 8, 1923.
Before hearing Mr. Bryan, 5 members of the freshman group accepted without reservation the doctrine of organic evolution. This number represents 12.8 per cent of the entire freshman group as compared with 51.6 per cent holding similar views in the upper-class group. Similarly, 5 members of the freshman group, 12.8 per cent, rejected the doctrine of evolution without qualifications before hearing Mr. Bryan, as compared with 2 members in the upper-class group, or 1.5 per cent. After hearing Mr. Bryan the number of freshmen accepting the doctrine completely had been reduced from 5 to 4, or to 10.2 per cent. the number rejecting the doctrine completely remained as before, etc.

Here we may call attention to the first of the outstanding results of the inquiry: Partly, it may be presumed, as a result of greater maturity, but in greater part due to their familiarity with the principles of evolution acquired in the compulsory course the percentage of students accepting the doctrine without qualifications was four times greater in the sample representing the upper classes than in the freshman group. Conversely, the percentages of freshmen rejecting the doctrine completely was between eight and nine times as great as the percentage of upper classmen. Moreover, the proportion of freshmen who, while not rejecting the doctrine of evolution completely (before hearing Mr. Bryan) nevertheless believed that what evidence they had did not favor it was four times greater than in the corresponding group representing the upper classmen. Also, as might be expected, the freshman group neither accepting nor rejecting the doctrine was over three times as large proportionately as the corresponding group representing the other classes.

Here, then, is one index of the change of ideas brought about as a result of the impingement of the scientific point of view upon the student mind. As an indication of the change of ideas brought about by the opposing force represented by Mr. Bryan, however, the above tables do not present a wholly comprehensive summary. The extent of the change becomes clear only when a study is made of the shifts of opinion of the individual men, rather than the net results.

In the following table we have compared the actual number of shifts of opinion indicated in our returns with the number of shifts which theoretically might have occurred within the limited number of categories represented in the questionnaire. For example (within the group of upper classmen) any of the 70 students who accepted Proposition 5 (complete acceptance of evolution) theoretically might have shifted to a qualified belief in evolution, to indecision, to qualified rejection or to total rejection. In any of these cases, the shift would have been away from the evolutionist beliefs. He could not in any case (within the categories laid down) have shifted to greater adherence to the doctrine, for the formulation of the question itself would prevent. Similarly, two men who were completely opposed to evolution might become more favorably disposed to it, but could not reject it any more completely. Obviously, the men in opinion classes 2, 3 and 4 might shift in either direction.

It will be clear to the reader that ratios between the numbers of actual shifts and the numbers which are theoretically possible will provide the soundest and most significant measures of the forces involved.

**TABLE III**

<table>
<thead>
<tr>
<th>Direction of shift</th>
<th>Upperclassmen</th>
<th>Freshmen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toward evolution</td>
<td>66</td>
<td>34</td>
</tr>
<tr>
<td>Away from evolution</td>
<td>134</td>
<td>34</td>
</tr>
<tr>
<td>Either direction</td>
<td>136</td>
<td>39</td>
</tr>
</tbody>
</table>

This table gives us our second outstanding conclusion: The views of more than one-quarter of Mr. Bryan’s hearers were changed substantially as a result of his discussion. Among the larger of the two groups represented in our table, nearly
one-quarter of the men who were not already complete disbelievers in evolutionary doctrine were influenced in the direction which Mr. Bryan intended.

This does not mean, however, that these men were actually converted to Mr. Bryan's views. Some of them (whose views before hearing Bryan were represented by Proposition 2) were already disbelievers in evolution and were merely strengthened in their disbelief, (and hence shifted to a belief in Proposition 1). Likewise, other men who accepted evolution completely before hearing him afterward changed so that their positions coincided with Proposition 4, which is still upon the side of evolution. A complete analysis of the figures makes it necessary to determine how many of the students represented in the samples shifted from acceptance of the doctrine in greater or less degree to a position of uncertainty and how many to a position of rejection in greater or less degree; how many from the position of uncertainty to positions of rejection and acceptance; and how many from positions of rejection to positions of acceptance or uncertainty. This is shown in the following table.

