fication of $p_A - p_B$ will afford, relative to σ, a value as a normal deviate which will give a good value for P, because the great irregularity in the distribution of $p_A - p_B$ makes it impossible to fit any normal curve at all closely to the values of the chances for different values of $p_A - p_B$. Fig. 1 shows the distribution when we have 7 in one series and 5 in the other, where the differences advance by 1/35, and also the normal curve which "fits" in the sense that its standard deviation is that of $p_A - p_B$. With the great oscillations on the two sides of the curve, it must be clear that the summation of the chances to a given abscissa can not be expected to be closely equal to the area under the curve.

It may be remarked that for the experiment with its control we do not logically have a four-fold table to be treated as that table usually is treated. What we have is two independent point-binomials. Moreover, what a χ^2-table gives us is the chance for an observed table as bad as we have, *i.e.*, for one of equal or less probability (apart from fluctuations due to small numbers). But the probabilities of the different tables are not in the same serial order as the differences $p_A - p_B$ in the different tables. Hence there is neither logical nor arithmetic likelihood that the use of χ^2 should solve well our problem of determining whether the effects of treatment in experiment and control are statistically significant. It is still true, of course, that if numbers are sufficiently large, χ^2 will give the correct probabilities, but they have to be larger than is customary in such experiments.

SCIENTIFIC EVENTS

THE SCIENTIFIC EHIBITION AT DALLAS

THE American Association for the Advancement of Science, under the presidency of Dr. Irving Langmuir, associate director of research of the General Electric Company, will meet at Dallas, Texas, from December 29, 1941, to January 3, 1942, inclusive.

Fourteen sections of the Association and twenty-nine of its associated and affiliated groups will actively participate in the meeting. Among these groups will be the American Society of Zoologists, the Botanical Society of America, the American Society of Naturalists, the American Phytopathological Society, the Genetics Society of America, the American Meteorological Society and the American Society of Parasitologists.

The Adolphus and Baker Hotels, located diagonally across the street from each other, will serve as joint headquarters. The association registration and the annual exhibition will be on the mezzanine floor of the Baker Hotel. Most of the sessions will be held in the downtown section of Dallas, many being scheduled for the headquarters hotels.

The Texas Academy of Science and the Southwestern Division of the association, active in preparations for the meeting, are anticipating a large attendance from southwestern United States. The vast resources of this area, including cheap natural gas, and its easy accessibility to all parts of the United States have attracted large industries, and defense operations have stimulated many older industries, including the smelting of tin and zinc, the mining of mercury, extraction of magnesium and bromine from sea water; production of toluol, manufacture of paper, of airplanes and the building of ships. Scientists in these and other industries will contribute to the program of the meeting, and it is expected that many of the industries will be represented at the exhibition.

Announcements and diagrams of the exhibition hall will be mailed to prospective exhibitors at the end of June. For information regarding exhibits, write to the undersigned, 3941 Grand Central Terminal, New York, N. Y.

DORIS LEISEN,
Director of Exhibits

THE PEARL DIVERS GROUP IN THE AMERICAN MUSEUM OF NATURAL HISTORY

THE new Pearl Divers Group in the Hall of Ocean Life at the American Museum of Natural History was opened on June 10. It was constructed under the direction of Dr. Roy Waldo Miner, curator of the Department of Living Invertebrates. It represents an underseas scene in the enclosed pearl lagoon of the coral atoll of Tongareva—a small ring-shaped island in the South Seas about 2,000 miles due south of Honolulu.

Through the large central opening of the group, which measures 35 feet across the front, 12 feet in depth and 14 feet in height, two Tongarevan pearl divers are depicted plunging down into a coral gorge beneath the water's surface.

One of the central features of the group is a cluster of pearl oysters adhering to the coral of the sea bottom. One of the native divers is gathering oysters to bring them to the surface, while the other is swimming down to reach the oyster bed. These are the large pearl oysters, with shells six to eight inches in diameter, that the world uses for knife handles, buttons, inlays and other decorations.

A bed of *Tridacna* clams (known as "man-trap" clams) is half buried in the rocky slope which rises to the cliff-like coral wall at the left, their sinuous openings gaily festooned with brightly colored mantle edges. This species of *Tridacna* is smaller than the

clams of the Great Barrier Reef, that weigh several hundred pounds, but even the smaller variety is dangerous to the unwary diver who has a foot or hand caught between the shells.

