lips, near Cimarron, N. M., and in the northeastern section, where the foothills of the Rockies rise from 6,000 to 12,000 feet. The expedition includes: Dr. John E. Hill, associate curator, and William Buchanan, assistant in mammalogy. They will be joined later by Robert E. McConnell, a trustee of the museum, and Harold B. Clark, who last summer led an Alaskan expedition for the museum.

DISCUSSION

OXYGEN-POOR WATERS OF THE CHESAPEAKE BAY

STUDIES on the physical and chemical properties of Chesapeake Bay waters during the summer of 1936 gave evidence of a definite oxygen-poor layer at the bottom in the deeper regions, and data from subsequent series of water samples have proved the existence of that layer and have furnished interesting information concerning its vertical and horizontal extent. Water samples for these studies have been secured at the stations shown by the numbered dots on the accompanying chart (Fig. 1), and sampling is now being

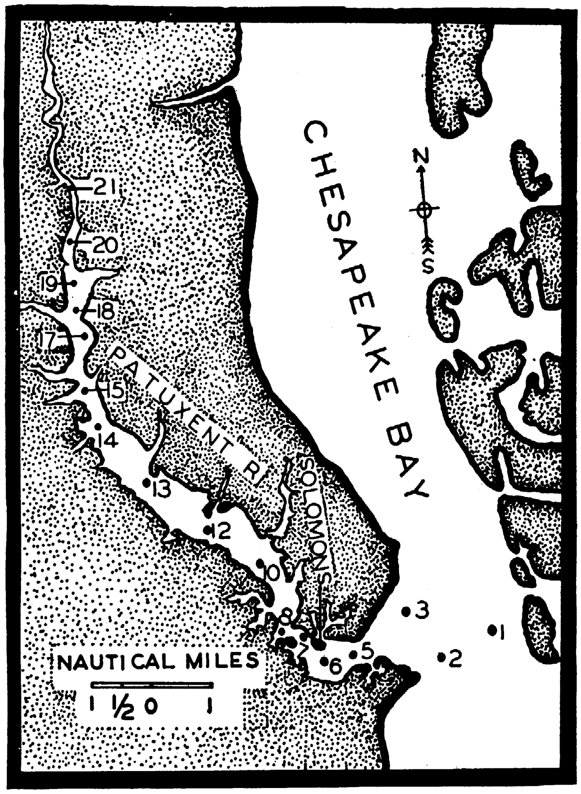

FIG. 1. Locations of principal sampling stations (numbered points) in Chesapeake Bay and the Patuxent River.

continued at those stations, with the aid of a grant from the American Philosophical Society. Three stations are in the bay, opposite the mouth of the Patuxent River (about 38° 18′ N. lat., 76° 25′ W. long.), and others are located at various places in the tidewater reaches of the river.

A clearly defined oxygen stratification appears to prevail in the bay from about June 1 to about October 1, with very low oxygen concentration in the bottom waters. This is accompanied by an equally pronounced salinity stratification of opposite gradient, with high salt concentration at the bottom. The oxygen concentration of the surface waters varies around 6 cc per liter (104 per cent. of total saturation), while at depths of 8 to 10 meters the oxygen content is frequently as low as 2 cc per liter (35 per cent. of total saturation). Below a depth of 12 meters, the concentration is usually under 1 cc per liter (17 per cent. saturated), and deep samples are often found to contain no measurable oxygen. The top of the oxygen-poor layer usually occurs at a depth of about 9 meters.

The summer range of oxygen concentration from the surface water to the oxygen-poor layer below is narrower above the river mouth than in the bay, and it diminishes rapidly in the upstream direction as is shown by the dark area of Fig. 2. Also, the stability

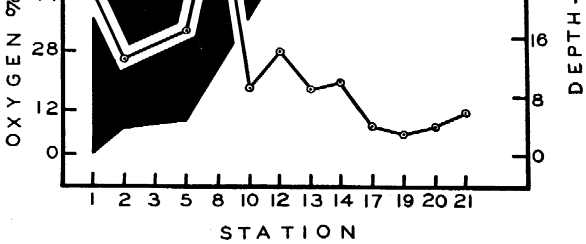

FIG. 2. Ordinates of upper margin of dark area are summer O_2 contents near surface and those of lower margin are corresponding O_2 contents near bottom, at stations numbered as in Fig. 1; ordinates of line graph show depths of water at the several stations.

of the water layers decreases in like manner. Of course, any influences that produce vertical mixing—such as seasonal temperature changes or local tidal and topographic differences—may modify or destroy stratification. It was found in 1937 that instability of the water strata, due to mixing, began in the latter part of September at the upper river stations and slowly progressed downstream toward the deeper waters of the bay, where effective mixing did not begin until late October. The stratification of winter, which has not yet been studied seriously, seems to be notably different from that of the summer season.

