conditions are virtually exempt from the disease. Plague does not attack the gaol population or the native army; it attacks the ordinary civil population, because they live in houses which are not rat-proof, because they treat the rat almost as a domestic animal, because large numbers of them refuse to trap or kill it, and because they will not adopt the sanitary precautions which are pressed upon them. Plague has now been present in India for fifteen years, and the appalling total of nearly 7,500,000 deaths from it has been recorded. Of this the Punjab accounts for nearly two and a half million deaths—almost a third of the total. The tale of deaths in the last ten years represents 1 per cent. of the population of that province. When I think of the sensation that was caused in this country a short time ago by what was by comparison a minor outbreak in Manchuria, resulting in only 50,000 deaths, I fear that people in this country do not realize the awful ravages that this scourge is daily making among the Indian people. Scientific research has established that it is conveyed by rat fleas to human beings. The two effective remedies are inoculation and house evacuation. Professor Haffkine has discovered a vaccine by which comparative though not absolute immunity can be temporarily secured. But by an unhappy accident at Mulkowal several villagers died of tetanus after inoculation. Inoculation in India has never recovered from this disaster. It is hated by the people and avoided by them except when the disease is in their midst. House evacuation is easier in villages than in towns. Administrative arrangements by which plague is now fought include the provision of special plague medical officers and subordinates, and they and the district staff are on the lookout for the occurrence of plague, and when it occurs they visit the locality, offer inoculation, give assistance to persons to vacate their houses, advise rat destruction, and so on. To the prevention of plague there would seem to be no royal road. The case is one in which lavish expenditure of money is not called for, and would be useless. But the provincial governments have spent, and are spending, a good deal. The United Provinces have expended some £600,000 up to date. The Punjab government is spending about £40,000 a year. The improvement of the general sanitary conditions under which the population lives is more and more clearly seen to be essential, and to improve them the local governments are devoting all the money they can spare. They have been helped to do so by the grants for sanitation made by the government of India. The scientific difficulties are enhanced by the difficulty of overcoming prejudice and ignorance, habit and apathy. In some districts there is actually religious objection to rat-killing and inoculation. No better work can be done for India than to offer example and instruction in principles of life that appear to us elementary, and to strive to exorcise the foes of progress—superstition and resistance to prophylactics. There are, I am glad to say, signs that the sanitary conscience is beginning to awake among the people."

UNIVERSITY AND EDUCATIONAL NEWS

PROFESSOR WILBUR J. FRASER has resigned as head of the department of dairy husbandry of the University of Illinois to devote his entire time to a professorship which he will retain within the department. Professor Fraser has been head of this department since its organization some fifteen years ago, during which time it has grown until it now numbers twelve members and its resources amount to over fifty thousand dollars annually exclusive of receipts.

W. C. RUEDIGER has recently been advanced from assistant professor to professor of educational psychology in the Teachers College of the George Washington University.

THE following new appointments have been made at the University of Colorado: Max M. Ellis, Ph.D. (Indiana), instructor in biology; Arthur G. Vestal, B.A. (Illinois), instructor in biology; Paul M. Dean, M.A. (Colorado), instructor in chemistry; Harold E. Robbins, M.A. (Yale), instructor in physics; Whitney C. Huntington, B.S. (C. E.) (Colorado), for the past year assistant, instructor in civil

engineering; Rex E. Edgecomb, B.S. (C. E.) (Iowa State), instructor in civil engineering; Charles D. Fawcett, B.S. (E. E.) (Colorado), instructor in electrical engineering; Frank S. Bauer, B.S. (M. E.) (Illinois), instructor in mechanical engineering; Herbert D. McCaslin, B.S. (M. E.) (Purdue), instructor in mechanical engineering; J. B. Hanson, A.B. (Missouri), instructor in physiology and pharmacology.

DISCUSSION AND CORRESPONDENCE

M. COSSMANN ON THE PHYLOGENY OF CERITHIUM

IN the *Revue Critique de Paléozoologie* for April, 1911, M. Cossmann published a review of my paper on "The Phylogeny of Certain Cerithiidæ" which involves a question of fundamental principles in the study of phylogeny and is therefore of interest to consider at greater length.

M. Cossmann calls attention to the fact that my classification differs widely from that published in his monograph on the Cerithidæ.[1] The reason for this is, as stated in my paper, that we are following entirely different methods of work. We are, I think, in accord in assuming that a natural classification should be based upon descent from a common ancestor but as to the principles to be followed in determining relationship we differ widely. M. Cossmann's classification is based on a comparison of the aperture and especially of the "cerithial" canal, mine upon the entire ontogeny of the shell, the facts thus obtained being applied in accordance with Haeckel's biogenetic law. M. Cossmann's argument in favor of using the aperture as a basis of classification is stated in his review as follows: "C'est par l'ouverture que sortent les organes d'un Gastropode, c'est par là que son manteau secrète le test; c'est donc l'ouverture qui joue le principal rôle dans l'évolution." It is true that the mantle secretes the shell at the aperture, but if the adult aperture be considered of so much importance how can we neglect the succession of apertures represented by the young shell every growth line of which outlines the aperture of the shell at the time when the line was formed. If it be true, as stated by Hyatt,[2] that "All modifications and variations in progressive series tend to appear first in the adolescent or adult stages of growth" we shall find in the adult aperture the extreme limit of variation for the individual, and it is to this stage that we look for divergence from the well established, hereditary characters that ally the organism with its ancestors. If recapitulation be a fact it is in the young stages that inherited characters find their fullest expression. A defense of the methods used in my paper and of my results is simply a defense of the theory of recapitulation, and no adequate presentation of the subject can be attempted in a limited space. The validity of the theory is still questioned by some scientists, mainly zoologists, but the final answer to the question will be, as in the case of the theory of evolution itself, an accumulation of corroborative facts so overwhelming as to finally silence doubt. Already the accumulation of such facts is so considerable as to convince nearly all paleontologists and many zoologists. In an excellent summary of the present status of opinion on this subject Cumings[3] has called attention to illustrations of recapitulation in each of the classes of invertebrates above the Porifera.

Against this mass of evidence a mere dogmatic statement has little weight. It is not enough to cry scornfully, "Quelle importance peut-on attribuer à des conclusions basées sur de telles prémisses?" He who would show these premises to be unsound must show Haeckel's law to be invalid by answering the arguments of Hyatt, Cope, Jackson, Beecher, Cumings and many others, and also otherwise account for the great accumulation of evidence in favor of the law which appears not only in the works of authors avowedly in favor of the theory but in the facts presented

[1] M. Cossmann, "Essais de Paleoconchologie Comparée," VII., July, 1906.

[2] A. Hyatt, "Genesis of the Arietidæ," p. ix, Smith's Cont. to Knowledge, No. 673, 1889.

[3] E. R. Cumings, "Paleontology and the Recapitulation Theory," *Proc. Ind. Acad. Sci.*, 25th anniversary meeting, 1909.