Date	Locality	Average Lethal Doses of Extracts of				
		Mytilus californianus Livers only	*Emerita analoga*			
June 14	San Francisco Beach	.....	Whole animals*	2.5	mg.	
17	" " "	.....	" "	5.0	"	(large specimens)
			" "	2.0	"	(small ")
18	Musselrock (San Mateo County)	0.12 mg.	" "	2.0	"	
21	Salmon Creek (Sonoma County)	10 "	" "	> 60	"	
23	Musselrock	0.2 "	" "	10	"	(large specimens)
			" "	6	"	(medium ")
			" "	6	"	(small ")
26	Muir Beach (Marin County)	0.2 "	" "	2.5	"	(small ")
26	Bolinas Beach (Marin County)	0.15 "	" "	2.2	"	(small ")
29	San Francisco Beach	.....	Eggs	3	doses	eight large females
			Muscles	10	"	
			Viscera	250	"	
July 4	Musselrock	0.2 mg.	Gonads	2.5	mg.	
			Livers	0.6	"	
4	Montara (San Mateo County)	0.2 "	Viscera	0.35	"	
4	Miramar (San Mateo County)	.....	Gonads	1.5	"	
			Livers	0.15	"	
5	Salmon Creek	0.1 mg.	Livers	0.12	"	
19	La Jolla † (San Diego County)	.....	Livers	> 60	"	
20	San Francisco Beach	2.0 mg.	Livers	0.6	"	

* The ratio of weights of liver extract to extract of whole crabs is approximately 1: 10. For a comparison the values given for whole animals have to be divided by 10.

† For this sample I am indebted to Dr. C. E. ZoBell, of the Scripps Institution of Oceanography.

animal the analysis of which will indicate the approach of a "toxic period." Mussels and clams are obtainable only at low tide, during a short time of the day, in limited parts of the coast, while sand crabs can be collected at practically any tide level, every day of the month and at any locality along the coast. Furthermore, the results demonstrate that at some time during the summer months the paralytic shellfish poison is likely to be prevalent in unexpectedly large amounts along the California Coast, since the crab is found in large numbers on any sandy beach. The view held so far that the poison is confined to certain bivalves is no longer tenable. At least this decapod, which, like the mussel, feeds on the plankton of the shore,[4] seems to concentrate or form the poison in the digestive gland. In this connection it is of interest to record that sand crabs kept in aerated sea water in the laboratory for 24 hours gave off measurable amounts of poison into the water. The underlying sand, which had been completely washed free of electrolytes with distilled water, yielded another amount of poison after elution with concentrated salt solution. Further studies of these equilibria and of the toxicity and biology of *Emerita analoga* in conjunction with those on *Mytilus californianus* are expected to be of great help in the elucidation of the intricate problem of mussel poisoning.

[4] F. W. Weymouth and C. H. Richardson, Jr., *Smithson. Miscel. Collect.*, 1912, Vol. 59, No. 7, Publ. 2082.

SUMMARY

The paralytic shellfish poison may be found in a high concentration in the sand crab *Emerita analoga*.

HERMANN SOMMER

THE OCCURRENCE OF MOTTLED TEETH IN IOWA[1]

BLACK and McKay[2] in 1916 were among the first who called attention to mottled teeth in certain areas of this country. Some relationship was suspected between the condition and the drinking water of those regions. Until recently, however, no common characteristic of the waters from affected regions was observed, and, consequently, the causal agent of the disturbance in the structure of the teeth remained unknown.

[1] From the Laboratories of Physiological Chemistry and Physical Chemistry, Iowa State College, Ames, Iowa. Dr. Carl T. Ostrem, Ankeny, Iowa, cooperating.

[2] Black and McKay, *Dental Cosmos*, 58: 129–156, 1916.

Churchill[3] analyzed waters from different sections of this country and found fluorine in a considerable number. Churchill states: "It is well to emphasize the fact that no precise correlation between the fluoride content of these waters and the mottled enamel has been established. All that is shown is the presence of a hitherto unsuspected common constituent of the waters from endemic areas. However, it is of interest to note that apparently the relative severity of the defect in these various areas seems to follow the fluoride concentration."

Smith, Lantz and Smith,[4] of the University of Arizona, have shown that the tooth defect is due to fluorides in the drinking water; they have analyzed the fluoride content of waters in endemic areas and found it to be high. Furthermore, they have produced an analogous condition in rats by feeding small amounts of fluorides. McCollum, Simmonds, Becker and Bunting[5] and Schulz and Lamb[6] observed some years ago that the feeding of sodium fluoride had a marked effect on metabolism and caused changes in the teeth of rats comparable to those we now recognize as characteristic of mottled teeth in human beings.

