lain by thick beds of Devonian, Permian, and Carboniferous deposits, and these strata are so folded as to make several parallel chains rising more than 3300 feet above the sea, and containing the highest summits of the region. Further west the country assumes the character of a plateau which is built up of nearly horizontal strata of the formation—so characteristic of the Urals—which has a fauna intermediate between the Permian and Carboniferous of Western Europe. Above this there are Triassic deposits.

Several other contributions will be devoted to the same region. One, already published, contains a most elaborate work "On the Lower Devonian Fauna of the Western Slopes of the Urals," by Th. Tchernysheff. Until 1880, the bituminous, gray, and dolomitic limestones of the Urals—very poor in fossils as a rule—were thought to be Silurian, but M. Tchernysheff describes 107 species recently found in these limestones, and shows that their fauna is of Lower Devonian age. This conclusion is of great importance, as it throws light on the age of the very same series of limestones, quartzites, and slates in Siberia and Turkestan (also arrayed in ridges running south-west to north-east).

Another sheet of the geological map covers the most interesting region on the right bank of the Lower Volga.[1] Upper Carboniferous strata appear in that region in the deeper ravines only; the Cretaceous formation is represented by beds belonging to the *étage Aptien* and Neocomian groups of the Lower Cretaceous, as also by the Cenomanian, Turonian, and Senonian groups of the Upper Cretaceous. Nearly the whole of the region is covered, however, by Eocene clays and sands; boulders, partly of local origin, and partly carried from North-Western Russia, are strewn over the surface, and the manner of their distribution is such as to exclude the possibility of transport by floating ice. Prof. Sintsoff concludes, therefore, that the ice-sheet of Russia extended as far south-east as the Volga under the 50th degree of latitude.

Finally, an important contribution to the palæontology of Russia—"The Ammonites of the *Aspidoceras acanthicum* Beds of East Russia"—is published in the same *Memoirs* (ii., 3) by Prof. Pavlow. These beds, which are met with in Simbirsk and the Southern Urals, have a mixed fauna, the characters of which may be best explained by the statement that during the Jurassic period Central Asia was under the sea, and that this basin was in connection with the Jurassic basins of both Tibet and Central Europe.

Besides the above larger works, the Geological Committee has brought out two volumes of *Izvestia* (*Bulletins*), which contain a mass of valuable information. Prof. Mushketoff's notes upon the Kalmuck Steppes are, as usual, rich in most suggestive remarks about the activity of wind and water in the desert. He shows also that during the Quaternary period the Caspian Sea did not extend further west than the Ergheni Hills, communicating with the Black Sea through the Manytch Valley only. In a paper on the limits of glaciation in Central Russia and the Urals (vol. iv.), M. Nikitin shows that the ice-sheet extended in Russia as far south as 48° 30′ N. latitude on the Dnieper, and 50° on the Volga.[2] In a subsequent paper (vol. v.), devoted to the post-glacial deposits of Germany, the same author distinguishes two different kinds of loess, one of which may be due to the agency of wind. Many papers are devoted to the Urals—their crystalline rocks, the traces of glaciation (M. Krotoff, in vol. iv. fasc. 9), and the intermediate Permian-Carboniferous beds, the fauna of which, according to Prof. Stuckenberg, contains forty-one Carboniferous species, thirty-four Permian, seven species belonging to both, and twenty-three characteristic of the Permian-Carboniferous groups. Four papers are devoted by M. Mikhalsky to Poland, and it appears that the beds of Poland, which were formerly thought to be Jurassic, must be regarded as Neocomian—that is, Cretaceous. M. Lagusen describes a new sub-genus, *Lycophoria*, of the *Strophomenidæ* family; Prof. Schmidt deals with the glacial and post-glacial deposits of the Baltic provinces; M. Pavlow describes the *Exogira virgula* beds, as also some Cretaceous and Tertiary deposits of South-East Russia; and M. Nikitin gives a sketch of the Carboniferous deposits and the loess of Samara.