The Pearl Divers Group emphasizes the delicate beauty of the corals of the South Seas, the many varieties ranging through all the vivid colors of the rainbow—from rose to lavender, purples, blues and tans. Besides the hundreds of other brightly colored fishes which swim singly or in schools, the group contains vicious needle-toothed morays, lurking in crevices. These dangerous eel-like fishes bite at anything that comes near.

To simulate the shimmering under-surface of the water as a diver sees it from 25 feet or more underseas, sheets of chrome-plated copper were installed at the top of the group after several other materials had been considered by Dr. Miner to produce this effect. This also presented another engineering problem, for the contact of these sheets with the iron framework that supports the coral cliffs would cause them to corrode within a fairly short time. Dr. Miner solved this by attaching the chromed copper to the framework by means of aluminum supports—thereby guaranteeing the life of the roofing as long as the group exists. Air-shafts, leading from the group to open spaces underneath the balcony of the Hall of Ocean Life, also insure the preservation of the contents.

The Pearl Divers Group is the gift of the late Edith Haggin De Long, whose generosity made possible, not only the modeling and assembling of the group itself, but also the mural by Francis Lee Jacques on the gallery floor immediately above.

The expeditionary work for the group, under the leadership of Dr. Miner, was made possible through the cooperation of Templeton Crocker, of San Francisco, who accompanied the expedition and placed at the museum's disposal the facilities of his schooner yacht, the *Zaca,* at Tongareva. Contributions for this expedition were also made by Junius S. Morgan, George T. Bowdoin, Clarence L. Hay and Wyllys Rosseter Betts, Jr. The personnel of the museum consisted of Dr. Miner, leader, Mr. Betts, field associate, and Chris E. Olsen, departmental artist and modeler.

INDUSTRIAL RESEARCH

AMERICAN industry spends six per cent. of its net income on industrial research and has increased its research personnel forty-one per cent. in the last two years, according to a report on industrial research by the National Resources Planning Board which has been transmitted to Congress by President Roosevelt. It covers all phases of industrial research in the United States and is the second in a series on Research Resources of the Nation prepared by the board with the assistance of scientific councils and committees. The National Academy of Sciences and the National Research Council are responsible for the preparation of the present volume. Its conclusions are drawn from an extensive survey in which 2,350 companies reported 70,033 persons engaged in technical research in American industry at an average annual cost of $300,000,000.

Significant facts developed by the survey are:

The rate of increase of research personnel during the last two years is twice the average rate for the last twenty years.

The contribution by newly established laboratories to the increase of research employment within the last two years is insignificant.

Of the total research personnel reported, slightly more than half are professionally trained, principally as chemists and engineers. The remainder is about equally divided between technical and nontechnical workers.

A considerable number of small and medium-sized companies conduct research. However, most of the industrial research effort, as measured by personnel, is supported by a comparatively small number of large corporations.

In general, viewing industrial research as a national asset, its rapid growth in those areas where it is already established is most gratifying. The rate of expansion into additional areas appears to be decreasing rather than increasing. There remains a number of industries to which research methods could almost certainly be applied with profit on a larger scale than they now are. Finally, the total volume of industrial research being conducted by small and medium-sized companies is relatively small, as measured in terms of personnel.

In 1938 the largest number of research workers was employed in the chemical and allied industries. Next were petroleum, electrical communications, electrical machinery, apparatus and supplies, other machinery industries and rubber products. In that year more than half of those working in industrial research laboratories in the United States were employed by the chemical and petroleum industries and by the electrical industry, including communications, utilities, radio and the manufacture of electrical machinery, apparatus and supplies.

A breakdown of the professionally trained persons engaged in industrial research is as follows: chemists, 15,700; engineers, 14,980; physicists, 2,030; metallurgists, 1,955; biologists and bacteriologists, 1,955; other professions, 909—a total of 36,553. In other technical, administrative and clerical positions 33,480 persons were employed.

Commenting on close cooperation between government and private research agencies the report says:

The Federal Government maintains a large number of research laboratories from which help may be obtained in conducting research along lines that promise results re-