Dr. Carl T. Ostrem, of Ankeny, Polk County, Iowa, recently called the attention of Professor V. E. Nelson, of Iowa State College, to a condition existing in that region which corresponds exactly to the description of mottled teeth. How extensive this area is we do not know. However, a large number of the children of this vicinity have mottled teeth. It is possible that the trouble began after the sinking of deep wells in this region and that the condition did not occur while shallow well water was used. This is substantiated by the fact that the cases so far noted have occurred in children born at approximately the time when the deep wells were installed.

Professor Nelson, Mr. Greenwood and Mr. Wilhelm have undertaken a study of this problem in this locality and, although their data thus far are not extensive, they are convinced the water in this area contains fluorides and that the mottled teeth are due to this.

Two samples of drinking water from deep wells were analyzed qualitatively by the spectrographic method, employing the carbon arc, and the characteristic calcium fluoride band was present in each spectrum. One sample of water was obtained in the town of Ankeny and the other from a farm in the neighborhood. A sample of shallow well water from this same region gave no qualitative test for fluorine. Neither did the water from the college supply give a test for fluorine. The City of Ames is approximately 20 miles north of Ankeny. The two samples of drinking water from deep wells were analyzed quantitatively for fluorine by the Churchill modification of the Fairchild method[3] and shown to contain 10 and 15 parts of fluorine per million respectively. Fluorine is a difficult element to determine, especially in small amounts. We expect to improve our methods and technique and perhaps will have to modify our values somewhat after such is done, and after large numbers of samples are analyzed. However, mottled teeth occur in the community referred to, and this presumably is due to the fluorides in the water. Although our experiments with rats are not concluded by any means, still they seem to indicate thus far that consumption of the water causes the characteristic changes in the teeth resulting from fluoride ingestion. H. V. Smith and M. C. Smith,[7] of the University of Arizona, in their recent publication show the latest distribution of mottled teeth in this country. Iowa is one of the states in which they say mottled teeth have not so far been reported. We expect to extend this work to different sections of the state of Iowa.

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VICTOR E. NELSON
D. A. GREENWOOD
H. A. WILHELM

[3] H. V. Churchill, *Jour. Ind. and Eng. Chem.*, 23: 996–98, 1931.

[4] Smith, Lantz and Smith, "Dental Survey," April, 1932. *Technical Bull.* No. 32, Agricultural Experiment Station, University of Arizona.

[5] McCollum, Simmonds, Becker and Bunting, *Jour. Biol. Chem.*, 63: 553–62, 1925.

[6] Schulz and Lamb, SCIENCE, 61: 93–94, 1925.

[7] Smith and Smith, *Technical Bull.* No. 43, 1932. Agricultural Experiment Station, University of Arizona.

BOOKS RECEIVED

CLARK, GEORGE L. *Applied X-Rays.* Pp. xiv + 470. 239 figures. McGraw Hill. $5.00.

FREUDENBERG, K. *Stereochemie. 5. Lieferung.* Pp. 159. Leipzig und Wien. Franz Deuticke. M. 18.

GILBERT, NORMAN E. *Electricity and Magnetism.* Pp. xvi + 548. 388 figures. Macmillan. $4.50.

HARDY, JAMES G. *A Short Course in Trigonometry.* Pp. ix + 143. Figures. Tables. Macmillan. $2.25.

HENDERSON, JUNIUS and ELBERTA L. CRAIG. *Economic Mammalogy.* Pp. x + 397. Thomas. $4.50.

HITCHCOCK, DAVID I. *Practical Chemistry for Students of Biology and Medicine.* Pp. xi + 182. 26 figures. Thomas. $2.75.

JOHANNSEN, ALBERT. *A Descriptive Petrography of the Igneous Rocks.* Vol. II. Pp. xxxi + 421. 119 figures. University of Chicago Press. $5.50.

KIRBY, RICHARD S. and PHILIP G. LAURSON. *The Early Years of Modern Civil Engineering.* Pp. xvi + 324. Illustrated. Yale University Press. $4.00.

MARSHALL, F. H. and E. T. HALNAN. *Physiology of Farm Animals.* Pp. xi + 366. 117 figures. Cambridge University Press. $3.25.

MARTIN, THOMAS. *Faraday's Diary.* Vol. I: September, 1820—June 11, 1832. Pp. xxiii + 430. Illustrated. G. Bell & Sons, London.

RUCH, G. M. and F. B. KNIGHT. *Standard Service Algebra.* Pp. xiv + 528. Illustrated. Scott, Foresman. $1.32.