Another work, issued by the Russian Geological Survey, deserves especial mention on account of its general interest and value. This is the annual bibliography of works on geology, mineralogy, palæontology, &c., published in Russia, or works published elsewhere which refer to Russia ("Bibliothèque géologique de la Russie"). Brief abstracts, in Russian with a French translation, are given of the more important papers. The titles are given in the original language; if the original is Russian, then a French version is given; if the original is not Russian, a translation into this language is added.

The publications for the year 1885 number 256; for 1886, 356; for 1887, 405; and for 1888, 390. But the later series include omissions in earlier numbers. The editor of this useful annual is M. S. Nikitin; his chief assistant in the work is Mdlle. Marie Tzwetaev.

[1] "Carte géologique générale de la Russie," Feuille 93; "Kamyschin," by I. Sintsoff, in *Mémoires du Comité Géologique*, vol. ii. No. 2.

[2] An abridged translation of this paper has been published in *Petermann's Mitteilungen*.

SCIENTIFIC SERIALS.

American Journal of Science, August.—On the observation of sudden phenomena, by S. P. Langley. The paper deals with the apparently inherent defects of human observation, especially in recording unexpected natural phenomena, its object being to reduce this personal error to a minimum. The author believes that a means may be found by which any person, skilled or ignorant, may make not only meridian observations, but an observation of any sudden visible event, of whatsoever nature, so accurately that no correction need be applied. An instrument constructed for the purpose, and here illustrated, has been tried by various observers in various ways, the probable error for any single observation being rather less than one-twentieth of a second.—A spectro-photometric comparison of sources of artificial illumination, by Edward L. Nichols and William S. Franklin. These experiments, made in Cornell University during the summer of 1888, consist in the spectro-photometric comparison of various artificial sources of light and of daylight with that emitted by a sixteen candle-power incandescent lamp. The sources of light subjected to measurement were a standard candle, various petroleum and illuminating gas flames, a lime-light, two electric arc lights, clear daylight, an incandescent lamp of high resistance at various temperatures, and an incandescent lamp of low resistance at normal candle power. The general result is that candle-power as determined by means of the Bunsen photometer affords no correct measure either of light-giving energy or of the luminosity of the source of light, the direction of the error always being such as to favour sources of a low degree of incandescence when compared with those of higher temperature.—On the possibility of hemihedrism in the monoclinic crystal system, with especial reference to the hemihedrism of pyroxene, by George H. Williams. A fresh study of the remarkable crystals of pyroxene from Orange County, New York, recently described by the author as hemimorphic, seems to show that they should rather be regarded as hemihedral, and that they are by no means an isolated instance of this peculiar development in pyroxene.—On the earlier Cretaceous rocks of the north-western portion of the Dominion of Canada, by George M. Dawson. The purpose of this paper is to call attention to certain facts recently brought to light respecting the equivalency of the Queen Charlotte Islands and Kootanie formations, and to the importance of the earlier Cretaceous rocks, of which they are representatives, over great areas of the western and extreme north-western portion of the continent. These facts are just now specially interesting from their analogy to those lately developed by Mr. R. T. Hill respecting a similar earlier Cretaceous formation in the south-western region of the United States.—A new occurrence of gyrolite, by F. W. Clarke. This specimen, from the New Almaden quicksilver mine, California, is shown on analysis, and by comparison with How's figures for a Nova Scotia gyrolite, to be a somewhat impure gyrolite associated with apophyllite, and agreeing approximately with the formula $Ca_2Si_3O_8 . 3H_2O$.—On action of light on allotropic silver, by M. Carey Lea. The author's further studies of this subject show that light can convert yellow or red-yellow allotropic silver to white, and cause the blue-green modification to pass to the gold-yellow.—Papers were contributed by J. F. Kemp, on certain porphyrite bosses in North-Western New Jersey; by W. B. Dwight, on recent explorations in the Wappinger Valley limestones and other formations of Dutchess County, New York; by George F. Becker, on silicic acids; and by O. C. Marsh, on gigantic horned Dinosauria from the Cretaceous. Mr. Marsh also continues his memoir on the discovery of Cretaceous Mammalia, illustrating the subject with two plates of the teeth of American Cretaceous mammals.