area 340 by 800 feet. Three dams, 35, 50 and 60 feet long, respectively, formed ponds 350, 375 and 475 feet in length.

A dam 75 feet long is reported by Johnson to have backed up a mile of water, and Houk records 1,241 acre-feet of water impounded by beaver dams in the San Luis Valley, Colorado.

The number of dams on a stream is also an important factor in determining the size and shape of the beaver meadow and to locate six dams on a mile of stream is not uncommon. In fact, according to Houk, in Silver Creek Valley in Colorado there were 46 dams located on 5¾ miles of stream, and these averaged about 660 feet apart. In some cases the water was backed up to a depth of five and one-half feet.

So long as the beavers occupy the ponds no beaver meadows are formed, but as soon as the ponds are made the silt begins to settle in and fills them, and this forces the animals to continue to raise the dam. When the rodents abandon the pond, however, a meadow may be formed in a very short time.

In 1897 Seton mapped and described some ponds on Lost Creek in Yellowstone Park which were inhabited by a colony of beavers. These animals began to desert the area in 1903 or 1904, and in 1912 when Seton revisited the site the colony was abandoned and the meadows were pretty well formed. In 1921 the ground was solid and the dams practically obliterated. It is evident then that a meadow can be formed in about 15 years.

CONCLUSIONS

The authors, from the data presented here, conclude that beavers are able to aggrade all smaller valleys below the size of navigable rivers and having been active for many thousands of years have accomplished an enormous amount of aggrading work and are important physiographic agents. Their work is characterized by complete aggrading of valley floors, originally in small descending steps, which disappear in time and leave a gently graded, even valley plain horizontal from bank to bank. The fine silt gathered in the beaver pools has produced the rich farm land in the valleys of the wooded areas of the northern half of North America.

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THE MOVEMENT OF WATER FROM CONCENTRATED TO DILUTE SOLUTIONS THROUGH LIQUID MEMBRANES

AN experiment by W. J. V. Osterhout and J. W. Murray was described under the above title in the issue of May 13 of SCIENCE, page 430. To quote, "In certain models set up to imitate living cells the behavior of water is the opposite of what is expected, for it moves from a concentrated to a dilute solution or from a region of low to one of high activity. This apparent violation of the laws of thermodynamics may continue for months before equilibrium is attained." Briefly, this experiment consisted in using guaiacol (o-methoxy-phenol) as a membrane in the bottom of a U tube and placing water on one side and a solution of acetic acid in water on the other side. The water moves from the acetic acid to the pure water side.

In attempting to discover a possible thermodynamic explanation for the above experiment or to show that a thermodynamic explanation does not apply we have performed the following experiments. The freezing point of guaiacol was determined and the lowering in the freezing point was determined when water or acetic acid was added and finally when both were added simultaneously. It is found that water and acetic acid produce the same lowering of the freezing point when equal numbers of moles are added. This first experiment was not too conclusive, since the solubility of water is small in guaiacol. Three hundredths of a cubic centimeter of water was added to 50 cc of guaiacol. In the next experiment a large amount of acetic acid, 1 cc, was added to 50 cc of guaiacol, producing a lowering of 2.49 degrees. Addition of water to this solution in 0.1 cc quantities gave only one fourth the lowering which one would have predicted from the number of moles added. In this experiment there is no difficulty from small solubility, as water is quite soluble in this solution.

One may draw the conclusion from these experiments that the water and acetic acid are associated in the guaiacol solution. The fact that the water produces some lowering in the freezing point may indicate that the association is not complete or that acetic acid is associated by itself in guaiacol, and the addition of water increases the dissociation of double acetic acid molecules.

An explanation for at least part of the anomalous diffusion of water in the experiment of Osterhout and Murray may be as follows. Water and acetic acid are associated in water solution. This attracts no attention ordinarily, since the water is the solvent, but may be inferred from the fact that acetic acid, which exists associated as double molecules in the gas phase, exists as single molecules in water solution. The solute which is diffusing through the guaiacol is, therefore, this rather stable pair, which has been shown from the above freezing points to exist in the guaiacol solution. The diffusion of this pair is then a typical case of osmosis, except for the fact that the solvent is very slightly soluble in the membrane and the solute does the diffusing, from a region where its concentration is high to one in which its concentration is low.

