of human dwellings, be they temporary or permanent. All evidence points to the strong need of disinfecting or destroying all the wastes from ourselves and other animals, destroying all excreta in which the flies deposit their eggs, and to do all to eliminate this factor in the spread of infectious and contagious diseases that heretofore has received so little attention.

House Boats for Biological Work.

By Ulysses O. Cox.

House boats for pleasure are not at all uncommon on the Mississippi River, but one built and equipped for scientific purposes was, until the past summer, entirely unknown on that stream, and, I am told, on most streams in this section of the country. Last March the writer was called to Minneapolis by the director of the State Zoological Survey, Professor Nachtrieb, and asked to suggest plans for further study of the fishes of the State. Among these suggestions was the one that a house boat, or rather, in this case, a floating laboratory, be built at Mankato to float down the Minnesota and Mississippi rivers, at least as far as the State line.

There were a number of things to be taken into consideration. It had been several years since the Minnesota River had been navigated by any craft larger than a row boat, and just how large the floating laboratory could be made and still float and be manageable was a question. There were numerous bridges to pass, many sand and gravel bars to interfere and hundreds of snags to be avoided. It was finally decided to build the barge portion of the boat twelve feet wide, twenty-two feet long, two feet deep and with a flat bottom. It was estimated that a boat so built would draw, when empty, no more than five or six inches of water, which estimate proved later to be correct. On top of the barge was built a cabin twelve feet wide, fourteen feet long and six and one-half feet high. The roof of the cabin was covered with boards and then with canvas. At each end of the cabin a door opened out on the platform, which was as long as the width of the boat, and four feet wide. On each side of the

cabin there were two long, movable windows. In one corner of the cabin there was a well equipped dark room for photographic work. Along one side of the room was a laboratory table fitted with drawers and shelves, and in another part were numerous shelves for specimen jars and dishes. A common cooking stove adorned one corner of the room, and in the floor were two large galvanized-iron tanks in which eatables were stored. Besides a complete cooking outfit, cots and bedding, we had various kinds of seines, gill nets, hooks and lines, microscopes, dissecting tools, injecting apparatus, and all other things needed for preserving any material that we might find. Besides a large number of jars and bottles, two large galvanized-iron tanks served for storing preserved material. Formalin was used altogether for preserving museum and anatomical material, and it worked exceedingly well, except when left in the sun. Under the latter conditions, the formalin seemed to decompose and the material would spoil.

We guided our boat, which we named "Megalops," by means of two large oars that worked in oar locks placed on each end of the boat, and we found no difficulty whatever in directing the boat just where we wished, except when the wind was blowing. At such times it was frequently necessary to anchor until the wind ceased. Our speed was seldom rapid, but it was usually very satisfactory. We would move a mile or so and then probably stop a day or two to investigate the ground, and would remain at one place as long as the collecting was profitable. During the four months we were out we traveled from Mankato on the Minnesota River to Red Wing on the Mississippi, and did not meet with a single accident of any consequence. It will be remembered, also, that much of this distance is frequented by steamboats, rafts and floating logs.

At times there were as many as six persons in the party, but usually only five. During the four months that the Megalops was in commission, the following persons were on her for work: Prof. H. F. Nachtrieb, of the State University of Minnesota, and Chief of the Zoological Survey; Dr. D. T. McDougal, of the Bronx Park Botanical Gardens, New York City; Dr. W. S. Nickerson, of the Minnesota State University Medical School; W. S. Kienholtz, J. E. Guthrie, and Charles Zeleny, students of the University; George Hinton, the "boy" and "cookee," and the writer, who was dubbed the "captain."

In every way the trip was a success. We discovered a number of

what may prove to be new species of fishes, certainly new to Minnesota; collected a great many insects, some of them new, and a number of reptiles. Besides these, extensive data were secured concerning a number of fishes, valuable histological and embryological material was preserved, and a number of anatomical preparations were made. There is no better way, it seems to me, to study the fauna and flora of a river than by such a floating laboratory, and I wish to strongly commend the plan to any persons who are considering plans for such study.

The Megalops now lies anchored at Red Wing Minnesota, on the Mississippi River, and it will likely continue on down the river the coming season, after which it may become a part of the equipment of a permanent biological laboratory on the Mississippi, which it is hoped will soon be established by the University of Minnesota.

Tests on Some Ball and Roller Bearings.

By M. J. Golden.

These tests were made to determine the comparative friction of ball and roller bearings when used for shafts under ordinary shop conditions, so the simplest forms obtainable were used, and they were tested at such speeds as usually occur in shop practice. When used in shop practice two or more of these bearings are placed side by side and in this way an ordinary hanger or other such piece of apparatus is built up. In the test the unit of the maker was taken for the size tested and no effort was made to establish any relation as to comparative sizes.

The bearings selected were for shafts one and fifteen-sixteenths inches in diameter, and as the shaft turns in direct contact with the rollers, the spindle used was a piece of regulation, cold-rolled, shop shafting of this size. This piece of shafting broke down before the bearings were affected. The ball bearings, of which three were used, were of the form shown in fig 1. In this figure the full form for a shaft is shown. In the test the bearing at one end was used. This consists of an inner ring of case-hardened steel fitted closely to the shaft and having a V groove cut around the outside. The balls travel between this groove and a corresponding