Mr. Porter, Miss Hegeman directed that the money be divided equally between the two institutions and used for the "increase and diffusion of knowledge."

THE late Charles E. Munroe, who was the last surviving charter member of the American Chemical Society, has left to the George Washington University, Washington, D. C., his library on chemistry and explosives, consisting of 505 bound volumes, 2,627 unbound volumes and pamphlets, and some thousands of clippings.

CAPTAIN ALLAN HANCOCK has presented the exploration cruiser *Velero III* to the University of Southern California. The vessel and its endowment go to the university as companion gifts to the Allan Hancock Foundation for Scientific Research established a year ago, a building for which is now being constructed. All steel from stem to stern the *Velero III* is 198 feet in length with 30-foot beam, powered by twin Diesel engines and fuel capacity for a 10,000-mile non-stop cruise. Fresh food and water storage is ample to supply thirty men on a three-months voyage. For the past eight years annual voyages have been made in the eastern Pacific. The vessel will continue her exploration work and will also serve for instructional purposes in nautical subjects.

IT is stated in *Nature* that the annual report of the Institute for Science and Labor, which was transferred from Kurasiki to Tokyo at the end of 1936, indicates that much of the work of the institute follows the lines of work of the National Institute of Industrial Psychology in Great Britain. Among a number of completed researches mentioned in the report are those on the clothing of farmers, syphilis morbidity in villages, psychological qualifications for textile workers, an examination of vocational testing methods, studies on manual dexterity and on the physical fitness of employees, studies on motions and positions in working, on repetition work, psychological differences between skilled and unskilled workers in a weaving factory. Some of the physiological work is on lines similar to those pursued by the Industrial Health Research Board in Great Britain as, for example, the investigations on environmental conditions, such as climate, the effect of occupational activities on basal metabolism, the metabolism of heavy muscular labor or the physiological studies on walking, but in addition the institute has completed a preliminary research on the daily protein requirements of the nation. Occupational diseases and the prevention of accidents have also received attention, and it is noted in abstracts of publications of the institute included in the report that scientific workers in Japan are now advocating on scientific grounds raising the minimum age of juvenile labor to at least fourteen years, with special protection up to eighteen years of age.

# DISCUSSION

## UNDERTOW[1]

IN a recent article[2] Professor O. F. Evans contributed some interesting data in regard to undertow. He showed by means of colored water that in small bodies of water with an on-shore wind there was a return of a subsurface current to counteract the on-shore current at the surface. These movements were all slow and were all observed in relatively smooth water. However, Evans suggested that these currents might become strong under storm conditions producing an "undertow" which might be dangerous to bathers.

Previously Shepard (SCIENCE, 84: 181–82, 1936) had suggested that this dangerous "undertow" was probably a myth based on the existence of river-like currents which move perpendicularly out from the beach in many localities. These flows, which are called "rip currents" or "rip tides" are in no sense undertow since like streams their principal movement is in the upper water. The existence of dangerous "undertow" was questioned chiefly because of failure to obtain reports from life guards or swimmers that it existed, and also because, as Professor W. M. Davis (SCIENCE, 61: 206–08, 1925) had shown, wave motion produces both a forward and backward movement along the bottom. However, in view of the experiments cited by Evans it seemed highly desirable to make further investigation of the nature of subsurface currents, particularly under storm conditions.

The opportunity to make these tests was provided by the 1,000-foot Scripps Institution pier. For the past year the writers, with the help of WPA assistants, have been taking daily soundings along this pier, using a machine which rolls along the rail and has a sounding arm which extends out for 10 feet from the pier. To the sounding line on this machine a wooden frame like that in Fig. 1 was attached. This frame has a large vane at the bottom which is moved in the direction of the prevailing current. At the top is a smaller vane which serves to tell the direction in which the large vane is pointing under the water. A heavy weight was suspended at the bottom of the line to dampen the surge of the waves. This device could be raised or lowered to any depth desired and thus could show the nature of the water movement at the various depths. Also it could be moved all along the pier by means of

[1] Contributions from the Scripps Institution of Oceanography, New Series, No. 39.

[2] SCIENCE, 88: 279–81, 1938.