**TABLE IV**

<table>
<thead>
<tr>
<th></th>
<th>Upperclassmen</th>
<th>Freshmen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptance to uncertainty</td>
<td>12</td>
<td>88</td>
</tr>
<tr>
<td>Acceptance to rejection</td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td>Uncertainty to rejection</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>Uncertainty to acceptance</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Rejection to acceptance</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Rejection to uncertainty</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Unconverted (in any category)</td>
<td>116</td>
<td>85.4</td>
</tr>
<tr>
<td>Total</td>
<td>136</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Thus, 8.8 per cent of the upperclassmen shifted their position from complete or partial acceptance to a position of uncertainty, etc. From this table it is again clear that the shift in opinion is in the direction of Bryan doctrine, although reversals of opinion are relatively few.

A third conclusion which may be derived from our analysis, therefore, is that Mr. Bryan's appearance on the Dartmouth campus served not so much to create converts as to arouse an attitude of skepticism or caution toward the deductions of the classroom. Whether or not this effect is transitory or permanent is of course not made evident.

It is obvious that the changes cited above have been arrived at in a manner almost mechanical, and in no way show what occurred in the minds of the students. Interesting as are these tables it is equally clear that their value would be enhanced if they were supplemented by data of a qualitative nature. In the attempt to get at the mental processes involved, the students were requested to append to each questionnaire an anonymous statement giving the writer's impressions of Mr. Bryan and his arguments. We now turn to a general appraisal of these replies:

The first conclusion to be drawn from this qualitative data is that many of the students who were unqualified adherents to the doctrine of evolution before hearing Mr. Bryan were reinforced in their convictions, even though our questionnaire did not permit them to express a quantitative change of opinion in the direction of increased intensity of belief. Thus, in several instances men who recorded themselves as accepting Proposition 5 before, attempted to indicate still greater conviction afterward by recording their beliefs as 5 or 6, even though this was not permissible within the framework of the questionnaire. Moreover, such comments as the following indicate inclination of the same kind:

"The more he talks the better for evolutionary doctrine. When analyzed (his) statements were so obviously untrue or senseless that they resulted against rather than for his point. It seems to me that Bryan would throw most students (who are) on the fence to the side of evolution with his old-fashioned ideas of hard-boiled religion, for that is the way I interpreted his religion. Bryan only strengthened my firm belief in evolution. It is a great satisfaction to know from personal observation that the great opponent of creative evolution is only a garrulous old man."

It must be admitted that there were a few indications of shifts in the opposite direction by men whose opinions had not undergone any formal change according to our classification.

The second conclusion to be drawn from this qualitative data is that there was almost general
agreement upon the excellence of Mr. Bryan's oratory. Even the most convinced evolutionists among his hearers were frank to express their admiration in this regard. But a third conclusion represents an antithesis to this: there was likewise almost general agreement, even among those who held to his point of view, that Mr. Bryan's argument against evolution did not constitute an example of what to them seemed rational thinking.

These conclusions may be illustrated by the following citations. The first are from the comments of upperclassmen who both before and after hearing Mr. Bryan were unqualified adherents to the views which he attacked:

Bryan is a silver-tongued orator and held the audience not so much by the stating of facts as by ability, taught by long experience, to keep the audience in the proper frame of mind.

Mr. Bryan is a wonderful orator. He got himself out of many a hole through the use of his wit, humor and evasion.

In my opinion, Bryan is a wonderful orator; he has the power to please an audience and arouse their emotions, but these two things do not make him a scientist.

With regard to his argument, we may set in opposition to these citations the comments of freshmen (presumably the least mature of the two groups of students) who, before hearing Bryan, were unqualified disbelievers in evolution:

I was very disappointed in Mr. Bryan; although he gave his speech very well his argument, examples and references were not good or sound.

I admire the way he upheld the old sound home teachings about religion. The world needs a little more religion in its makeup. However, I do not think he proved anything except his ability to talk.

Throughout the comments, in fact, the evidence shows that the students almost without exception were able to discriminate between Mr. Bryan's oratorical ability and the logic that he employed. They did not allow his skill in the former to cloud their capacity to think upon the subject in hand. This conclusion may seem inconsistent with the facts, previously pointed out, that many of Mr. Bryan's listeners were changed in their beliefs after hearing him. We can do no more than to point out that where this inconsistency existed, it was usually recognized by the students themselves: Thus,

Bryan is without doubt a great orator and it was his oratory rather than his evidence against evolution that somewhat swayed my opinion.

I do not think that he proved anything. He made me, however, undecided as to the true origin of man.

All of his arguments, I thought, were poor, as they did neither break down the ideas of evolution nor build something better in its place. He did, though, make me undecided.

Now, coming back to the previous point, the following citations give additional evidence of the student's ability to distinguish oratory from reason.

