No decisive data for symmetrical molecules is now available, but it appears that the measurement of the infra-red absorption spectra of such molecules might be decisive. There is no doubt that a more careful study of intensities must be made, a rather exacting problem where the fine structure is not easily resolved. Such measurements should not only yield information concerning the molecule in question but also serve as tests for certain details of the wave mechanics itself.

Not only are the intensities important, but also the shape and breadth of the lines have theoretical significance. This phase of the subject is but slightly developed and so far agreement with experiment is not good.

Bands in the far infra-red can not be expected from molecules which have no permanent electric moment. This probably excludes such a molecule as methane, whose rotation is by no means clearly understood. There is, however, a large number of gases for which data in this region will be invaluable. The problem of normalization of the rotation of HCl has been definitely settled by its far infra-red band. Water vapor has a far infra-red absorption spectrum, the intricacy of which must be ascribed to its lack of symmetry and has not been satisfactorily interpreted. Symmetrical rotation should be investigated here as soon as possible. The most promising for this purpose is the ammonia molecule.

The infra-red region is not simply an extension of the spectrum at the long wave-length end. The data which it furnishes are not simply more data of the kind to be obtained in the other parts of the spectrum. The band spectra of the near infra-red region are different in type from those of the far infra-red and both are different in character from the bands in the photographic regions. The information to be obtained from these infra-red spectra is not to be found elsewhere. Their resolution and measurement is therefore a problem not only worthy of our endeavor but necessary for the development of the theories of band spectra and the related problems of molecular structure.

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SCIENTIFIC SERVICE THAT THE NATIONAL FORESTS MIGHT BE RENDERING

WITH the network of good roads that has been constructed within the last few years rapidly extending itself over every part of this country, scientific men and nature lovers are faced by the fact that we shall soon have no wild places and no areas left in their natural condition except barren and inaccessible mountain tops and waterless deserts, unless reservations are set aside for preserving the natural conditions.

In fact, at the present time the only places of any considerable extent that are intended to be kept in a natural state are the national parks, and as time goes on these are being managed more and more as recreation resorts, their natural condition being sacrificed to the entertaining of large crowds of tourists. The destruction of timber in building and grading the broad roads for high-speed traffic, the wear and tear caused by the tens of thousands of visitors in the places most famous for their scenery, the camps, hotels, garages, etc., necessary to serve and accommodate them, the parking of thousands of cars and other accompaniments of the constantly growing tourist traffic are disastrous to the natural conditions in those regions of the parks where the scenery is most remarkable, while those regions of them that lie off the routes of tourist travel are not safe from destructive exploitation legalized by acts of Congress slipped through without the public understanding their purpose or effect. Not a session of Congress passes without attempts to trim off portions of the parks containing timber or other commercially valuable resources, and too often they are successful. Three of the national parks have been treated this way during the past year (1926). From state and local parks we have little to hope in the way of preserving natural conditions. They are usually too small and are commonly managed chiefly as recreation resorts; moreover, they always suffer under the frequent changes of administration that occur in local governments.

If natural conditions are to be preserved it must be accomplished in places that are not resorted to by crowds of tourists, a condition that the national parks with their wonderful scenery can not meet. Also it is usually necessary that the reservations should be of some extent in order that the destructive effects of exploitation on adjacent lands may not reach completely over them. Land used for grazing, and least of all land used in forestry operations, as is the case with the national forests, does not remain in a natural condition, though it may serve well enough as a preserve for the protection of birds or animals that can adapt themselves to the changed conditions. It is especially the very old trees that have taken centuries to grow and would take centuries to restore, that make the difference both from a scenic and scientific point of view between a primeval forest and an ordinary farmer's wood lot or the young growth of cut over lands.

This leads us to wonder why a few square miles out of the immense extent of the national forests

(whose total is given as 157,502,793 acres) have never been permanently set aside as reservations to be kept in their natural condition for scientific purposes and for exemplifying the different types of forest in their most perfect development.

