There is no direct experimental evidence available at the present time which proves that the natural arsenic in marine foods, if consumed regularly over long periods of time, will or will not produce harmful physiological effects. However, the fact that seafoods are eaten regularly by maritime peoples and have for centuries constituted the principal article of diet of some of the nations of the world without demonstrable harmful effects is presumptive evidence that the arsenic present therein is in a relatively non-toxic form.

In the investigative work reported here shrimps were chosen as the source of "naturally combined" arsenic, since it is known that arsenic occurs in shrimp in greater concentrations than in most other seafoods. Samples of shrimp have been encountered which range in arsenic content (as As_2O_3) from 171 to 5 milligrams per kilogram, dry basis.

Groups of rats were taken at weaning and fed diets of various arsenic content derived from shrimp and from added arsenic trioxide. At the end of 3 months and again at 5½ months of the feeding period representative animals from each group were killed, autopsied and sections of their liver, spleen and kidney examined histologically for evidences of injury due to arsenic feeding. The carcasses of the animals (without the alimentary canal) were also analyzed for arsenic.

It can be seen from the results shown in the accompanying table that although the carcasses of rats which had received the largest amount of arsenic, in the form of shrimp, contained about 4 times the quantity contained in the stock diet controls (with no added arsenic), the rats which had received approximately the same quantity of arsenic as arsenic trioxide contained from 55 to 65 times that in the control animals. The results also show that during the first 3 months of the feeding period as well as for the full 5½ months only 0.7 per cent. of the ingested "shrimp arsenic" was stored in the bodies of the rats, while more than 18 per cent. of the inorganic arsenic trioxide was stored in the first 3 months. Apparently the rats receiving the inorganic arsenic trioxide had, some time within the first 3 months of the feeding period, reached an equilibrium in which no more storage of arsenic was taking place. It is, therefore, impossible to calculate from the above results the percentage of arsenic which was stored before this equilibrium had been reached. Undoubtedly the percentage stored would have been much higher had the first feeding period been of shorter duration.

The above results are direct evidence that there is a difference in the metabolism of the arsenic as it occurs in shrimp as compared to inorganic arsenic and that only a very small percentage of the arsenic contained in shrimp is absorbed and stored in the animal body when such foods are eaten.

There was no retardation of growth in any of the arsenic-fed animals nor any observable differences in their physical vigor or appearance and in none of them was there any histological evidence of injury to the spleen, liver or kidney due to the feeding of arsenic at the levels here employed.

These experiments are being continued, with other rats scheduled to be killed at the end of 9 and 12 months.

E. J. COULSON
U. S. BUREAU OF FISHERIES
ROE E. REMINGTON
KENNETH M. LYNCH
MEDICAL COLLEGE OF THE
STATE OF SOUTH CAROLINA

EXPERIMENTAL PRODUCTION OF INCREASED INTRACRANIAL PRESSURE

THE production of a marked elevation in intraocular pressure by injecting small amounts of chloroform into the carotid artery of anesthetized dogs was described by Koppányi and Allen.[1]

We studied the effects of this procedure on the intracranial pressure. Dogs anesthetized with sodium barbital were used. Cisternal puncture was carried out and the needle connected with a water manometer. Blood pressure was recorded from one carotid artery, the other being used for chloroform injections. Injection of 0.2 to 0.5 cc of chloroform into the intact carotid artery produced a marked and sustained elevation of intracranial pressure. This elevation began in one or two minutes, reached a maximum in ten to twenty minutes, and remained approximately at the maximum level until the animal died. The usual level of the intracranial pressure before the chloroform injection was in the vicinity of 150 mm of water: the maximum height following chloroform injection was from 325 to 400 mm.

A coincident rise in intraocular pressure was produced by chloroform injections, corresponding to the observations made by Koppányi and Allen.

Once this elevated intracranial pressure was produced, the new high level seemed to be maintained much the same as the normal level. It varied directly with the level of arterial blood pressure. Alterations of arterial blood pressure resulting from the injection of epinephrine hydrochloride (marked rise), intravenous morphine sulfate (fall), intravenous 50 per cent. dextrose solution (initial fall and subsequent rise) and inhalation of amyl nitrite (marked fall) were invariably and immediately reflected by similar alterations in the increased intracranial pressure. Venous pres-

[1] *Proc. Soc. Exp. Biol. and Med.*, 12: 488, 1924–25.

sure (jugular) also followed the arterial blood pressure variations.