He was very clever to bring in ridicule all through the talk, but I think he rather evaded the issue. . . . In short Bryan did not prove any facts for religion nor did he disprove any of the facts of evolution. He was very interesting but hardly instructive.

His speech, which was well delivered, was poor in itself and outside of its emotional appeal very unconvincing. No one would worry about the so-called danger to religion a minute if he had read the speech in a book and not heard Bryan deliver it.

He seemed to me to obscure the real and essential points under a cloud of ridicule and raillery that no doubt pleased the audience but in no way changed our opinions.

Bryan was extremely unfair in his whole argument. In the first place he gave the college to understand that his topic was "Science vs. Evolution." He knew that he could not get an audience if he had announced that he was to give only the theological arguments against evolution, so he stated that he would combat it from the standpoint of science.

He really proved nothing. Whenever a point arose which tended toward a decisive argument for his opponents he dodged it completely.

His arguments were weak and poorly founded. He seemed to be ridiculing evolution, not arguing against it; or probably he considers this a good way of arguing against it.

Bryan said: "Why base your philosophy of life on a theory you can't prove?" Great Caesar! Is there anything more impossible of proof than the Bible itself and the whole story it tells, both in the old and new testaments?

Vituperation and wit are poor and surely non-convincing substitutions for criticism and argument.

He indulged too much in sarcasm and used wit rather than reason to "get across" to his audience.

Instead of trying to bring up the most salient points of conflict between the fundamentalist and evolutionist points of view, he resorted for the most part to ridicule and sarcasm, at which he is master, but which proves nothing.

He does not seem able to get right down to hard cold facts. He is forever wandering about giving little examples that the people think are very good at the time . . . (but which later one realizes) are rather weak.

All of these quotations in one way or another seem to indicate that the students possess intellectual honesty to a considerable degree, a fact
that is further made evident in the following quotations:

He said that a belief in evolution made one agnostic. Even if this were true, its teaching should not be forbidden. How about the search for truth and freedom of speech?

He claimed to have an argument between religion and evolution. Can there be an argument between intelligence and emotion, between fact and feeling?

His whole argument seems to be, "Evolution is wrong because it tends to undermine our faith in God," which after all is no argument at all. It is like saying "Evolution is wrong because it is wrong."

He said that evolution tends to destroy one's belief in a God, especially in a personal God, and that is true; nevertheless, that is a pretty weak argument that evolution is wrong. I had rather laugh at the Bible and believe in evolution than accept unquestioningly a piece of fiction as the truth! How can we accept a thing as true if it will not bear scientific investigation? We have got our minds to think with. Why not try to use them once in a while instead of following a fool like Bryan who says his heart tells him that God is there. He'd better have his heart examined.

Some inkling as to the causes which led more than one-quarter of the men to change their opinions after hearing Mr. Bryan is disclosed in the following citations, which have been prefaced with numerals referring to the propositions in the questionnaire, thus indicating the change which occurred.

(5-4) Although Bryan failed to win me over to his side completely he caused me to reconsider the whole matter and it is through this reconsideration that I intend to draw my final conclusion.

(5-4) He did succeed in showing me that the theory of evolution was not absolutely proven, and that there are many loop-holes in it, but he did not succeed in making me give up the theory.

(5-4) He opened up a new door of thought on this subject which I haven't fathomed yet.

(5-4) He did leave me with the impression that evolution had not as yet been proven as fact, but that it is the result of logical reasoning and experimentation.

(5-4) He did not state facts and therefore I do not believe that he proved anything. However, by his sincerity and masterful oratory he brought back to me the feeling that religion holds a very important place in life and is essential to harmony and human welfare. It is this fact which makes me doubt whether evolution is correct in every detail or not.

(5-4) His argument concerning the missing link in the origin of species seemed to me a very strong one.

(5-3) I was impressed by the way he emphasized the fact that it (evolution) was a guess.

(4-5) Under the stimulus of Bryan I really looked into the theory of evolution and was more firmly convinced that it is correct.

(4-5) His feeble attempt convinced me more than ever that evolution was indisputable.

(4-3) He clearly showed that the "facts" of evolution were based merely on resemblances.

(4-2) Bryan's argument cast enough suspicion on the evidence supporting evolution, to make me feel that it was no harder to believe in the miracles of Christ than it was to believe that man was descended from lower life.

(4-2) Bryan convinced me that there was something more to the evolution of man than the mere Darwinian theory.

