Only 2 cuttings of the entire lot died, and the remaining 13 cuttings rooted successfully. At the end of 3 weeks an examination of the cuttings indicated that roots were forming. The cuttings remained in the sandbed for 5 weeks, at which time they were removed and potted. When it was obvious that the original lot of cuttings was rooting successfully, a second, larger propagation was made. These have begun to root in a comparable manner, with roots appearing in 3 weeks. Apparently, cuttings made from lateral shoots when the plants are still in the seedling stage root easily and rapidly.

The only objection that might arise from the use of such juvenile cuttings is the possibility that prostrate plants or juvenile forms would result. However, since the Chinese are reported (see Hu) to propagate their trees from cuttings, we may expect similar results, for we may assume that their cuttings came from the lower horizontal branches and not from the terminals. This possibility will, of course, be determined only when the cuttings have grown considerably.

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Science and Social Problems

With the advent of new, horrible, and efficient weapons of destruction resulting from the application of the scientific method to the problem of killing or incapacitating men, a new sense of responsibility has developed among scientists. Some have proposed that they refrain from using their talents in further researches of this kind, others have forcefully advocated the formation of a world government, and still others have proposed that the scientific method now be directed toward a study of the problems of sociology, economics, and politics with the hope that a resultant better understanding could lead to the development of a society in which war would be eliminated. Thoughtful people not actively engaged in science have also begun to look to it to provide knowledge which will assist men in using their ever-increasing power over nature in wise and nondestructive ways.

In a world in which the scientists of a few important nations have no freedom of choice, the first proposal appears to be foolish; it would be equally foolish to ignore the professed objectives of the rulers of these nations and put our trust in a world government. Furthermore, there is nothing to indicate that the people of the world are yet ready to surrender a sufficient measure of their sovereignty to allow a world government to function in any effective way. If a solution to the problem of war is to be found with the assistance of scientists, the third proposal would seem to be the only one offering a significant prospect for success.

This approach, however logical, is not as simple as it might appear. Dr. E. U. Condon, in a recent paper (*Science*, June 25, pp. 659–665) discussing science and security, remarks: "In short, the greatest contribution to real security that science can make is through the extension of the scientific method to the social sciences and a solution of the problem of complete avoidance of war." Earlier in the paper he had deplored the reluctance encountered even in civilized countries to accept and extend the use of the scientific method to sociology, economics, and politics. He defined science as "the process of studying and the results of study of the facts of experience derived from a conscious program of observing, while systematically varying the factors of a given situation in order to arrive at a rational understanding of the observational data so obtained." Perhaps an explanation for the reluctance which disturbs Dr. Condon and other scientists lies in this definition of science.

Understandings arrived at as a result of the application of this scientific method to the social sciences would have a high probable accuracy and would therefore provide logical bases for legislative or educational actions. However, it must be noted that in order to vary systematically the factors of a given situation, the scientists conducting the studies of necessity must have control over them. Since it is unlikely that sufficient numbers of people would voluntarily subject themselves to such control, it follows that legislative action establishing it would be required. While it can be argued that the stakes are high enough to justify the risks involved in such procedures, it is unlikely that sufficient support can be developed in this country to permit such a radical change to be made without resort to subterfuge and deception. This is perhaps one reason for the cool reception such proposals have received from the public and the Congress.

Social science studies conducted to date, with minor exceptions, have been observational and statistical rather than experimental, and perhaps this is the kind of research which the advocates of broader application of the scientific method have in mind. Here is, however, another difficulty. Understandings so achieved are only approximations, and in many cases inaccurate approximations at that, due to the inherent limitations of the methods employed. Their accuracy can be improved by subjecting them to experimental verification, but this immediately raises the problem of control again. Under these conditions it is unlikely that there will be unanimity of opinion among scientific specialists as to the meaning of the understandings reached or as to their validity. Positive action based on such a shaky foundation would be definitely hazardous even if the people and their legislators could be persuaded of its reasonableness.

It may be true that expanding the application of the scientific method to social sciences will provide us with knowledge which will lead to the elimination of war. All concerned should, however, recognize the difficult problems to be solved, and scientists should be the first to point them out so that all of the people have a clear understanding of the hazards and difficulties involved.

Meanwhile, a careful appraisal of the differences between the beliefs of science and of the important religious faiths, with due regard for the probable accuracy of each aspect of their respective dogmas, should have at least equal value, relative to the solution of social prob-

lems, with observational studies in the social sciences. For the destruction of the religious faith of a large portion of the world's dominant and educated people by the approximations of science has left a spiritual void which is a basic cause for the catastrophic impact of diverse, materialistic, political systems on each other and on the unfortunate, but largely inarticulate, human victims.

