shown that Argelander's scale in the 'Durchmusterung' was just as close to this as that of any single one of the photometers. 6°. Coming to accidental errors, Mr. Chandler showed that, from a full discussion of the naked-eye estimates of Gould, Sawyer, and himself, the probable error of a single estimate was a little over ±.06 of a magnitude when the stars were at considerable distances from each other, and about ±.05 of a magnitude when near; while the probable error of a single measure in the 'Harvard photometry' was ±.17 of a magnitude, and in the 'Uranometria Oxoniensis' about ±.10 of a magnitude, thus showing that the eye-estimates were from two to three times as accurate as the photometric. 7°. Discussing the cause of the large residuals in the 'Harvard photometry,' Mr. Chandler showed the strong probability of wrong identification of stars in many cases, citing one case where no bright star existed in or near the place called for by the observing-list, on account of a misprint in the 'Durchmusterung,' and yet some neighboring star was observed on several nights for it. 8°. Also the method of applying a correction for the mean value of the atmospheric absorption was very questionable, since overwhelming evidence pointed to an enormous difference in this absorption from night to night. 9°. The author pointed out that we must obtain better results from photometers if we ever expect to use their results for the detection or measurement of variable stars, since several variables have been detected, and their periods and light-curves well determined, by careful eye-estimates, whose whole range of brightness is no greater, or even less than, the range of error in the photometric observations upon a single star with the meridian photometer.

In a discussion of a paper by Mr. Barnard upon 'Telescopic observations of meteor-trains,' Professor Newton pointed out that the study of their drift was the only method we have of studying the upper currents of our atmosphere, except such rare catastrophes as the Krakatoa explosion.

The closing paper was by Mr. Chandler, 'On the use of the zenith-telescope for latitude.'

PROCEEDINGS OF THE SECTION OF BIOLOGY.

THE regular work of the biological section began on Thursday, and a partial classification of the papers into botanical and zoölogical added considerably to the interest and convenience of those present. Some have proposed a divison of the section of biology into botanical and zoölogical sections, but this, with a small meeting, seems hardly desirable, as there are apt to be only enough papers to occupy the time.

Among the first of the botanical papers was one by Prof. W. J. Beal, giving a comparison between the hygroscopic cells of grasses and sedges. In both grasses and sedges, as has long been known, there are one or more longitudinal rows of cells on each leaf, the function of which is to fold or close the blade in times of drought, and thus prevent too rapid evaporation of moisture from the surface. These rows of cells, as well as the cells themselves, vary in shape, size, and distribution in the different genera and species, and may have some value in the discrimination of critical species. The most interesting point brought out was, that many parallels exist between the genera of grasses and sedges in the arrangement of these hygroscopic, or, — as Professor Beal chooses to term them, — bulliform cells.

The paper of Messrs. J. M. Coulter and J. N. Rose, giving a synopsis of the North American pines, based on leaf-structure, had some points in common with the one just mentioned, and was of especial value from a systematic stand-point, from the fact that any species in this somewhat difficult group can at once be distinguished by the peculiarities of its minute leaf-structure; and the results of the author's observations are shown to be worthy of attention from the fact that a classification based on these characters is, in its broader features, closely like that of the late Dr. Engelmann, which, as is well known, took into consideration the whole tree.

The relations of germs to disease naturally occupied a prominent place in the proceedings of the section, and the presence of over half a dozen investigators in this line made the discussions interesting. Dr. D. E. Salmon read two papers bearing on the causes of immunity from a second attact of germ diseases. There are three possible explanations: 1°, something is deposited in the body during the attack which is unfavorable to the germ; 2°, something has been withdrawn which is necessary to its development; 3°, the tissues have acquired such a tolerance for the germ or for an accompanying poison that they are no longer affected by it. Dr. Salmon favored the last view, and gave details of a large number of experiments to substantiate his opinion. He said that Metchinkoff's phagocyte theory was not wholly satisfactory, and that large doses of the germs were more powerful than small ones. He attributed their action to a poison which was a result of their growth, and thought that a large dose had a greater effect because the poisons benumbed or killed the cells, thus giving the bacteria a better chance to grow and to thus produce more poison.

