boundary very correctly. In fact it is more nearly correct than some of the later ones. The beds which he refers to this period had been previously noted by Shumard, Buckley and others, and their age determined to some extent by vertebrate remains found in their upper portion. In 1894 I described these beds * as they occur in southwest Texas and, on the basis of Professor Cope's determinations, separated the Neocene into Oakville (Miocene), Lapara, Legarto and Reynosa (Pliocene). Later I traced these beds to east Texas and proved their identity with Loughridge's beds,† and thus found that the clays and sands east of the Trinity, which Kennedy has called the Fayette and Frio, are in fact Oakville and Lapara-Lagarto. The only exception to this which I now recall is the sandstone north of Corrigan, which Professor Harris first thought was Lower Claiborne, but after study of fuller collections decided to be Jackson.

Therefore the true correlation of the two sections would probably be more like this:

Texas Section.			Sabine Section.
Lapara-Lagarto, Oakville ?		Neocene.	Burkville beds.
Oakville.			Grand Gulf.
Lower Claiborne.	Frio.	Eocene.	Jackson.
	Fayette.		Wanting.
	Yegua.		Wanting.
	Marine.		Cooksfield Ferry.
			Lower Claiborne.
			Wanting as such.
			Basal Lignitic.
Lignitic.	Carrizo Sands (Queen City).		
	Lignitic.		

My interpretation would be that the Sabine section shows an overlap of the Lower Claiborne on the Lignitic, entirely covering the sandy, unfossiliferous Carrizo beds, which elsewhere in Texas form so prominent a feature at the top of the Lignitic beds. Also an overlap of the Jackson on the Yegua ? (Cooksfield Ferry beds), covering both the Fayette and the Frio.

* *Journal of Geology*, Vol. II., pp. 549, etc.

† *Trans. Tex. Ac. Sc.*, 1894, pp. 23. *Trans. Am. Inst. Min. Eng.*, Vol. XXXI.

The Oakville is stratigraphically the correlative of the Grand Gulf, and it is possible that closer work in Texas may yet show that the lower portion, in which we have found no fossils as yet, is the extension of the Oligocene portion of the formation. From Harris' determination of the age of the Burkeville beds, I suspect them to be a part of the Oakville beds, as they are certainly older than any Lapara we know west of the Trinity. It will require still further field work, however, to determine its exact relation to these beds.

E. T. DUMBLE.

A NOTE ON METHODS OF ISOLATING COLON BACILLI.

IT often happens that bacteriologists wish to obtain fresh cultures of *Bacillus coli* for experimental purposes and they sometimes find that the methods of isolation in general use are unsuccessful or inconvenient. The reasons for the latter fact have not hitherto, so far as I am aware, been satisfactorily explained. In some comparative bacteriological studies made in cooperation with one of my students, Mr. William J. Mixter, I found it necessary to obtain a large number of fresh cultures of *B. coli* and soon learned that the two methods in common use, viz. (1) 'plating out' the aqueous suspension of fresh fæces in agar, litmus-lactose-agar, or gelatin, or (2) inoculating from such a suspension into dextrose broth and incubating eighteen to twenty-four hours with subsequent plate cultivation, while giving a plentiful supply of bacteria gave, for the most part, negative results as regards *B. coli*.

After considerable experimenting we finally hit upon the following method with satisfactory results. A very small portion of fresh fæces is inoculated directly into dextrose broth in the fermentation tube, and allowed to develop at 37°. At the end of from two to six hours the culture medium becomes turbid throughout and gas formation is generally proceeding rapidly. If inoculation is now made into litmus-lactose-agar plates and incubation continued at blood heat, colonies of *B. coli* develop abundantly and with great rapidity. Isolation, purification and cultural tests can then be carried on by the usual methods,

and in some cases the colonies obtained by plating on litmus-lactose-agar represent an almost pure growth of *B. coli*. If, instead of plating after the short period of growth, the original culture is allowed to develop for twenty-four, or even for eighteen, hours, *B. coli* is isolated only with much greater difficulty.

The explanation of these facts is apparently simple. In the first few hours a rapid development of colon bacilli occurs, while other microorganisms present multiply more slowly, but if a longer incubation period is allowed, the other microorganisms, especially the streptococci recently described in SCIENCE by Mr. C. E. A. Winslow and Miss Hunnewell, develop abundantly and overgrow the colon bacilli. This over-growth is probably to be explained by a study of the products of the two kinds of microorganisms. The colon bacilli produce lactic acid, but also under favorable conditions carry on putrefactive processes with the ultimate formation of alkaline matters which partially or entirely neutralize the acid formed. The streptococci flourish only in the presence of sugars, but produce abundant acid and, while, therefore, perhaps growing more slowly at the start, eventually produce much more lactic acid than does *B. coli*. Moreover, colon bacilli appear to be extremely sensitive to lactic acid of some strength and are therefore inhibited, if not actually killed, by the acid produced by the streptococci.

The method of procedure here outlined has given satisfactory results not only in the Institute laboratories, but also at the hands of other investigators than ourselves who at my request have kindly tested it.

S. C. PRESCOTT.

BIOLOGICAL LABORATORIES,
MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

THE EGGS OF MOSQUITOES OF THE GENUS CULEX.

THE conventional description of the oviposition of *Culex* has been rendered obsolete by recent observations. This description was based on the eggs of *Culex pipiens* Linn., a species which deposits them in large, boat-like masses, floating on the surface of water. The eggs do not hibernate. This has been assumed to be the general manner of oviposition in the genus *Culex*, but such is not the case. So far as at present known, *Culex* pipiens is the only *Culex* that so deposits its eggs.

The species of *Culex* may be divided into two groups, the first comprising those species in which the legs are unbanded, the second those in which the tarsal joints are banded with white rings. The method of egg laying is different in these groups. In the first group, the eggs are generally laid floating on water and apparently they do not hibernate. *Culex pipiens* belongs to this group, but its boat-shaped masses of eggs represent the extreme form of development of the floating type of egg. In *Culex melanurus* Coq., the eggs are laid singly, floating on the surface of water; in *C. territans* Walk., they are laid in little groups of two or three, side by side and also floating; finally, in *C. pipiens* Linn. we have the well-known boat-shaped mass. However this type is not exclusive for the dark-legged species of *Culex*, for *C. triseriatus* Say lays its eggs singly, adhering firmly to objects at the extreme edge of the water, and the species doubtless hibernates in this state.

In the ring-legged species of *Culex*, the general type of egg described by Professor John B. Smith (SCIENCE, N. S., XV., 391, 1902) obtains. *C. sollicitans* Walk., described by Professor Smith, laid its eggs dry at the edges of places where water was likely to collect and the larvæ hatched when water appeared. *C. canadensis* Theob. lays its eggs singly and they do not float on the water, but mostly sink to the bottom. In this species the eggs will hatch in part in the presence of water, but most of them remain unhatched till the winter is passed. There seems to be a full brood of these mosquitoes early in spring from hibernated eggs, after which only scattering eggs hatch, most of them going over to the next season, whether wet or dry. In *C. sylvestris* Theob., the eggs are laid similarly and sink in water, but the species breeds continuously all the summer, practically all the eggs hatching when covered by rain water. But a set of eggs obtained in September all hibernated, although they were kept wet.

There remain many species of *Culex* whose