It appears that oxygen stratification in the Chesapeake Bay differs markedly from that prevailing in the Western Basin of the North Atlantic. Seiwell's[1] extensive investigations have shown that in that ocean region, where salinity stratification is not well developed, there is an oxygen-poor layer at intermediate depths, characterizezd by oxygen contents less than 60 per cent. of total saturation. That layer lies between a surface layer and a bottom layer, both of which are relatively rich in oxygen. On the other hand, in the Chesapeake Bay the surface stratum, which has low salt content and high oxygen content, is underlaid, at least in summer, by a bottom layer of much higher salinity and exceedingly low oxygen concentration. Seiwell's results, together with those of other students of Atlantic and Pacific waters, have contributed much to our general knowledge of marine environments, and further study of the various factors that control bathymetric oxygen variations should lead to a better understanding of many fundamental problems in oceanography and its diverse applications in the fishery industries.

In the preparation of this paper, valuable advice and criticism have been received from Professor Burton E. Livingston, of the Johns Hopkins University, and from Professor R. V. Truitt, of the University of Maryland.

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THE EFFECT OF ARSENIC ON THE TOXICITY OF SELENIFEROUS GRAINS

DURING investigations on the "alkali disease" or selenium poisoning and investigations on the comparative toxicities of several elements including selenium, tellurium, arsenic, vanadium, nickel, tungsten and molybdenum it was observed that, at the concentrations used, selenium was the only one of the elements to cause severe liver pathology[1,2,3,4,5] in the rat.

More recent experiments on the combined toxicities of selenium in combination with the above mentioned elements have revealed that the feeding of arsenic along with seleniferous grains prevents the characteristic symptoms of selenium poisoning in rats. The addition of 5 ppm of arsenic as sodium arsenite to the drinking water has given full protection against liver damage caused by 15 ppm of selenium in the form of seleniferous wheat. Two and one half ppm of arsenic gave only partial protection. The animals receiving 5 ppm of arsenic in their drinking water and 15 ppm of selenium in their feed also appear to be free from the other characteristic symptoms of selenium poisoning. Experiments also indicate that arsenic is effective in preventing liver damage and the general toxic effects of inorganic selenium as well as organic selenium (selenium occurring naturally in grains).

The feeding of arsenic to livestock to prevent selenium poisoning is not recommended on the basis of these results but since arsenic is effective it is hoped that some other elements or compounds which are in themselves non-toxic will be effective. Experiments are underway, and certain compounds have given promising results. Experiments with larger animals are also underway. A more detailed report is in preparation.

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"ANOMIA" PECTEN LINNAEUS

LINNAEUS, in the tenth edition of "Systema Naturae," 1758, p. 702, describes a fossil shell, *Anomia pecten,* in these words: "A. testa semi-orbiculata depressa multistrata; valvula altera plana (List. Angl. 243., t. 9, f. 49). Testa inferne s. margine cardinis linea recta s. transversa." No locality was given, but a specimen is contained in his cabinet at the Linnaean Society, London.

Lister's figure, cited by Linnaeus, is of a specimen "ex fodinis carbonum Fossilium juxta Hallifax," and is quite recognizable as *Pterinopecten papyraceus* (J. Sowerby, 1822) known to occur in the Halifax Hard Marine Band in the Coal Measures. The above description could be held to apply to this shell. By a strict application of the rules of nomenclature J. Sowerby's specific name would appear to be invalidated by Linnaeus's previously described species.

On the other hand, there is no doubt that Linnaeus had before him Swedish Silurian brachiopod shells long known as *"Strophomena" pecten* (Linn.). Knowledge

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3 K. W. Franke and A. L. Moxon, *Jour. Pharm. and Expt'l. Ther.,* 61: 89–102, 1937.

4 A. L. Moxon, S. Dak. Agric. Expt. Station *Bulletin* No. 311, 1937.

5 Unpublished data—this laboratory.