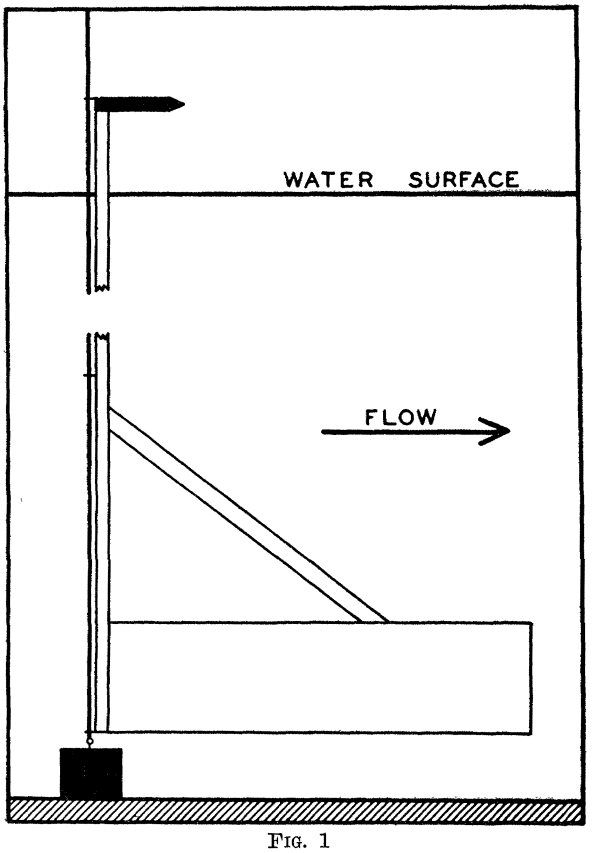


FIG. 1

the movable sounding machine. This carried observation out to depths of about 22 feet.

Choosing two days when there was a strong on-shore wind and fairly large waves numerous tests were made. The directions were easily observed and seemed to leave no doubt as to conditions existing at these times. In all cases the current was essentially the same at the surface as at the bottom. For the most part the current was moving to the south along the shore.

In some places near shore within the range of the breakers outward moving currents were observed, but these were always shown both at the surface and on the bottom. They can be considered as a type of rip current.

Observations with a current meter at the end of the pier in about 25 feet of water showed also that the current had a longshore trend in the same direction as the current at the surface. On the other hand, a bottom current, observed by R. Revelle and R. H. Fleming on another occasion when there was no wind, flowed contemporaneously with the outward movement of a rip current. On this occasion the bottom current was longshore, indicating that the rip current had passed over the bottom water without disturbing it. This of course represents a case that is the opposite of undertow.

These observations suggest that dangerous undertow is not an accompaniment of strong on-shore winds and large waves. However, they are of too limited scope to prove the absence of this danger to bathers. It is to be hoped that Professor Evans and others interested will extend these experiments to lakes and other parts of the ocean. Meantime the bather is still in danger from the rip currents which may carry him out beyond his depth, even if they do not carry him below the surface. The rip currents incidentally are observed under all sorts of conditions of waves, currents and winds.

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## SURVIVAL OF THE TROPICAL RAT FLEA IN UNITED STATES

SINCE July, 1934, when Roudabush and Becker[1] reported the tropical rat flea (*Xenopsylla cheopis*) from the interior of the United States, several other reports have established its presence from the East, Mid-west and Far West. The evidence given in these papers leaves one with the impression that the flea is well established, but as yet no one has proved that the flea does not migrate into the interior every year.

Realizing that such a question must some time be answered, Dr. E. R. Becker and the author continued to collect the fleas at Ames, Iowa, every year from 1934 to 1938. In order to check its presence thoroughly, they were collected every fall until snow covered the ground and every spring as soon as possible after the first thaw. These collections prove that the flea is not a periodic visitor but is actually a resident in the interior.

In August, 1938, several specimens of the tropical rat flea were sent to Ward's Natural Science Establishment for identification. These came from Youngstown, Ohio, and since Ewing and Fox[2] have already reported that infestation no further details are necessary.

Several workers, cleaning out an infestation of insects in a Rochester, N. Y., church, brought into Ward's some of the insects for identification. Among other things three female specimens of the flea under consideration were found in a chandelier of the inverted dome type. Exactly how or why the fleas happened to be there is not understood, but there is some evidence that at least one of them underwent some development while in the chandelier, since a deserted pupal case was found in the debris.

Ewing and Fox[2] state that "there is a possibility that a more resistant race of this flea has been devel-

[1] R. L. Roudabush and E. R. Becker, SCIENCE, 80: 97, 1934.

[2] E. W. Ewing and Irving Fox, SCIENCE, 88: 427, 1938.