In view of Mr. Bryan's statement that the chief cause of the antagonism between fundamentalism and evolution lies in the fact that the acceptance of evolutionist doctrines almost inevitably undermines the Christian faith, it is interesting to read some of the comments of the students upon this point. They are by no means in agreement. The following statements are made by some of those who with Bryan hold to the irreconcilability of the two doctrines:

(5-5) I have lost a great deal of the inborn faith at college and I lost some of it in evolution. If this is a menace, why not "put the label" on the course as Bryan suggested, give everyone the facts at the start, and part of Darwin's life. Then teach the course. We will be prepared.

(5-4) I do believe, as he does, that the theories of evolution are degrading to religion. It has expelled a good many of my former beliefs from my mind.

(5-3) One thing which he said was true—evolution has killed any spiritual God that I used to believe in.

(4-4) He had one good argument and that was that evolution in most cases is ruining the students' religion and ultimately lowering their morality. . . . A person should have some sort of religion and this fact must be met in some way.

(3-4) I remain or am confirmed in my agnostic beliefs.

(4-4) When he says that evolution undermines religion, I agree with him completely. And no greater catastrophe could happen to our nation. But Mr. Bryan is not openminded enough to take into consideration that the facts point to the acceptance of the theory of evolution no matter how distasteful they may appear.

As against this point of view may be cited an even larger number of cases in which the entire compatibility of a belief in evolution with a religious belief is stoutly maintained:

(5-5) My experience has been that before I took evolution I was an agnostic. Evolution brought my religion back. To me it is a most Christian doctrine and in no way incompatible with religion. It made religion real to me—a scientific reality at the basis of everything.

(5-5) He did say one thing that I agree with, and that
is, we should come nearer to God and believe in Him more fully. But the question with me is, which form of belief, Bryan's or the evolutionists', leads us nearer to God? I believe the latter by all means, if it is taught in the right way.

(5-5) Bryan believes that man cannot believe in God and evolution. He believes in God as a static influence and that the world is making no improvement. This does not agree with my point of view that God is a constructive influence and that evolution tells of the improvement of both men and animals.

(5-5) He does not seem to realize the fact that evolution stops at a certain point and that evolutionists call from then on upon some force—"and whether we call it God or anything else—what's the difference?"

(5-5) The fact that so many ministers accept the doctrine contradicts Bryan's doctrine that evolution is destroying Christianity.

(5-5) He proved that some professors who believe in evolution were agnostics but that does not prove that the average person who accepts the general theory would become an agnostic. Might not the professors become agnostic because of their scientific attitudes in general and not just through evolution?

(5-5) His major premise seemed to be—evolution destroys Christianity and Christianity is necessary in this world. I believe that this is false. Evolution may destroy the creeds and dogmatic codes of the old religion but out of it will grow a rational religion based on fact and intelligence and reason and love of humanity. This religion will be a much better one than the old, narrow, bigoted one of the past.

(4-5) I believe he is absolutely wrong in saying that acceptance of the doctrine of evolution destroys the Christian principles of morals and liberty. It makes my faith in the heavenly power stronger.

(2-2) It seems to me that evolution augments the facts given in the Bible. It teaches that the world was created in six periods of time, not stating how long. Evolution tells us how it was done.

We believe that the data which has been summarized above, both in its quantitative and its qualitative aspects, presents a fair picture of the results of Mr. Bryan's appeal, regarded as a social force, upon a relatively small, self-contained, homogeneous and critical student body. The results of the same force upon American society in general will be different to the extent that it differs in its psychological constitution from the group dealt with.

Our study shows the strength of the scientific force against the opposing impetus of fundamentalism. (Four-fifths of the Dartmouth upperclassmen remained under the sway of the former). We cannot assume that a similar immediate resultant would be found in society at large. Nevertheless, the history of thought shows that the masses of men ultimately take their views from the educated groups. The world today accepts the doctrines of Galileo even though the masses of men could not prove them; it does so because these doctrines gained the universal acceptance of educated men. Because Mr. Bryan has raised the issue between fundamentalism and science, the great public now for the first time is called upon to pass judgment. For the first time the masses are becoming aware of the views of science upon the problems involved. As long as the issue was not raised, but not longer, was it possible for "water-tight compartments" to exist side by side in the social mind. With the issue now squarely placed before it, there is ample historical precedent for the assumption that the doctrine of evolution will in time be universally accepted by the public.