ciates it would seem not only logical but inevitable that bacteria in all stages of their developmental cycles should be found in nature. It is of value to demonstrate this fact because of its many important implications, biological and practical. It is important, also, in order to remove the many significant observations of Hadley and previous investigators from the shallow objection of being artificially induced laboratory "involutions."

Following the methods of Hadley, and also with slight variations therefrom, we have demonstrated the presence of filterable microorganisms in soils, decomposing manure, hay infusions, fresh human feces and milk. We have followed the transformation of some of the "g" types (Hadley) to the point where they would be recognized as "bacteria" in the usual sense. It should hardly be necessary to state that all filtrates have been controlled and tested for "sterility" by the conventional methods. Berkefeld v and n filters have been used with the same positive results. Growths obtained from the filtrates have been refiltered and the "g" types again developed.

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POSITIVE GAS AND WATER PRESSURE IN OAKS

EVIDENCE of positive gas and water pressure in forest trees was observed by the writers during the late summer and early fall of 1930, in western North Carolina and northern Georgia hardwood forests.

In connection with a growth study carried on by the Appalachian Forest Experiment Station, numerous forest trees were drilled with the increment borer. This tool consists of a hollow steel bit, turned like an auger into the bole of a tree (usually at breast height). The hollow bit will then extract a solid core of wood somewhat smaller in diameter than a pencil, extending from bark to pith. A sudden reverse twist of the handle frees the core from solid wood at the inner end of the bit. Annual rings on the core can be counted for determining age or measuring growth along that particular radius.

It was the writers' observation that frequently after the bit had been inserted two inches or more, scarlet oaks (*Quercus coccinea*) would emit enough liquid to cause a dripping from the outer end of the borer. Often there was an accompanying hissing sound as though gas were escaping, though not with any great pressure.

One 14-inch apparently sound scarlet oak was encountered which had sap pressure enough to eject the 3-inch core with considerable force and follow it with a stream of liquid which was thrown 3 to 4 feet from the base of the tree. This liquid had the characteristic ill-smelling odor of scarlet oak sap. The occurrence seems more remarkable considering the very dry season preceding it. At that time, late summer, the rainfall deficiency for the calendar year was 12.73 inches related to a normal of 40.28 inches.

The only two species in which inflammable gas was found were the chestnut oak (*Quercus montana*) and the white oak (*Quercus alba*). In some of these trees, which ranged from 8 to 16 inches, diameter breast high, the positive gas pressure was sufficient to blow the core out of the hollow bit with considerable force. The gas was frequently lighted and would shoot a blue flame, sometimes 1½ to 2½ feet long, extending horizontally near the source but gradually curving upward to its tip. The flame would burn steadily for thirty seconds or so, then gradually lose force and become smaller. It was usually snuffed out soon after lighting to preserve the temper of the borer. In all trees issuing inflammable gas the heartwood was unsound, apparently affected by a dry rot. Curiously enough failing pressure could occasionally be revived by turning the borer into the tree a little farther; sometimes the issuance of gas was stopped completely by turning it too far. Because of the fact that the flame was blue it suggested a gas similar to, if not, methane, which is known to be a product in the decomposition of cellulose.

The writers have not observed positive gas or sap pressure in any other species or at any other season of the year than indicated above. Wood,[1] however, observed inflammable gas in white oak and red oak (*Quercus borealis*) in West Virginia during the fall of 1927. Such phenomena as have been observed may be of interest to investigators of the water and gas systems of trees.

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[1] L. M. Wood, "Gas from Trees," Service Bulletin, U. S. Forest Service, Washington, D. C. December 1, 1930.

