VOL. XV. DECEMBER, 1893. NO. 12.

Issued December, 1893.

THE JOURNAL

OF THE

AMERICAN CHEMICAL SOCIETY.

THE RELATION OF TEACHING TO RESEARCH IN CHEMISTRY.[1]

BY W. E. STONE.

IT is eminently proper that this Congress of Chemists should devote some portion of its attention to the teaching of the science. This not alone because it is desirable that chemists be well taught, but also by reason of the prominent place chemistry has secured in the curriculum of every college and university as well as in many high schools. The teaching of chemistry in institutions of learning is a modern innovation, introduced and developed within the memory of living men. The chemical laboratory as a means of instruction was first recognized in America about thirty years ago. Now the chemical lecture room and laboratory form an essential part of the equipment of every institution for higher education. It naturally follows that teachers of chemistry have become numerous, and positions of this kind are the goals toward which many young chemists aspire.

The teaching of chemistry has therefore become a kind of profession with its own peculiar limitations and disappointments as well as its pleasures and aspirations. The discussion of methods and details of teaching chemistry I leave to the speakers who are to follow me. I wish, however, to consider briefly what I regard as a most important feature of didactic chemistry, viz.: *The attitude of teachers of chemistry toward research.*

[1] Opening address by the Chairman of the Section of Didactic Chemistry at the World's Congress of Chemists, Chicago, August 26, 1893.

A survey of the field reveals an interesting comparison between America and Europe in this respect. In the European universities we find the teachers of chemistry including the famous investigators and discoverers. It is a recognized function of the teacher that he be also an investigator. Indeed his appointment to a chair in any of the great universities is dependent upon his standing as an investigator and he retains his position only so long as he maintains this standing. In short one of the necessary qualifications of the teacher is active participation in scientific research. Turning to America, two features are at once noticeable. First, a less degree of activity and attainment in scientific research, and second a weaker interest in the spirit of investigation. We must acknowledge that our teaching and the results of our research are still inferior to those attained abroad. The reasons for this are probably complex, but *chiefly* they are to be sought in the relations of our teachers to investigation. Certainly our teachers of chemistry do not lack training, for many of them have been trained under the conditions abroad which we recognize as superior. They do not lack enthusiasm because many are young men with the successes and examples of their European preceptors still in mind. Our American teachers are not at the head in their profession by reason of any lack of training or enthusiasm or material equipments. If I ask then why, any one of my hearers can answer promptly. Every American teacher of chemistry has a common complaint to voice. They will tell you that the demands made upon them as instructors are alone culpable for their meagre contributions to the annals of research. Too many students. Too many hours of teaching. Too many subjects to be taught. These are the counts in the indictment against the conditions under which our American teachers exist.

In short, to sum up the existing *status*. We find ourselves somewhat in the rear of the foremost ranks of investigators and teachers. We find these branches most flourishing where the activity of the investigator is a required qualification for the teacher. In our own country we find these requirements of secondary moment or they are lost sight of entirely. This seems to me not only a great fault in our educational system, but also a very

serious hindrance to the progress of American chemical science.

I am aware that some will fail to see the relation between teaching and research in chemistry and will maintain that the teacher should be only teaching and the investigator only occupied with investigation.

We may regard this matter from the standpoint of the student, from the standpoint of pure science, and finally from the standpoint of the teacher himself.

The student has a right to expect instruction in chemistry either as part of a liberal education or as preparation for a professional career. In either case it is or should be taught, not as a dead and completed science, but as a constantly advancing vital, living science. It is or should be taught as a science of investigation. The only one who can teach it as such must be himself an investigator. No one would maintain that the discoveries of Wöhler or Hoffmann did in any way detract from their effectiveness as teachers. On the contrary, it is apparent that in their characters as investigators they transmitted an inspiration to their pupils which has given to modern chemistry an incalculable impetus.

Again, science looks mainly to teachers for its advancement, since as a rule, they alone have or should have at command the necessary funds, materials, and equipments for the prosecution of researches. Moreover, they alone have or should have the leisure and unbiased mind so essential in the search for truth.

Lastly, the teacher himself has no right to content himself with the single aim of the pedagog. If he would not stagnate he must advance. He must be himself a student standing as interpreter between the unknown and his pupils. The true attitude of the teacher of chemistry toward research is one of interest and active participation in precisely the same degree as he manifests interest in and sympathy with his pupils.