

he flounders and, stirring up the mud, obscures his own vision, his breathing is laboured and the discomfort so great that judgment is apt to be hasty; moreover, for elderly men the thing is impossible. The same man in a suitable observa-

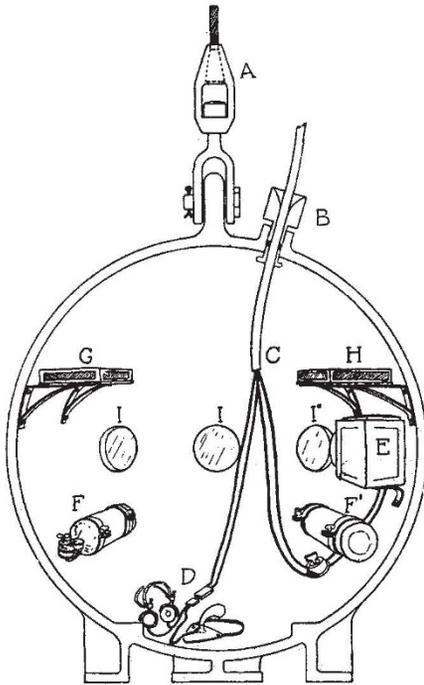


FIG. 2.—Section of the bathysphere. A, swivel for attaching cable to sphere. B, stuffing box through which electric cable enters sphere. C, electric cable, containing two wires for the telephone circuit and two for the electric lights. D, telephone. E, searchlight with beam focused through window I'. F, oxygen tank ready for use with valve attached—one dial showed the amount of oxygen remaining in the tank, the other the rate of discharge. F', reserve oxygen tank. G, tray containing soda lime for absorbing carbon dioxide. H, tray containing calcium chloride for absorbing moisture. I, main observation window, 6 in. in diameter. I' and I', windows for searchlights. The windows were discs of fused quartz 3 in. thick and 8 in. in diameter.—From *Bull. New York Zoo. Soc.*, vol. 33, No. 6. By courtesy of Mr. William Beebe.

tion chamber could be travelled by overhead tackle from one end of the work to the other without the least exertion. Beebe was surprised to find what misleading information his nets had been giving about the distribution of the bathypelagic creatures, and it seems certain that under-water observation will sooner or later be used in solving practical fishery problems; it is to be hoped that Great Britain,

which used to lead the world in diving, will not be the last to divert some of her marine biologists from determining salinities and measuring herrings

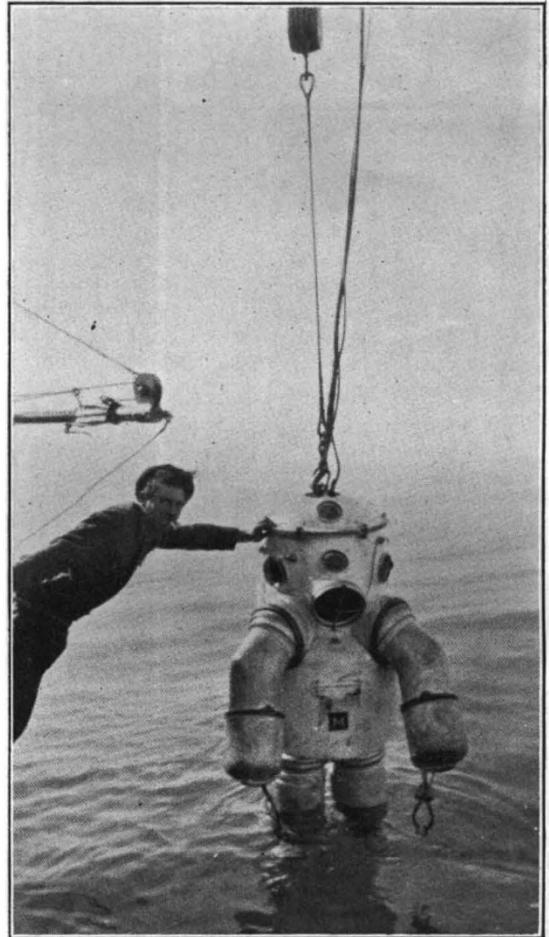


FIG. 3.—Neufeldt and Kuhnke's 'iron man' articulated shell.

to going under water and watching the reactions of fish to the baits on a long line, or even to being towed along in the mouth of a trawl to see what proportion of fish dodge it and how they may be circumvented.

<sup>1</sup> *Seventy Fathoms Deep: with the Divers of the Salvage Ship Artiglio.* By David Scott. Pp. 288 + 32 plates. (London: Faber and Faber, Ltd., 1931.) 12s. 6d. net.

### Diet and Disease.

REFERENCE has already been made in these columns to certain recent dietary surveys<sup>1, 2</sup>. From such researches it is possible to enlarge our knowledge of the types of diet which different peoples or individuals may find adequate, to point out in what respects diets in common use may fail to satisfy accepted standards, in certain cases to correlate prevalent diseases with a particular type of diet and, by means of additions to the food supply, to confirm the results of the survey and

indicate how the diet may most simply be improved. A recent report by Orr and Gilks is of great interest, since the investigators find a marked correlation between diet and physique and general health.<sup>3</sup>

The survey was carried out on two tribes living in Kenya, the A-Kikuyu, who are agriculturists, and the Masai, who are pastoralists. The Kikuyu diet consists chiefly of cereals (maize or millet), tubers, plantains, legumes, and green leaves. Only the women eat green leaves in any quantity; more-

over, the consumption of edible earths (salt) is almost confined to them and children up to five years of age. Analysis of the dishes in common use showed that the diet was probably adequate in calories, protein and phosphorus, but low in fat for both sexes. The intake of calcium by the men was definitely subnormal, and probably that of sodium also; the women obtained more of these elements from the green leaves and salt consumed, and their intake of them was probably adequate: some of the edible earths eaten also supplied additional iron.

