

beds and under, the name of *Conocoryphe trilineata* (*Atops trilineatus*), is claimed as a characteristic fossil of the Olenellus Zone.

*The genus Microdiscus is absent.* This trilobite is especially characteristic of the Olenellus Zone and continued to live with Paradoxides. Here it occurs in the Paradoxides Zone, but is absent from the Protolenus Fauna.

*The genus Olenellus is absent.* Though carefully looked for, no example of this genus has been found among the trilobites of the Protolenus Fauna, hence, though this fauna apparently holds the place where we might naturally expect to find *Olenellus*, that genus proves to be absent, or at least not at all characteristic; and, as so many of its associate genera also are absent, we cannot regard this fauna as the Fauna of *Olenellus*.

Of the genera of trilobites that are present *Micmacca* has affinity with *Zacanthoides*. It differs in the course of the posterior exterior of the dorsal suture. The relation will seem closer if we suppose a movement of the eyelobe during the growth of *Zacanthoides* similar to that which occurred in the Ptychoparidæ, by which the eyelobe was drawn in toward the glabella, while at the same time there was a projection of the posterior extension of the dorsal suture outward toward the general angle. If this change were shown to have occurred in *Zacanthoides*, *Micmacca* might be looked upon as an ancestral form of that genus.

In this fauna there is a very primitive assemblage of Brachiopods, of forms which it is in many cases difficult to assign to any known genus. Many are small, some are minute, and the larger species belong to the Obolidæ and Siphonotretidæ.

The Gasteropoda have already been alluded to; among these *Pelagiella* (n. gen.) is remarkable for the peculiar aperture which seems to indicate a free swimming Heteropod.

This fauna is distinguished from that of

Olenellus by two marked features; it is more *primitive* and also more *pelagic*.

The way in which the trilobites are bound together by the single feature of a continuous eyelobe shows a unity of origin and a close relationship not found in any other fauna. And yet among these trilobites there are forms which in other respects are parallel to the types which developed in the later faunas; thus in *Protolenus* we have the flat pleura with the diagonal furrow of *Paradoxides* and the deeply grooved, geniculate pleura of *Ptychoparia*, and at the same time the prominent glabella and deep dorsal furrows of *Solenopleura*. *Micmacca*, as has already been said predicated *Zacanthoides* of a later fauna, and *Protagraulos* in its almost obliterated glabella and flat cephalic shield closely resembles *Agraulos* of the Paradoxides Fauna.

It is a more *pelagic* fauna than that of *Olenellus*, for we notice the absence of many forms differentiated for shore-conditions. Trilobites with fixed outer cheeks, like *Olenellus* and *Microdiscus* are absent; calcareous corals and sponges are rare; thick-shelled brachiopods and the Orthidæ are wanting, or rare; no Lamellibranch is known, but Foraminifera are quite common in some of the beds.

The question of the antiquity of this fauna as compared with that of *Olenellus* is discussed. The facies of the fauna as above described indicates a greater antiquity, but if the two faunas were contemporaneous, that of *Olenellus* may have reached these shores first.

#### VOLCANIC DUST IN TEXAS.

SOMETIME since the writer was given, for examination by the microscope, a sample of a white, fine-grained silicious deposit by Prof. R. T. Hill, of the U. S. Geological Survey, who writes as follows concerning it:

"The material which I gave you was collected by an old Texas friend of mine, Mr. S. P. Ford, in De-

ember, 1893, who said that at first he supposed it was chalk, but had since come to the conclusion that it is something else. When I wrote to Mr. Ford that I thought it was volcanic glass, probably derived from some of the now extinct vents along the Rocky Mountain front, he expressed some doubt as to this mode of origin, and said :

“ ‘This specimen was from a solid hill from thirty to forty feet high, composed entirely of this stuff. The point I make is that, on account of its thickness, the crater must have been somewhere very close, and if so, is it not something heretofore unknown in Texas? The exact locality is on Duck creek, in Dickens county, about 50 miles northwest of the Double Mountain.’ (Dickens county is in northwestern Texas, in the Brazos River drainage.—Author.)

“ ‘This specimen undoubtedly comes from the post-Cretaceous formations constituting the great Llano Estacado. Perhaps you will remember that in 1886 I collected some similar material from near Wray, Colorado, and Hecla, Nebraska, which was described by Prof. Merrill of the National Museum, in the *American Journal of Science*. This Texas material seems very similar to that of the Colorado-Nebraska locality, both in appearance and in geological position. I wish that more was known of the stratigraphy of the Texas beds. The Colorado specimens occur in what is called the White River Tertiary.’ ”

An examination by the microscope shows that the white material is volcanic glass, in the angular and fluted forms figured by Merrill,\* as characteristic of volcanic dust from Furnas county, in southern Nebraska. Diller † also describes and figures similar forms of glass particles from Norway, Krakatoa, Truckee River and Breakhart Hill, the latter a hill to the north of Boston, Mass. In the same article he describes volcanic dust from Unalashka, which fell in October, 1883, and discusses volcanic dusts in general. Professor Diller concludes that “so far as definite observations have been made, they warrant the general assertion, that with occasional exceptions, which can be readily explained, volcanic dust contains a higher percentage of silica than the lava to which it belongs.”

