Against the elementary nature of argon and helium stands the difficulty of placing them in the periodic system. He does not agree that the argument drawn from the ratios of the specific heats is conclusive as to the molecule of argon or helium containing only a single atom. The density of argon, 19.94, being less than that of N_2, 21.06, he accounts for by the possibility of the presence of helium or some other inert gas. Of positive arguments in favor of his theory he gives none, but suggests that a determination of the atomic heat would decide the question. He inclines to the view that the constituents of helium were formed from hydrogen in accordance with Prout's law.

The latest contribution to a systematic arrangement of the elements is an article by Richard Lorenz in the Zeit. Anorganische Chemie, on 'Twin Elements.' The author gives this name to elements which have nearly the same atomic weight, resemble each other in occurrence and chemical behavior, and are with difficulty separated from each other. Such twins are sodium-magnesium, cobalt-nickel, phosphorus-sulfur. The atomic weights of each twin differ from those of the next twin by four units. In some instances a single member only of the pair exists or is known, as chlorin is the only element of the twin which lies between phosphorus-sulfur and potassium-calcium. Lorenz develops from this a germinal rule. Taking as his starting point the atomic weights three and four, the latter corresponding to helium, he proceeds by successive increments of four. Of the second pair (7, 8), lithium only is known; the third twin is (11, 12) boron-carbon; of the fourth only oxygen is known; of the fifth (19, 20), we have fluorin, and perhaps argon. Up to the atomic weight of 128, thirty-nine elements correspond to this germinal rule, while there are ten elements whose weights do not fall within the limits of any pair. Fourteen of the thirty-two twins have but one member, four twins have no known member, and one twin, cobalt-nickel, is displaced one unit from its theoretical value. Of the elements of higher atomic weight, ten of the best known follow the rule, while four do not. The author seems to indicate his opinion that this germinal rule expresses the composite nature of the elements, and suggests that the elements which conform to it may be built up analogous to one series of hydrocarbons, while the exceptions may be built up on a different plan.

The article recalls two anonymous contributions to the American Supplement to the *Chemical News* for 1869 (pp. 217 and 339) on the 'Numerical Relations of the Atoms' and the 'Pairing of the Elements,' where very similar ideas were suggested.

J. L. H.

ASTRONOMICAL NOTES.

In our issue of November 15th we called attention to an article by Dr. Marcuse, of Berlin, giving an account of a series of observations made by him with the new photographic zenith telescope belonging to the Geodetic Commission. We have now received Prof. Albrecht's report upon the performance of the same instrument, which has been mounted at Potsdam side by side with the old visual instrument. This arrangement has enabled Herr Schnauder and Dr. Hecker to carry out a simultaneous series of observations with the two instruments, and using the same stars. The result of the research was not favorable to the photographic instrument, since it necessitated much extra labor, without any sufficient compensating advantage in the accuracy attained. It will be remembered that the Geodetic Commission proposes to establish four permanent observing stations on the same parallel of latitude, but differing nearly 90° in longitude, in order to get a continuous and very accurate determina-

tion of the latitude variations. The present tests of the new photographic instrument were undertaken with a view to the employment of such instruments at the four proposed stations. The results obtained at Potsdam will, therefore, cause the adoption of the older form of instrument.

PROF. ALBRECHT has published his 1896 report on the variation of latitude. He has included all series of observations from 1890.0 to 1896.5 and, after plotting them, has drawn a curve through the points obtained. This furnishes the means of getting the instantaneous latitude for any place on the earth, and for any time between the extreme dates used in the formation of the curve. This is probably the best way of treating the question, so far as the reduction of recent meridian observations is concerned, but it is useless for purposes of prediction, or for the re-reduction of older series of observations. But perhaps the time has not yet come for a definitive attempt to obtain laws for the motion of the pole which will permit accurate prediction, or which will represent former motions of the pole with entirely satisfactory precision. H. J.

SCIENTIFIC NOTES AND NEWS.

GEOLOGICAL FIELD WORK OF THE UNIVERSITY OF WYOMING.

PROF. WILBUR C. KNIGHT, of the Geological Department of the University of Wyoming, writes that the field work carried on by the department has just closed for the year. The entire season has been spent in studying the Jurassic terrane and collecting its fossils. Besides securing valuable stratigraphical data, many fossils new to science have been discovered. The collection is so large that it will take a year to arrange it for study. The new material can be roughly classified as follows: Invertebrates, six species. Pisces, two species of *Ceratodus*. Plesiosaurs, two species. Ichthyosaurs, one vertebra of a large animal. This must not be confounded with Marsh's *Baptanodon*. Dinosaurs, four species—two carniverous and two herbiverous. Crocodiles, one species.

With this year's discoveries it is now definitely known that there are three species of American Jurassic plesiosaurs, and it is very probable that there are four. This institution has the largest collection of these animals known.

The dinosaurs are very interesting. The largest carnivor is, so far as can be determined at present, a Megalosaur, but not allied to Marsh's *Ceratosaur*. The second carnivor is a very small animal. The two herbiverous animals have not been unpacked. One of them is a very large animal, and the other of medium size. The crocodile is a small species. All of this material has been taken from beds in new localities that have never received any attention.

While collecting new material, parts of most of the saurians that Marsh has described from the Jurassic were found. One of these is probably his Atlantosaurus. The femur in its natural bed measured 6 feet and 3 inches, and a caracoid measured 18×26 inches. Owing to the great additions made this year, the University of Wyoming now claims the second largest collection of American Jurassic vertebrates in the world, Yale having the largest. As soon as this material can be restored it will be described, after which it will be arranged for the students of vertebrate paleontology.

THE BRAIN WEIGHT OF MAMMALS.

AMONG the numerous valuable memoirs in the Gegenbauer *Festschrift* is one by Max Weber, professor of zoology in Amsterdam, entitled 'Preliminary Studies upon the Brain Weight of Mammals.' This contains the most exhaustive and accurate statistics which have been collected hitherto upon the absolute weights of the brain in the mammals and upon the relation of brain weights to body weights. In every case the sex is indicated, also the general condition of the animal. The length of the animal is given, the weight of the body, the weight of the brain, the ratio and the percentage of brain weight to body weight. The conclusions which Prof. Weber draws are thus based upon the most extensive and accurate statistics which have ever been brought together. They are as follows: First, in the matter of absolute brain weight