It would naturally be expected that the selection for permanent preservation for scientific and scenic purposes of the finest tracts of each of the various different ecological types of forest would be one of the first steps of a scientifically conducted bureau on assuming the management of the nation's forests. Probably there is a general belief that it is being done, but if any such reservations had been made we would certainly find notice of them in the recently published "Naturalist's Guide to the Americas" of the Ecological Society of America, a work in which several forest service officials cooperated, and which must give an official expression of the policy of that bureau. We may look in vain in it for any information of the existence of such reservations; on the other hand, we find in an article in it entitled "Permanent Sample Plots in the National Forests," by C. F. Korstian, of the United States Forest Service, the following statements:

> Relatively few of the permanent sample plots on the National Forests are in virgin forest and the silviculturist can not imagine keeping all of them in such a condition, even if they are now. . . .
>
> Since the silviculturist is working in part on such utilitarian problems as the effects of different methods of cutting or thinning or slash disposal on the subsequent growth of the uncut trees and on natural regeneration, the reason why his permanent sample plots must be located largely outside of virgin forest is apparent. As a matter of fact most of these plots are on culled or cutover lands where the conditions are at most only semi-natural. . . .
>
> It is therefore evident that the permanent sample plots in the National Forests, although they may not all be important from the standpoint of the preservation of natural conditions, will supply the forester, the ecologist and the biologist with much valuable scientific information which can not be secured in any other way.[1]

Nobody will dispute the importance of such plots for experimental purposes, but they do not preserve natural conditions. The failure of the forest service to set aside plots for the latter purposes has not escaped comment.

Dr. Charles C. Adams, in speaking of the administrations of the national forests, says:

> We see that the ecological conditions in forests are thus undergoing profound changes from wild and primeval conditions and there are almost no parts remaining in these areas which will remain wild unless a new and definite policy is developed of holding as reserves certain areas. There are however many reasons for maintaining such areas for study, demonstration and education and for recreational uses, although this idea has not yet received much recognition in forestry.[2]

Forest service officials themselves admit this. Writing on the same subject G. A. Pearson says:

> It does not assure that any areas will be kept in a natural state unless specific provision is made to attain that end. It is true that extensive areas, because of inaccessibility, will remain comparatively immune from exploitation for many years: but this is merely a temporary condition which unforeseen developments may terminate at any time. The only way in which the preservation of natural conditions can be assured is by formal withdrawal of specific areas under specific provisions as to future care.[3]

Where is the forest service withdrawing from exploitation any such areas? We can not shut our eyes to the fact that even the most conservative forestry operations do not maintain and can not restore natural conditions either from their scenic or scientific aspect. Forestry for commercial purposes will not permit of letting trees grow old or large; generally they will be cut as soon as they will make a small board. If we are to have any sample tracts of the wonderful forests of the Pacific states, which are unequaled anywhere else in the world, no time can be lost in making reservations of them. The first-class timber in the national forests has already been mostly sold off.

Where are there any fine tracts exemplifying the characteristic Douglas fir, western hemlock and cedar forest that formerly covered hundreds of square miles in the northwest with trees 180 to 230 feet tall or over, that are safe from eventual destruction? The firs in such forests are six or seven centuries old or more, the cedars doubtless very much older. There is no forest of that type of any account in any national park except one or two small strips, sadly mutilated by the roads that run through them, and by cutting of firewood for the hotels, in the Mount Rainier Park. Where is any tract of the wonderfully impressive and scientifically interesting Sitka spruce forest that was characteristic of the coastal regions of Oregon and Washington that is being preserved? There is none in any national park.

In asking the forest service to preserve a few square miles of the finest parts of the national forests the scientific men of this country would not be asking for any economic sacrifice. Since a forest in its natural state maintains itself unimpaired, the indi-

[1] C. F. Korstian in "Naturalist's Guide to the Americas," pp. 19–20.

[2] *Scientific Monthly*, XX, June, 1925, p. 585.

[3] *Ecology*, III, October, 1922, p. 285.

vidual old trees that from time to time die off being constantly replaced, any timber so reserved would always be available in a serious national emergency such as a prolonged war. If it is sold and cut for lumber there will be nothing there for a long period to come except a growth of young saplings.

