on the shoreline physiography of Japan. Dr. Taro Tsujimura, reputed to be the country's leading geographer, has a similar position at Tokyo.

Courses given at Kyoto include physiography, climatology, oceanography, political geography, human geography of islands, history of geography, and occasionally regional geography. The Tokyo department offers courses in geomorphology, climatology, soils, cartography, cultural geography, and the regional geography of Asia. Regional geography of areas other than Japan and the Far East generally has been neglected both in teaching and in research. When I commented on this fact, Prof. Tsujimura sadly replied: "That was our great mistake."

The Japanese university course requires 3 years and normally follows 14 years instruction in primary, middle, and higher schools. The Tokyo Institute of Geography had a total of 20 geography majors and Kyoto had 13, but the numbers of students were reported to vary considerably from year to year. A large majority of the students are preparing to teach in the secondary schools and colleges, but some have gone into research organizations with the South Manchurian Railway, the Institute of Oriental Culture, and the Home Ministry, which has been engaged in land-planning projects. Dr. Komaki pointed out that the military and naval services did not recognize the value of geographic training and that almost all the younger geographers went into the services as regular officers. A major exception was the Institute of Oriental Culture, which specialized in political geography and was connected with the military during the war.

The principal geographical publication is *The Geographical Review of Japan* (*Tirigaku Hyōron*), which is the organ of the Association of Japanese Geographers (membership, 270) and is published monthly. It is well illustrated with maps and photographs, and each article is abstracted in English. The Tokyo Institute takes the leading part in editing and publishing this journal. The Kyoto Institute, up through 1943, published an annual volume, *Papers in geography* (*Chiri-Ronso*), containing approximately a dozen articles on various geographical fields. This publication was sent on an exchange basis to the American Geographical Society, the National Geographic Society, and the University of Michigan. A so-called popular geographic monthly in Japan is *Chiri-gaku*, but its circulation is only about 5,000.

In the past, geographical instruction and research in Japan have been circumscribed to a high degree by the government, as was true of most other academic fields. During the war years no foreign publications were received or contacts made. Last winter the universities were closed because of the lack of any coal for heating. Despite these difficulties, research is continuing, and several geographers showed me maps of population and economic factors on which they were working. The excellence of their cartography made one wish that American geographers could used a brush and water colors in similar fashion.—*Robert C. Klove* (Washington University, St. Louis).

In the Laboratory

An Improved Helmet for Breathing Oxygen or Other Gases[1]

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The value of a helmet rather than a mask for inhalation of a variety of gas mixtures has long been recognized. Masks leak frequently and become uncomfortable on long wear, chiefly because of difficulty in fitting the complex curves about the nose and eyes. In physiological experiments where accurate measurements are made, an airtight fit is essential and, if pressure is to be used within the unit, a helmet is highly desirable for the same reason.

A number of helmets for this purpose have been designed during the past seven or eight years at the Experimental Diving Unit, Navy Yard, Washington, D. C., two of which were fairly successful. Several defects still remained, chief among which was fogging of the vision plate. In order to remedy these defects, the present apparatus was developed.

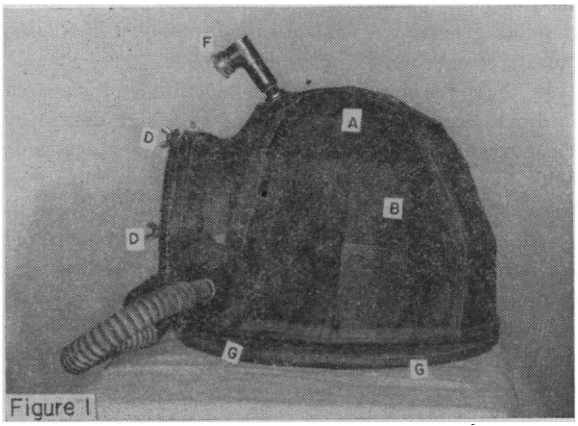
The construction of the hood is very simple (Figs. 1, 2). It consists of a wire frame (A), covered with canvas to form the background on which the rubber cover (B) is cemented. A removable, transparent, oval face plate (C) is held in place by four ¼-inch 20-thread wing nuts and studs (D). A sponge-rubber pillow (E) for a head rest is built in for use in the supine position but also helps to support the helmet vertically in the upright position. In the upright position, the lower flange rests comfortably on the shoulders and also keeps the helmet in position. An