Similar experiments in which the intracranial pressure was not modified by chloroform injections showed no direct effect of morphine sulfate or of caffeine sodio-benzoate on the level of intracranial pressure, even when the drugs were given in large doses. When they were given intravenously, there was usually a temporary drop in blood pressure and a parallel drop in intracranial pressure. Hypertonic salt or dextrose solutions were the only agents which produced a rise in blood pressure without a corresponding change in intracranial pressure.

These studies are being continued.

THEODORE KOPPÁNYI
PHILIP L. GRAY
GEORGETOWN UNIVERSITY SCHOOL OF MEDICINE

A STUDY OF THE COMPOSITION OF BLACK CONCRETIONS IN ONONDAGA LIMESTONE

IN the district about the Indian Ladder in the Thacher State Park, southwest of Albany, New York, are found many outcroppings of Onondaga limestone. In this region much blasting has been done to obtain rock for road construction. On the exposed face of one of these quarries was noticed many black spots surrounded by the usual gray of the limestone. In this gray limestone are to be found fossil sponges, corals, starfish, Brachiopods, mollusks and arthropods. Sponges were especially abundant during the Devonian Era. In conformity with this, many white calcite replacements have been recorded. On further examination, these black spots were found to be much more crystallized than the surrounding limestone, and seemed to be similar in shape but of varying dimensions. The shape was roughly ovoid and the dimensions varied from 2 to 8 inches long and 2 to 6 inches in diameter. About 100 pounds of this material were gathered for study. This material was then subdivided with a hammer and chisel to separate the limestone from the black crystalline material.

In nearly all cases these black nodules were found to be a hard central portion having a hardness above 6. This was found to be chert. After having separated the material into three parts, the usual limestone analysis was performed on each portion with the results shown in Table 1.

It is evident from these results that the black color of the black limestone is due to free carbon in a very fine state of subdivision. This carbon had excellent adsorbing properties. It was noticed that correct results could not be obtained for the carbon determination until the extracted carbon was heated for 12 hours at 400° C. under reduced pressure. Unless this treatment was given, carbon dioxide obtained from the combustion of this material was unusually high. It was assumed that this excess was caused by adsorbed carbon dioxide. As phosphorus is generally found in fossils and neither phosphorus nor nitrogen were found in the stone, it indicates that they probably escaped as gases.

TABLE 1

	Limestone	Chert	Black limestone
SiO_2	27.65	84.00	12.65
$Al_2O_3 + Fe_2O_3$	1.56	——	——
FeO	——	1.60	0.91
CaO	38.12	5.88	46.97
MgO	1.58	0.00	0.56
CO_2	31.00	6.35	37.85
Fe_2O_3	——	2.05	——
C	——	——	0.38
Na_2O	——		0.00
K_2O	——		0.00
TiO_2	——	0.00	0.00
P_2O_5	——	0.00	0.00
MnO	——	0.00	0.00
Al_2O_3	——		0.00
SrO	——		0.00
S	——		0.00
SO_3	——		0.00
N_2	——	0.00	0.00
Loss on ignition	31.70	6.33	38.60
Hardness	3	7	3
Color	Dark gray	Light gray	Black
Specific gravity	2.70	2.62	2.69

It is well known that sponges are very siliceous in texture, and upon decomposing leave a silica deposit. This explains the chert generally found at the center of these concretions. With decomposition there is a contraction in volume, thus leaving some space to be filled in. Water left by the decomposition had then dissolved the most soluble material, which was calcium carbonate. After a saturated solution was reached, the calcium carbonate precipitated as calcite. The crystalline form was rhombohedral. The dark color is probably due to the organic matter left by the sponge and was occluded as the calcite precipitated.

F. W. SCHWARTZ
R. L. MATHIASEN
RENSSELAER POLYTECHNIC INSTITUTE

BOOKS RECEIVED

DANIEL, R. J., Editor. *Report for 1932 on the Lancashire Sea-fisheries Laboratory.* Pp. 132. Illustrated. University Press of Liverpool. 5s.

RICHARDS, L. W. and G. L. RICHARDS, JR. *Geologic History at a Glance.* Stanford University Press. $1.25.