

the present shore is another difficulty. The prevailing rounded or elliptical shape is not explained.

That the sea, when this part of the coastal plain rose above it, left numerous inequalities somewhat similar to the ripple-made pittings seen in the sand in the bottom of a gutter after a rain has suggested itself to me. If so, these basin-like pittings—separated from each other by sand ridges highest above the general shore slope on their east side—might have formed the basins for these ‘bays.’

Fuller observation and study is needed before anything but a tentative conclusion may be reached. Any additional observations or suggestions will be gladly welcomed.

L. C. GLENN.

DARLINGTON, S. C.

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*A NEW METHOD OF DETERMINING THE MOTION OF STARS IN THE LINE OF SIGHT.*

A METHOD of measuring the motions of stars in the line of light, which does not require the use of an artificial comparison spectrum, and which is therefore adapted to slitless spectroscopes, has been proposed by Professor Orbinsky, of Odessa (*A. N.* 3289). It is of unusual interest because the object-glass spectroscope, which is so advantageous with respect to simplicity of construction and to the brightness of the spectra which it yields, has never yet been successfully applied to this branch of astronomical research.

The principles on which the method depends may be briefly described as follows: If a luminous body is moving in the line of sight, the distance between any two lines in its spectrum is not what it would be if the body were at rest, since the two lines are unequally displaced by the motion. In a normal spectrum the displacement of the lower line would be somewhat the greater, although the differ-

ence would scarcely be measureable under ordinary circumstances, but on account of the increasing dispersion of a prism toward the violet the effect in a prismatic spectrum is reversed, and the upper line is displaced more than the lower one. The differential displacement of the  $H\delta$  and  $H\beta$  lines, in an ordinary prismatic spectroscope, is, in fact, somewhat more than half the absolute displacement of the  $H\gamma$  line. By measuring this apparent change of dispersion the motion of a star can be determined.

To avoid the errors attending the measurement of large distances on a photograph, and other errors which need not be specially mentioned here, the spectrum of a star whose motion in the line of sight is known is photographed on the same plate, and the apparent change of dispersion due to the motion of the first star is deduced from measures referred to corresponding lines in the spectrum of the second. The stars selected for purposes of comparison would naturally be bright stars with well-defined lines, and their motions could therefore be accurately determined by the usual methods. Only a comparatively small number of such standard stars would be required.

For slit spectroscopes it would probably be found that Professor Orbinsky's method is inferior to the usual one, although Professor Vogel finds that it can be applied to some of the photographs taken with the Potsdam spectograph. It not only depends upon a differential effect, and thus reduces the amount of the available displacement, but it requires the measurement of lines which are widely separated, and therefore badly defined in consequence of their great distance from the axis of the camera objective. Even if this lens were constructed with a view to giving a large field the definition would be inferior to that in the center of the field of an objective of the usual construction.

The latter objection does not apply, however, to the case of a telescope with object-glass prism, where a great linear extent of spectrum is obtained with small angular field. It is for instruments of this class that the method is intended, and it seems to promise well. Possibly the range of spectrum could be advantageously increased by the use of orthochromatic plates, which, largely on account of the compression in the lower part of the prismatic spectrum, have an actinic value in the region of  $\lambda 550$  not greatly inferior to that near H $\epsilon$ . It is true that few spectra have strong lines in this region. Various advantages and disadvantages attending the use of such plates will readily occur to the observer acquainted with their peculiarities, and actual trial would probably be necessary to determine on which side the balance lies.

J. E. K.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

SECTION OF ZOÖLOGY.

By reason of the absence of both the Vice-President and the Secretary-elect, the work of the section was somewhat delayed and embarrassed. Mr. L. O. Howard, of Washington, D. C., was nominated by the Council for Vice-President and was duly elected by the Association. Following the work of the general session, Section F. proceeded to complete its organization. Chas. W. Hargitt, of Syracuse, N. Y., was elected Secretary. Chas. S. Minot, of Boston, Mass., was elected Councillor, and George Dimmock was elected as a member of the nominating committee.

The following papers were read on Friday: *The Evolution of the Insect Mouth-parts*. By PROF. JOHN B. SMITH, Rutgers College.

Beginning with the typical mandibulate mouth the author undertook to show the the gradual modification of these parts in the structure of the mouths of all insects,

and further to show that there is no well-defined basis for the distinction of insects into mandibulate and haustelate groups. The paper was a very elaborate discussion of the subject and was listened to with the closest attention. It was illustrated by a series of lantern transparencies prepared by the author or under his direction.

Following this a paper was read by Mr. C. L. Marlatt, of Washington, D. C., on the Mouth-parts of Insects with Special Reference to the Diptera and Hemiptera.

In this paper the author sought to maintain the usually accepted view. It was illustrated by a series of charts and drawings and was a valuable contribution to the subject. Following this there was an animated discussion in which several entomologists participated.

The next paper on the program was by Prof. Chas. S. Minot on the 'Olfactory Lobes.' The paper was a noteworthy contribution to the subject.

Another important contribution to morphology was a paper on the 'Visceral Anatomy of the Lacertile,' by Prof. E. D. Cope.

On Monday morning occurred the joint session of sections F. and G., at which the following papers were presented:

*The Distinction Between Animals and Plants*.

By PROF. J. C. ARTHUR.

*Variation After Birth*. By PROF. L. H. BAILEY. Read by title.

*Rejuvenation and Heredity*. By PROF. CHAS. S. MINOT.

This paper was a noteworthy contribution to the subject of heredity, and was distinguished by its very forcible antagonism of the views of Weismann and his school.

The following papers were presented at subsequent sessions:

*Stemmiulus as an Ordinal Type*. By O. F. COOK.

From abundant material collected by Mr. Cook in Siberia, a more extended examination has been made possible and