In contrast to the Akikuyu, the Masai live chiefly on meat, milk, and blood, with small amounts of cereals or fruit. The milk is richer in protein, fat and sugar, than English milk, but poorer in all inorganic constituents except calcium. The diet supplies a large excess of protein and fat, and a liberal supply of mineral elements, but is low in carbohydrate, cellulose, and other indigestible residues. The diet of the women was less extreme than that of the men and approached in composition that of the Kikuyu women.

Physical measurements showed that the Masai men were 5 in. taller and 23 lb. heavier on the average than the Kikuyu men, and the women 3 in. taller and 27 lb. heavier than the Kikuyu women. The Masai are typically larger in the chest and smaller in the abdomen than the Kikuyu. Dynamometer readings showed that the Masai men can exert a hand pressure 30 lb. greater than the Kikuyu; the latter, in fact, are only as strong as the Masai women, but their maximum pressure is about 10 lb. greater than that of their own women.

The incidence of disease was found to be very different in the two tribes. Among the Kikuyu children bone deformities, especially those of late rickets, dental defects, and anæmia were common, but relatively uncommon among the Masai. The incidence of enlarged tonsils and cervical adenitis was the same in both tribes, occurring in about half of the children examined. In the case of the adults, respiratory infections and ulcers were common among the Kikuyu, intestinal stasis and arthritis among the Masai. The Kikuyu women appeared to be less susceptible to disease than the men and were generally in better physical condition.

Some experiments were carried out on native prisoners, on hospital and prison diets, with the object of confirming the inadequacy of the native dietaries, by making additions to the diets and noting any improvements in the retention of different elements or in the composition of the blood. The diets were considered to be inadequate in calcium, and possibly some other inorganic constituents, and in vitamins A and D. The salt supplement was given as a mixture made up to supply in the daily dose approximately the amount of minerals present in 1 pint of milk; the vitamins were supplied in cod liver oil. In adult Kikuyu, it was found that the minerals, especially when given with cod liver oil, increased the calcium retention and also raised the level of the blood calcium, which is lower than that of Europeans at

home or in Kenya. With growing Masai boys, it was found that a milk supplement was the most effective in increasing the weight and the calcium retention. The mineral mixture, calcium carbonate and bone flour, also increased the retention of calcium, but cod liver oil had little effect: it appears, therefore, that the chief deficiency in the diets is that of calcium. Bone flour also increased the retention of phosphorus. It was also found that a reformatory diet of maize, potatoes, and beans with ghee and salt did not permit of maximum growth; milk, maize and bone flour and maize supplements increased the growth rate of the boys, milk being the most effective. The diet appeared to be low in energy value as well as in calcium.

Tropical ulcer is common among the Kikuyu but comparatively rare among the Masai. Its incidence could not be correlated with the presence of malaria, syphilis, or intestinal parasites. Although slight injuries appear to precipitate its development, it is difficult to believe that they are the sole cause. The number of cases increases at the end of the dry season. Examination of the blood disclosed the fact that the inorganic phosphorus was very definitely raised in cases of ulcer as compared with other natives or Europeans in Kenya; the serum calcium was about the same in all natives and below the European level. A similar change in the direction of high phosphorus and low calcium occurs in animals on diets containing an excess of the former but deficient in the latter, suggesting that the abnormal ratio between these elements in the native diet is responsible for the change in the composition of the blood; the very high level of the blood phosphorus in ulcer cases, however, is not explained. The evidence certainly suggests that diet plays a large part in the aetiology of ulcer, presumably by decreasing the patient's resistance to trauma. No dramatic healing of ulcers was however produced when additions were made to the diet, although it appeared that they healed more quickly as the patient's general condition improved.

The observers conclude their survey with suggestions for the improvement of the diet of the tribes; both should consume more green vegetables, and the Kikuyu should also drink milk. The preliminary step would be a general improvement in agriculture and animal husbandry, especially among the Kikuyu.

The study is a striking illustration of the fact that man does not invariably select for himself a suitable dietary: it discloses that the incidence of disease among natives may be higher than among more civilised nations, which nevertheless consume 'artificial' rather than 'natural' foodstuffs. Finally, from the varying incidence of different diseases among the two tribes, it suggests that similar diseases among civilised peoples may also have a fundamental dietetic basis.

<sup>1</sup> NATURE, Vol. 126, p. 963; 1930.

<sup>2</sup> NATURE, Vol. 127, p. 897; 1931.

<sup>3</sup> "Studies of Nutrition: The Physique and Health of Two African Tribes". By J. B. Orr and J. L. Gilks (for the Dietetics Committee of the Economic Advisory Council). Medical Research Council. Special Report Series, No. 155. (London: H.M. Stationery Office, 1931.) 2s. net.