ecological factors may be already impracticable, but the academy may well have in mind the establishment of a state garden of the native plants.

Fresh acres in garden and field will be given each year to the new experiments in plant breeding, and here, too, the amateur may well lend a hand, though our agronomical friends may question whether such a suggestion is pertinent among points for amateur *botanists*.

In closing, I beg to submit a definite suggestion for which I must again seek excuse in that incontestable statement of our president this morning, that in lack of clean truth there lies national peril.

Nowhere in our educational literature is the absence of clean truth more conspicuous than in the nature-study books which are in common use in the graded schools. Nowhere has the unauthorized word had wider play or more credulous following. Untrained teachers have had nature study thrust upon them and have turned with avidity toward whatever seemed to offer help. Composites of sentiment and inaccuracy have been liberally supplied as "supplementary reading."

The suggestion is that there be issued in the name and under the direct auspices of the academy a series of leaflets upon science topics suitable for use as material in nature study and geography. Such topics should be treated especially from the standpoint of the state in so far as they lend themselves suitably to such treatment. Such leaflets should be available to the public schools at low cost. An educational editor, perhaps a member of the standing committee upon publication, might have in charge the apportionment of topics to members willing to cooperate, and ample discretion in editing to suit the educational needs in view should be allowed such an editor.

In objection, the point may be raised that in its very infancy the academy would be rash to venture to finance such a scheme. It may be confidently stated, however, that funds sufficient for such purpose would be at the disposal of the academy in case such proposal meets its good will.

A similar service has been and continues to be rendered by the Cornell Nature Study and Agricultural Leaflets.

John G. Coulter

OPENINGS FOR CHEMISTS

Eighteen years ago, as I was sitting in a café in Munich one evening, talking to a young Englishman, he said to me "England has the present but America has the future." He meant, of course, that while England at that time stood in the forefront of progress, industrially as well as politically, the conditions were such in America, both in our command of natural resources and in the character of our people, as to make it practically certain that the lead in both respects must go to America in a not far-distant future.

In the years which have passed since that time, this prophecy has been going on toward a rapid fulfillment. As an illustration, we may take the manufacture of iron. At that time, more iron was manufactured in England than in any country in the world, but within a few years afterwards the production in America exceeded that in England, and it is now very much greater here than there.

In this increased industrial activity in America, chemists have played and are playing a very important part. In this very industry of the manufacture of iron and steel, twenty-five years ago very few chemists were employed in this country, but to-day chemists are required not only in the large establishments where steel is produced, but in foundries and factories

of all kinds where large amounts of iron are used.

What has happened in the iron industry has happened also in a great variety of other industries. To speak of the different lines in which chemists are to-day employed would be almost to give a list of the important industries of the country. There is in these and in chemical work in general a rapidly increasing diversity. During the past year the American Chemical Society has established an abstract *Journal* which intends to give an account of all new work in chemistry which is published in the world. The abstracts in this journal are classified in thirty divisions, and this illustrates the great variety of industries and directions in which chemists are interested.

The amount of knowledge which has been accumulated in chemical science is so great that I feel safe in saying that the detailed knowledge in this science is greater in amount than the whole mass of scientific knowledge in all sciences fifty years ago. I do not, of course, mean that the value of this chemical knowledge is greater than the value of the scientific knowledge fifty years ago, but merely that its amount is greater, and I say this for the purpose of emphasizing the diversity of interests among chemists.

It is estimated that there are about eight thousand chemists employed in the United States at the present time. One of the previous speakers has referred to an estimate that there are only five thousand scientific men in the United States. While I do not suppose that all of the eight thousand chemists can be properly classed as scientific men in the sense in which the term was used by the former speaker, I am inclined to think that this number indicates that there are many more scientific men in the United States than would correspond to that estimate. The increase in the number of chemists during the past twenty-five years has been very largely occasioned by the employment of chemists in the industries. A quarter of a century ago, nearly all of the chemists in the United States were engaged in teaching, while to-day the majority are undoubtedly working in industrial lines.

But it is not merely in the industries that the number of chemists has greatly increased during this period. Thirty years ago, very few educational institutions could have been found which had more than three or four chemists on their staff. In the institution with which I am connected, the staff includes more than thirty chemists who are engaged in teaching or research, and I do not think that the institution is unusual in this regard.

Very large numbers of chemists have also been required in recent years by agricultural experiment stations and by government bureaus. Since the enactment of the pure-food law especially, the demand for chemists to fill positions in connection with the bureau of chemistry has largely exceeded the supply of suitable men, and during the past summer many of those who have been called upon to answer inquiries for chemists to fill positions have been compelled to reply that they had no suitable candidate to recommend.

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OUTLOOK FOR YOUNG MEN IN GEOLOGY

PROBABLY our academy can do no one thing more useful than to encourage the young men and women of talent who are looking forward to a career in science. By this is not meant a deliberate effort to divert men and women from other work to ours, but rather the holding out of a helping hand to those whose inclinations are toward a scientific career, but who hesitate