Dr. Joseph Jastrow gave an account of some

physiological observations on ants, in which he was able, by simple but ingenious means, to study the rate of walk of these insects, and stated that his results, so far as they went, confirmed the opinions of others that the smaller the animal the more rapid the step, and also the more quickly fatigue was produced. Dr. Jastrow also had some observations on the dreams of the blind, taken mostly from persons who had lost the sense of sight before the age of five. In these cases the dreams were all in terms of hearing. In the case of Laura Bridgeman, the dreams were apparently based on touch. In persons who become blind between five and seven, sight terms played an important part in dreams. The relation of these facts to the development of the sight centres was pointed out.

A short paper by S. H. Gage and Seth E. Meek, on the lampreys of Cayuga Lake, stated that the large lamprey, heretofore regarded as sub-specifically distinct, was identical with the well-known sea-lamprey of the Atlantic coast, the characters separating it being of a sexual nature and assumed at the breeding season. The existence of a second species in Cayuga Lake, hitherto not known east of Indiana, was mentioned. The authors described the method of nest-building, stating that the lampreys seek out a spot in the still water above the ripples, and then, by means of their sucking mouths, remove the stones until a nest from four to eight inches deep is made. In the sand in the bottom of this nest the eggs are laid. The time of oviposition was from June 9 to July 6 during the present year. The pile of gravel thrown up in making the excavation is not the nest, but later it is found to be occupied by the ammocoete larva.

The most important feature of Dr. Kingsley's account of the embryology of the shrimp (Crangon) related to the development of the compound eye. Locy was the only previous observer of the early stages of the eye of anthropods, and Dr. Kingsley's observations confirmed his results as well as going more into detail.

Dr. C. S. Minot, in his paper on the segmentation of the vertebrate ovum, reduced all types of segmentation to a common basis, and clearly pointed out the homologies. The most important point was that which showed that the majority of authors had confused the germ-layers in the mammalian ovum, and have termed the entoderm, ectoderm, and *vice versa*. On Dr. Minot's showing, the difficulties encountered in mammalian embryology are largely those of misconception and misinterpretation.

Dr. Merriam, after mentioning the fact that bats might be divided into tree-dwelling and cave-dwelling forms, presented evidence, of a negative character, which goes to show that the tree-inhabiting bats migrate. No woodsmen have found bats in hollow trees in winter, and there is no evidence that any forms hibernate. In a second paper the same gentleman gave an outline of the work being done in the department of agriculture, on economic ornithology and mammalogy, in which he pointed out, in most vigorous language, the immense damage done the agricultural interests by the bobolinks and English sparrows. One South Carolina planter with rice-fields of twelve hundred acres employed each year a hundred persons to kill the birds, at a total expense for ammunition, etc., of $4,500.

Among the papers read were the following: 'Culture experiments showing accidental relations between Gymnosporangia and Rolstelia,' by Dr. W. G. Farlow; 'Insect diseases,' by Prof. S. A. Forbes; 'Areas of form and color perception of the human retina,' by Prof. J. H. Pillsbury; 'Development of the human chorion,' by Dr. C. S. Minot; and, 'The auditory bones in the lower vertebrates,' by Prof. E. D. Cope.

MUSK is an animal substance, obtained from an abdominal sac of the male of the Moschus moschatus, a small hornless deer inhabiting the higher mountains of central Asia, ranging from Thibet to China, and into Asiatic Russia. The contents of the musk-sac are a solid, brownish, granulated, ovoid mass, exceedingly strong and tenacious in odor, and varying in size from that of a walnut to that of a hen's egg. There are four varieties of musk, viz.: Tonquin, from China, regarded as the best, and which is looked upon as the most recherché; Yunnan, from the frontiers of Indo-China; Assam, or Bengalee; and, least valued of all, Kabartin, from Tartary and Siberia. Musk is very expensive, the price at present ranging from eight to twenty dollars per ounce, in the pods or bags, according to grade. This high price is the cause of much adulteration, in this country as well as at the place of production; so that there is very little in the market that can be considered pure. The principal adulterants are lead, iron, coagulated blood, leather, stones, and even paper and rags. The adulterant is inserted in the bag, and the opening closed in such a manner as to defy detection. About five hundred pounds of musk are used annually in the United States, of which ninety-five per cent goes into toilet soaps and perfumery, the rest being used for medicinal purposes.

— PROF. JOHN DICKINSON, a brother of Miss Anna Dickinson, has accepted the chair of geology and mineralogy in the University of Southern California at Los Angeles.