ANALYSES OF THE BLOOD OF IDIOTS

IN the issue of SCIENCE for March 20, page 316, there appears a note headed "Biochemistry in Relation to Intelligence." In this note the writer, H. D. Powers, claims to have found an abnormal amount of inorganic phosphate in the blood plasma of idiots. In results which we have obtained from analyses of blood samples taken from idiots of classified mentality we have been unable to obtain such results. Inorganic phosphorus in blood plasma samples from twenty-five idiots has been found to be within the normal limits. Our results range from 3.1 mgs to 5.0 mgs per 100 cc of blood, with an average of 4.0

mgs per 100 cc. The ages of the idiots range between eleven and forty-four. Obviously diet was carefully considered. Acid soluble phosphates, lecithin, percentage hemoglobin, red cell count and cell volume have been found to be within the normal limits also. Our results indicate that there is some variation from the normal in the cholesterol content.

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DRAWINGS FROM PHOTOGRAPHS

To Professor Naylor's method, given in SCIENCE of January 2, 1931, for making drawings from photographs, we wish to add two suggestions which greatly increased the efficiency of this method for us: First, use grade A No. 2 Carbon Azo or other make of equal grade; and second, slightly overexpose and underdevelop the print which is to be inked in.

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QUOTATIONS

INDUSTRY AND SCIENTIFIC RESEARCH

ALTHOUGH many of the branches of organic chemical industry have sprung from the discoveries, often fortuitous, made in scientific laboratories—as, for example, Perkin's mauve, Griess's azo dyes, Baeyer's phthaleins and synthetic indigo, Knorr's antipyrine, Ehrlich's salvarsan, the nitrocellulose silk of Count Chardonnet, the viscose of Cross—the significance of such discoveries was frequently unrealized at the time either by scientific workers or industry. This alone should make us cautious in advocating any restriction of research. There are too many problems in our national and industrial life urgently demanding scientific solutions for such a policy to be either timely or wise. It is almost impossible to predict just where the next important advance will be made, or, in reviewing the results of a year's investigations, to single out the one discovery by which posterity will mark the year.

The influence of industry on scientific research is, however, fully as important as that of scientific research on industry. Even in the field of technique it is impossible to assess the contributions of either on a cash basis. The greater resources of the industrial research laboratory and its improved and frequently more advanced technique are continually reacting on scientific laboratories. The range of reaction conditions open to the organic chemist has enormously expanded in the last decade, and processes can now be effected in extremely high vacuum or under pressures of several thousand atmospheres and at temperatures ranging from the neighborhood of absolute zero to those of the electric furnace; whilst the activators or catalysts available range from the new organic catalysts, bordering on biochemistry, over almost the whole field of inorganic chemistry.

Nor is it only refinements of technique that are continually changing the conditions of scientific and industrial research. Almost every year sees fresh compounds, formerly curiosities and accessible only by tedious and costly laboratory processes, produced on the commercial scale at a price which allows their use in industry or in scientific laboratories as the raw material of further researches. The papers published in the journal of any chemical society reveal the way in which the scope of scientific research has been enlarged and influenced by industrial advances. The utilization of waste materials, the delicate balance between by-product and main-product, the fall or rise in price of basic materials like sulphuric acid, methyl alcohol, glycerol, which alone may result in new routes for existing products—the war-time shortage of sulphuric acid, for example, led to the development of alternative processes for phenols and amines which have not been entirely replaced by the earlier methods—these are factors which continually emphasize the dynamic character of industrial research and frequently have far-reaching effects on scientific research.

If, however, the increasing complexity of the field of organic chemistry makes restriction of research inconceivable, the demands made on leadership are increasingly severe. It was never easier than to-day for research ability to be wasted in an attack on unprofitable problems. Scientific progress has almost invariably come from the ideas and work of a talented few, and depends as much upon the quality and personality of the investigator as upon his technique. The most serious problem is the production of research leaders of the requisite imagination, foresight and enthusiasm to direct wisely the team work which modern industrial research demands. Any circumstance, whether of rates of pay, status, or insecurity of tenure which hinders the recruitment for industrial research of potential leaders of the requisite calibre is a national and not merely an industrial danger. There is little doubt that if the concentration of professional opportunities within at most one or two firms, as in Germany, does affect adversely the position and prospects of chemists, industry will quickly suffer from the reaction.

The distinction between scientific and industrial research to-day is not easy to define. Their relationship is dynamic and so intimate that circumstances which