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.

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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

eggs are unknown, but it seems probable that we now know the principal types of eggs.

HARRISON G. DYAR.
U. S. NATIONAL MUSEUM,
October 1, 1902.

RECENT ZOOPALEONTOLOGY.

NEW VERTEBRATES OF THE MID-CRETACEOUS.

THE report just published on 'Vertebrata from the Mid-Cretaceous rocks of the Northwest Territory of Canada'* by Henry F. Osborn and Lawrence M. Lambe, forms the second part of a 'series of descriptive and illustrated quarto memoirs' begun in 1891. The first part, by the late Professor E. D. Cope, is on 'The Species from the Oligocene or Lower Miocene Beds of the Cypress Hills.'

The determination by the Canadian Survey of a Mid-Cretaceous and fresh-water fauna, including fishes, batrachians, reptiles and mammals, is a forward step of great importance in vertebrate paleontology. The Survey had established beyond question, geologically, that the Belly River series is Mid-Cretaceous, that it underlies the Montana or Ft. Pierre-Fox Hills group, and overlies the Ft. Benton and Dakota groups; and at the outset of the paleontological investigation for this report, the question arose, What stages of vertebrate evolution are represented by the Belly River fauna? It soon appeared to Professor Osborn in the study of the fine collection made by Mr. Lambe that the Belly River vertebrates of the Northwest Territory were of decidedly different and *apparently* of older type than those from the Laramie beds of Converse Co., Wyoming, described by Marsh, and were rather to be compared with those described by Leidy, Cope and Marsh, from Montana, chiefly from the Judith River beds, which overlie the Ft. Pierre in a region by no means distant geographically.

The Belly River or Mid-Cretaceous fauna is distinguished from that of the Upper Jurassic (Como Beds, Purbeckien) by the entire absence of Sauropoda and by the presence of Ceratopsia in great variety. It is affiliated with that of the Jurassic, and, so far as we know, separated from that of the Laramie by the presence of highly specialized Stegosauria or plated dinosaurs,* by numerous turtles of the Jurassic family Pleurosternidæ, and by numerous large Plesiosaurs. There is very little in common between the Belly River fauna and the Laramie fauna of Wyoming and Colorado so far as described, except the dinosaur *Ornithomimus* and the very persistent chelonian *Baëna*. Most of the dinosaurs will probably be found to be separated generically.

A comparison between all the Belly River and Judith River or rather Montana and Laramie (Colorado and Wyoming) vertebrates, so far as named (111 species including many synonyms), leads to the conclusion: (1) that the Belly River fauna is more ancient in character both as to the older types of animals which it contains and as to the stages of evolution among animals which are also represented in the Laramie; (2) the geological interval represented by the Ft. Pierre-Fox Hills marine beds was accompanied by the extinction of certain Jurassic types and progressive evolution of the persistent types; (3) finally, the fossil land vertebrates hitherto described from Montana probably are, in part at least, of Mid-Cretaceous or Belly River age, although the true Judith River beds certainly overlie the Ft. Pierre and are of more recent age.

The descriptive section of the memoir by Mr. Lambe is illustrated by twenty-one plates and numerous text figures. The principal results are as follows:

Numerous vertebræ of a large plesiosaur from the Belly River are provisionally referred to the New Jersey species *Cimoliasaurus*

* 'Contributions to Canadian Paleontology,' Vol. III. (4to), Pt. II., 'Vertebrata of the Mid-Cretaceous of the Northwest Territory.' (1) 'Distinctive Characters of the Mid-Cretaceous Fauna,' by Henry Fairfield Osborn, Vertebrate Paleontologist (Honorary) of the Survey; (2) 'New Genera and Species from the Belly River Series (Mid-Cretaceous),' by Lawrence M. Lambe, Assistant Paleontologist. Ottawa, September, 1902.

* The only published evidence of Stegosauria in the Laramie of Wyoming and Colorado is the tooth of *Palæoscincus*.