ous wings and were probably aquatic in early life. The last statement is simply inferred from the fact that all the modern types most nearly allied to them are now aquatic.

"Some of the Devonian Insects are plainly precursors of existing forms, while others seem to have left no trace. The best examples of the former are Platephemera, an aberrant form of an existing family; and Homothetus which, while totally different in the combination of its characters from anything known among living or fossil insects, is the only Palæozoic insect possessing that peculiar arrangement of veins found at the base of the wings in Odonata typified by the arculus, a structure previously known only as early as the Jurassic. Examples of the latter are Gerephemera, which has a multiplicity of simple parallel veins next the costal margin of the wing, such as no other insect ancient or modern is known to possess; and Xenoneura, were the relationship of the internomedian branches to each other and to the rest of the wing is altogether abnormal.

"If, too, the concentric ridges, formerly interpreted by me as possibly representing a stridulating organ, should eventually be proved an actual part of the wing, we should have here a structure which has never since been repeated even in any modified form.

"They show a remarkable variety of structure, indicating an abundance of insect life at that epoch.

"The Devonian Insects also differ remarkably from all other known types, ancient or modern; and some of them appear to be even more complicated than their nearest living allies.

"We appear, therefore, to be no nearer the beginning of things in the Devonian epoch than in the Carboniferous, so far as either greater unity or simplicity of structure is concerned; and these earlier forms cannot be used to any better advantage than the Carboniferous types in support of any special theory of the origin of insects.

"Finally, while there are some forms which, to some degree, bear out expectations based on the general derivative hypothesis of structural development, there are quite as many which are altogether unexpected, and cannot be explained by that theory without involving suppositions for which no facts can at present be adduced."

MICROSCOPY.

Mr. W. H. Bullock, of Chicago, the maker of the microscope for lithological work described by us in Vol. I, No. 21 of SCIENCE, writes to us, objecting to an editorial remark, that the arrangement of the polariscope for instant use, claimed as a novelty by Mr. Bullock, had been used in the same position by Swift, of London, for many years.

Mr. Bullock admits the accuracy of this statement, but now sends details, as evidence, that he has shown considerable ingenuity in arranging his analyzing prism, "mounting it in such a manner, that it can be turned round 90 degrees, so that when the lower prism is at the spring stop or zero point, and the upper prism is pushed into position with the indicator forward, the prisms are parallel, and upon its being turned back or revolved 90 degrees the prisms are crossed." "The lower prism is also arranged differently to that used by Swift; it can be fitted either to the sub-stage or used in the supplementary sub-stage, and thus used close under the stage, so that no light can reach the object under observation, except that which passes through the lower prism." Mr. Bullock also notices other improvements which must render the instrument very perfect for the purposes for which it was designed, namely, lithological work.

Mr. Bullock sends a photograph of this microscope and we readily admit that it appears to be an excellent instrument; of the workmanship we are, of course, unable to speak, but probably the reputation of Mr. Bullock is sufficient guarantee in this respect.

NEW YORK ACADEMY OF SCIENCES.—Section of Chemistry.—Monday Evening, December 13, 1880, at 8 o'clock, the following paper, by Dr. HENRY A. MOTT, is announced:—Chemical Decomposition incited by a Cold Fluid Stratum floating on a Warm Liquid.

ASTRONOMY.

JUPITER.

MOTION OF SPOTS ON HIS SURFACE.

Jupiter, always enigmatical, has, since the appearance of the great red spot in his Southern hemisphere, become more and more perplexing. It was supposed this object would afford a ready means of determining Jupiter's true period of rotation. It has not done this, but has certainly led to the development of many interesting facts, one of which is that no period can be determined, because there are not two parts of the planet's visible surface which rotate in equal times. It would seem reasonable that any two points on the same parallel of latitude and in the same hemisphere must necessarily rotate with equal velocities; this does not even hold good. Could we be placed in such a position that the rotation of the planet would not visibly change the position of objects on his surface, we should still see the spots moving not only with different velocities, but in contrary directions. Spots very rarely change their latitude, as the very great axial rotation of Jupiter confines their motion to a parallel with his equator. In Jupiter's Southern hemisphere are two or three small dusky oblong spots. The most distinct of these I first observed on the morning of July 25, 1880, (see *English Mechanic*, No, 804, where an engraving showing its position is given). This group of small spots lies on a parallel of latitude about even with the Southern edge of the great red spot. On July 25, the centre of the first observed of the spots preceded the centre of the large spot by 1h. 35m. Since that date the red spot has been observed constantly, and the small one frequently. Up to November 23, thirty-five transits of the great spot across the central meridian, and nine of the smaller have been carefully observed. On November 22, the small spot preceded the greater by 3h. 17m. The interval between their transits having increased 1h. 42m. since July 25. The large spot has moved backward, compared with the direction of rotation, making its transit on November 22 occur 49m. later than on July 25, while the small spot came to its transit 53m. earlier than on July 25, showing that the two are moving with nearly the same velocity, but in opposite directions. The mean daily drift backward of the great spot since July 25 has been 0.40245m, while the forward motion of the small spot has been, during the same period, 0.43948m per day. It will be seen from this that a rotation derived from the small spot would indicate a quicker period than that derived from the large red spot.

From the observations of July 25 and Nov. 22, the great spot rotates in 9h. 55m. 37.065s., and the small one in 9h. 55 m.16.176s. The mean rotation of the two is 9h. 55m. 26.621s. A reduction of all the observations on hand will, doubtless, slightly change these figures. It would be well for observers to watch this small spot, as it may last as long as the large one. It it should continue permanent, it will eventually make the circuit of Jupiter and meet the red spot; this would occur about the middle of February, 1882.

But the motion of these two objects is very slow compared with the rapidly moving black spots which appeared just north of the equatorial belt on the last of October. But as attention has already been called to these remarkable objects by Messrs. Dennett, Williams and Denning, in *English Mechanic*, No. 816, I will not refer to them here, further than to say that they have been observed and sketched as often as the weather would permit since their first appearance. The region occupied by the great equatorial belt is subject to constant and quite rapid change, being filled at times with the most delicately soft plumey forms. Brilliant white spots are not unfrequent in this zone. These bright spots generally appear as intensely white heads, followed by a light, diffused and fainter train. Sometimes this train is composed of light,