This explanation serves to amplify the explanation given by Osterhout and Murray, who say that the phenomenon is due to the fact that the "acid increases the solubility of water in the guaiacol phase," indicates the way in which this increased solubility is brought about, does away with the apparent violation of the laws of thermodynamics, and suggests possible limitations in the applications of this model to biological phenomena.

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NATION-WIDE JUNIOR SCIENCE CLUBS

THE scientific attitude and scientific investigation have their beginnings in the lower grades of our secondary schools. Evidence of this appears in the desire of junior-high-school and high-school students to take part in scientific activities outside of regular school hours. The natural desire is to join a science club. Many of these science clubs are to-day well endowed in both leadership and facilities with which to work, so that they often make definite contributions to science. However, even before they finish their introductory work in science, secondary school students are being called upon to realize the application of scientific principles to every-day events, and to understand the position which science plays in the development of modern society.

During the past ten years, the American Institute of the City of New York has fostered the organization of its science clubs. This is a natural outgrowth of its efforts to relate science with society since 1828. Now, under the name of the American Institute Science and Engineering Clubs, it announces the expansion of its science clubs on a nation-wide basis to coordinate the scientific pursuits of American youth.

As a first step, the best youth organizations in the country have endorsed the plans. Already, educators everywhere are agreed that science is a natural and practical medium by means of which to stimulate and guide the thinking of young people. On October twenty-first, an introductory announcement of the new organization was sent to educators and their institutions, scientists, engineers and youth leaders, suggesting that they be sponsors of the clubs. This announcement presented the reasons for forming science clubs and explained how the American Institute Science and Engineering Clubs could perform the function of organizing existing and future clubs into one unit. The institute will supply upon request from these sponsors authoritative bulletins on "How to Organize a Science and Engineering Club," "How to Organize a Science Congress," "How to Equip a Science Techniques Shop" and "How to Interest a Community in Science Club Work."

As a unifying influence and also as a clearing house of science news for youth throughout the country, the American Institute will publish monthly its own science newspaper, called *The Science Observer*. This journal will carry columns devoted to club activities, youth research projects and up-to-date news in science. A pictorial section will be a feature of the publication.

The present program of the institute clubs calls for its annual science congress on December 29, at which the well-known Christmas lectures will be presented.

In March the annual science fair will be held in the American Museum of Natural History. To this come some of the most significant products of the scientific activities of the clubs and individual students. Four groups of exhibits designed to relate science with modern life are presented: Transportation, communication, production and public welfare are each a class under the engineering group. Plants and animals, medicine and biochemistry, heredity and evolution form the biological sciences. In the third group, the physical sciences, such as geology, astronomy and pure physics and chemistry, are represented. Of great interest will be the leisure-time activities exhibits of the fourth group. Prizes to a total of $3,000 are awarded to scores of exhibits at the fair.

Through the medium of traveling organizers, a speakers bureau and eventually short-wave radio, the work of the institute clubs will be organized as one national unit. Sponsors and other interested leaders may receive full information by writing to the American Institute, 60 East 42nd St., New York City.

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OPPOSITION TO AN INTERNATIONAL CONGRESS OF PSYCHOLOGY IN VIENNA

WHEN the twelfth International Congress of Psychology, to be held in 1941, was awarded to Vienna, it was not supposed that within a few months Austria was to be annexed to Nazi Germany. The *Anschluss* took place on March 11, 1938. The reaction among American psychologists was immediate and unequivocal.

Six weeks after the *Anschluss* of Austria there occurred the annual meeting of the Midwestern Psychological Association at the University of Wisconsin on April 22. Resolutions were adopted after considerable discussion urging the removal of the 1941 congress away from Austria, because "Germany is now governed by a Nazi dictatorship, which has subordinated the integrity of science and of scientists to