This is not a matter admitting of much more postponement if anything worth while is to be done. Every year of delay makes it more difficult and leaves in the national forests smaller and poorer areas available for reservations. The first-class timber on the public lands is rapidly disappearing. We must not be deceived by statements of vast areas of "primeval forest," or land that has never been logged, in the public domain. They exist, but they consist for the most part only of small and scrubby trees due to poor or rocky soil, high altitude, insufficient rainfall or other unfavorable factors; timber that the lumbermen will not buy until they can no longer get any that is better.

WILLARD G. VAN NAME

THE AWARD OF THE FIRST CHARLES REID BARNES LIFE MEMBERSHIP OF THE AMERICAN SOCIETY OF PLANT PHYSIOLOGISTS

AT the Kansas City meeting of the American Society of Plant Physiologists, in December, 1925, official action was taken by the society to honor and perpetuate the memory of Charles Reid Barnes, first professor of plant physiology at the University of Chicago, by establishing at each succeeding annual meeting an honorary life membership in the society. To this honor is to be elected each year some member distinguished as an investigator in the field of plant physiology. Those so honored are to be known as the Charles Reid Barnes life members of the American Society of Plant Physiologists. It was felt that such a living memorial to Dr. Barnes is one that he himself would have approved, and that it is a fitting tribute to the man who had perhaps greater spiritual and inspirational influence upon students of plant physiology than any other American worker in that science. A large number of those now engaged in physiological botany trace their spiritual lineage directly to Dr. Barnes or indirectly to him through those who came within his personal influence.

The first Charles Reid Barnes life member was elected at the recent Philadelphia meeting of the society and it is fitting at this time to devote a brief space to the great teacher in whose honor the society has established this life membership, and whose tragic death seventeen years ago was mourned by all who knew him. Barnes was fortunate in having Dr. John M. Coulter as his first instructor in botany, at Hanover College, where he took his first degree in 1877. He worked for a time at Harvard with Asa Gray and began his professorial career at Purdue University in 1882. For 28 years he led an exceptionally energetic life in the field of botany. From 1887 to 1898 he was in charge of the botanical work at the University of Wisconsin, where he built up a very active and vigorous department. In 1898 he joined Professor Coulter at the newly organized University of Chicago, and for twelve years guided the development of plant physiology in that institution.

Dr. Barnes was a teacher with rare gifts; the clearness and precision of his presentation of the subjects he taught has seldom been equalled. He captivated the imagination of his students for the field in which he labored. His cordial friendliness, his frank honesty of opinion, his searching analysis of problems, his keen critical estimation of the work of others, all endeared him to every one who studied under his guidance. The reviews that appeared in the *Botanical Gazette* during the 27 years of his co-editorship of that journal with Professor Coulter, show him to have been the keenest American critic plant physiology ever held. His conception of the science was well in advance of his period.

Those who came under his personal guidance in research found in Barnes a wonderful leader, whose clear and versatile vision enabled him always to suggest productive modes of attack upon all manner of problems. He was a wise counsellor, a splendid administrator, an incisive but ever helpful critic, and always a real friend to his students and colleagues.

His death in 1910 was caused by falling on an icy side-walk near his home, shortly after he had started to go to the university for his usual busy day. He became unconscious, and died a day or two later, on February 24, 1910. Those who knew him are proud to honor his memory. His name should be written high in the annals of the rapidly developing science, to which he gave his best.

After careful consideration of the many names that were proposed, the committee on the award of the first Charles Reid Barnes life membership in the American Society of Plant Physiologists has made the award to Dr. Burton Edward Livingston, professor of plant physiology and director of the Laboratory of Plant Physiology of the Johns Hopkins University and permanent secretary of the American Association for the Advancement of Science.

Dr. Livingston began his work in plant physiology at the University of Michigan in 1895 and the following year became an assistant in that subject, under Professor Frederick C. Newcombe, who had recently