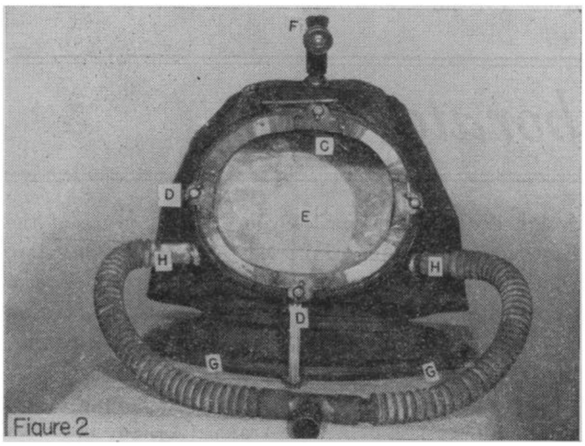
[1] The material in this article should be construed only as the personal opinion of the writer and not as representing the opinions of the Navy Department officially.

adjustable exhaust valve (F) and a rubber collar (G) are attached. The inlet channels (H) inside the hood are so constructed that they direct the incoming air on the face plate. The rubber collar is made of one-inch sponge and has a two-inch flange which can be fitted by folding it either in or out. The size of the opening is chosen to fit the average neck. The exhaust valve is adjustable from 0 to 3 PSI.

The construction of the inlet channels is perhaps the greatest single improvement. Their arrangement has regularly succeeded in overcoming the fogging of the face plate, which has been so troublesome in older models with flows of oxygen of 12 liters per minute and lower.

The helmet is easy to operate. The inlet opening is





connected to an oxygen cylinder through a standard reducing and flow regulator. The hood operates at a constant positive pressure of 3 mm. mercury, which can be altered if desired by the adjustable exhaust valve. The helmet is placed on the subject's head by stretching the rubber collar over the head and allowing it to come back into place about the neck. This operation is the only difficult one, in that it requires two men to help the subject into the helmet easily. Communication can be maintained with the subject by ordinary speech at distances not greater than three or four feet.

Tests were conducted to ascertain the degree of wearing comfort and the gas concentrations in the helmet over long periods. The test periods were of seven to eight hours in duration. After the helmet was adjusted, the subject was placed on a cot and the flow of oxygen started. There was no discomfort other than restlessness attendant upon confinement for a long period of time. It was found that an atmosphere of practically pure oxygen could be maintained with flows as low as 10 liters per minute. In one experiment careful records of temperature of air inside

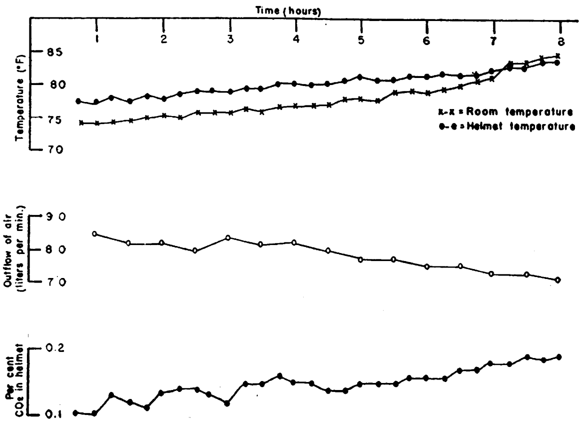


Fig. 3. Changes in temperature inside and outside helmet. Rate of outflow of air and CO_2 content within helmet are plotted from a 7½-hour experiment.

and outside the helmet were made (Fig. 3). Even with a small flow of oxygen there was no heating up of the air inside the helmet.

Carbon dioxide content remained low (0.15 per cent) throughout and there was no fogging of the face plate at any time.

The apparatus was also tested for use in a recirculator system in which carbon dioxide was removed and oxygen added as it was used. The helmet functioned well under these circumstances, and there was no fogging of the face plate.

The uses of a helmet are intermediate in position between those of a mask and those of a tent. It is more economical than a chamber, and higher concentrations of gas can be maintained. It cannot be as quickly removed and replaced as a mask, but it is more economical of oxygen. Because a surer fit can be obtained and because leaks can be more readily located than with a mask, a helmet is often the equipment of choice when studies involving accurate measurements of respiration are desired. A helmet which could be shown to be leak free might even replace the time-honored mouthpiece and nose clip for metabolic studies.