Professor Diller has also described some

volcanic material from Knox county, Nebraska, and from the West Blue River, Seward county, Nebraska,\* and estimated that about 90% was volcanic dust, there being also numerous rolled quartz grains.

The description of the material collected by Professor Hill from Wray (B. & L. R. R.), on the south side of the Republican River, occurs in an interesting article by Professor Merrill, ‘On the Composition of Certain Pliocene Sandstones from Montana and Idaho.’ †

Three figures are given showing the shape of the particles of volcanic glass found in the sandstones. In the material from the Devil’s Pathway (No. 35893<sup>a</sup>) “there are many disc-like bodies on the glass particles, colorless and nearly circular in outline,” but the other figures show angular and fluted forms like those above referred to. Merrill gives analyses of three samples of the volcanic dust from Montana and Idaho, and concludes that they are of andesitic or trachytic origin. His analyses include lime and alkali determinations, and the silica contents range from 67.76% to 68.92%.

Merrill also states that some volcanic dust from Krakatoa fell on a ship 885 miles from the source of volcanic activity, so that the existence of a layer of volcanic dust at a given point may not indicate the proximity of the volcano from which the material came, but a deposit forty or more feet thick would hardly form at a great distance from the source.

The volcanic dust obtained by the writer from a layer in the Neocene Lake beds that underlie Mohawk Valley, in Plumas county, California, likewise resembles in the shape of its particles the dusts figured by Diller and Merrill. An analysis of this material by Dr. W. H. Melville showed that it contained 70.64% of silica, and it was there-

\* *Proc. U. S. Nat. Mus.* 1885, p. 100.

† *SCIENCE*, May 30, 1884.

\* See article by J. E. Todd, *SCIENCE*, Vol. VII., p. 373.

† *Am. Jour. Sci.*, Vol. XXXII., pp. 199–204.

fore presumed to be a rhyolitic glass.\* The material obtained by Professor H : 11 closely resembles the Mohawk Valley material. The Texas occurrence is of unusual interest, being in a region where evidences of the former existence of volcanoes are rare.

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*CURRENT NOTES ON ANTHROPOLOGY (VI.).*

THE CAUCASIC LINGUISTIC STOCK.

COL. R. VON ERCKERT, of the Russian army, already known for an excellent work on the ethnography of the Caucasus, has just published an epoch-making volume on the languages of that region (*Die Sprachen des Kaukasischen Stammes*, Vienna, 1895). In this he solves the intricate problem which has so long puzzled linguists as to the relationship and place of these tongues. He demonstrates by satisfactory evidence, structural and lexicographical, that these numerous languages and dialects, some thirty in number (the Ossetic, which is Aryan, being of course excluded), belong to one family, which should be called the 'Caucasic.' It is divided in three groups, the Georgian, the Circassian and the Lesghian. The stock stands wholly independent, all similarities to either Ural-Altaic or Indo-European proving accidental or unimportant. Which of the groups is nearest the ancient original tongue he does not pretend to decide; but he offers striking testimony to the persistence of the traits of these languages. The Georgian was written as early as the ninth century A. D., and he gives a letter composed by a bishop in 918. It is quite identical, both in syntax and words, with the current tongue of to-day.

All these facts are the more to the purpose since so much has been made of late years by Professors Sayce, Hommel and their followers, of what they call the 'Ala-

rodian' linguistic stock (*i. e.*, the Georgian), in connection with the pretended 'Sumerian' of lower Babylonia. It is likely that they will have to 'back water,' now that comparisons can really be made.

CUNEIFORM INSCRIPTIONS.

DR. HUGO WINCKLER, in his 'History of Babylonia and Assyria,' tells us that the cuneiform method of writing was in use among eight nations speaking entirely different languages. Whether this is quite accurate or not, we need not stop to consider, as there can be no question that it had a much wider distribution than used to be supposed. Last year the well-known French archæologist, M. E. Chantre, unearthed specimens of it at Pterium and Cæsarea, in Asia Minor, as far west, perhaps, as such inscriptions have been found in place. The excavations continued by the University of Pennsylvania at Niffer have proved rich in finds of tablets. But the champion recent discoveries appear to be those of M. de Sarzec at Tello. A brief account of his eighth campaign in that rich locality appears in the 'Révue Archæologique' of December last, extracted from the official report of M. S. Reinach. From it we learn that M. de Sarzec opened a small mound some hundreds of yards from that which he had previously worked, and chanced upon the very archives of the old city themselves. They were inscribed on tablets and neatly stored in trenches, where they had rested undisturbed these thousands of years. From these deposits he took out more than *thirty thousand* tablets, about five thousand in perfect condition, another five thousand very slightly injured, and the others more or less defaced. This magnificent discovery will have the greatest importance in revealing the history and character of the ancient Babylonian civilization.

\* Bull. Phil. Soc. Washington, Vol. XI., p. 389.