In order to fill this void with something more tangible than Dirac's substance having negative energy and mass, it is proposed that a suitable body of specialists in all fields of knowledge prepare a list of the most pertinent facts of experience and observation. An example of a suitable fact would be that there are living organisms on this planet. The next step would be to request representatives of science and religion to present their understandings of these facts together with sufficient supporting evidence to permit an estimate of accuracy to be made. Finally, the facts plus the comparative understandings should be published. It is the writer's belief that such a comparison will demonstrate that there is room in the rational mind for religious faith, which might be the greatest service that science could render man in these times.

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The Effects of Allyl Isothiocyanate Compared With Ultraviolet Radiation

A comparative study of the effects of synthetic allyl isothiocyanate (mustard oil) and ultraviolet radiation upon the ciliated protozoan *Spirostomum ambiguum* has been conducted in our laboratory.

Eight to 10 sec of exposure to mustard oil caused striking effects. The same was true when the animal was exposed to ultraviolet for a period of 20 to 30 sec at a wave length of 2,537 A and a target distance of 5 cm. In the majority of cases the posterior end enlarged. Occasionally small swellings lighter in color than the rest appeared over the surface. These changes persisted 4 to 9 days and gradually disappeared.

Mustard oil and ultraviolet caused fragmentation of the macronucleus. So far no changes have been detected in the micronucleus as a result of either treatment. Details of this communication will be published.

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The Earliest Record (*ca.* 195 A.D.) of Fishing With the Hand[1]

Fishing with the hand is a primitive fishing method widespread throughout the world. On this fishing I am preparing a series of historical papers by continents and regions. It is undoubtedly the oldest means by which primitive man obtained his fish food. Its beginning cannot be dated, but fortunately, an approximate date can be set for the first recorded account.

[1] By fishing with the hand, just that is meant—the use of the human hand without any auxiliary help, unless specifically noted.

Various authorities (?) (without giving citations) allege that the classical writer, Aelian (fl. *ca.* 120 A.D.), in his great work, *De Natura Animalium*, describes hand-fishing in Macedonia. There is no English version of this work—not even in the Loeb Library. However, the American Museum library has an excellent Latin edition published at Zurich in 1556. I have made several searches through the chapter headings, watching for key words, *manus, piscator, Macedonia*, etc., but in vain. The account may, of course, be buried in the text, but careful scanning of this has been unavailing. Should such an account ever be found in Aelian, its date (*ca.* 120 A.D.) would eclipse that in the title of this article.

Fortunately, an obscure reference in Wm. Radcliffe's *Fishing from the earliest times* (2nd ed., 1926, p. 241) took me to the Greek poet, Oppian (of Cilicia), who flourished *ca.* 170–200 A.D. The Museum library has the English version of his poem, "Halieutica" (Oxford, 1722). Book IV of this work was translated by John Jones. In Book IV, lines 730–739, Oppian writes:

> The Diver hardened to the dreadful Toil
> With artless Force attacks the finny Spoil,
> Boldly he plunges from ethereal Day,
> Springs to the Deep, and treads the fluid Way;
> Firm as on Land along the vaulted Shores
> The secret Chambers of the Deep explores;
> Revisits safe the long-suspended Air,
> And grasps with loaded Hands a captive Pair.
> The *Sargo* thus, and tim'rous *Shade-fish* dies,
> Nor this his Fears secures, nor that his Size.

Further on, in lines 753–762, Oppian says:

> . . . The liquid Way
> The Swain descends, and singles out his Prey.
> Where the sleek Neck and taper Tail displays
> A naked Void, his cautious Hands he lays,
> With meeting Arms the crackling Captive bends,
> Snaps off his Chine, and all his Sinews rends.
> Knit in the close Embrace the rest abide,
> And fondly in their pointed Fence [of spines] confide.
> The Diver joyful of his finisht Toil,
> Remounts the Floods and bears the double Spoil.

Oppian next describes, with apt similes, how the *Shade-fish* seeks to hide from the diver, but in vain, and in lines 781–784, he thus concludes the account as follows:

> The Fish in careless ease supinely laid
> The grappling Fingers of the Swain invade.
> Up from the Deep he springs, and bids the Prey
> Recant his errors in aerial Day.

Reading these three excerpts from Oppian, one must conclude that diving and catching sea fishes with the hand was known and practiced by the ancients in classical times. But to fix the date of Oppian's account is very difficult. One authority gives his year as *ca.* 170–200 A.D. Perhaps it is better to say that he flourished in the last third of the Second Century A.D. Several of the authorities state that he died at the age of 30.

Taking all the facts into consideration, it seems fair to say that Oppian's "Halieutica" bears the date *ca.* 195 A.D. Certainly, it is the oldest account of fishing with the hand that has thus far come to light. The next oldest—from China—is dated *ca.* 1325 A.D.

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