

ingly shows one more than one half the spermatogonial number of chromosomes, but at the close of this division conjugate to form an asymmetrical dyad, the number of separate chromatin-elements being thus reduced from eight to seven (in *Podisus* from nine to eight). A reduction of the number to seven in the first division, such as has been described by Montgomery as an occasional or usual process in *Euchistus* and *Cænus*, was never observed. In the second division the asymmetrical idiochromosome-dyad separates into its unequal constituents, while the other dyads divide symmetrically. One half the spermatozoa, therefore, receive the large idiochromosome and one half the small, the other chromosomes being exactly duplicated in both.

Correlated with this asymmetry of distribution is the fact that the spermatogonial chromosome-groups do not show two equal microchromosomes (as is the case in such forms as *Anasa*, *Alydus* or *Protenor*, where an accessory chromosome is present) but only one, which is obviously the small idiochromosome, the large one not being certainly distinguishable at this period from the other spermatogonial chromosomes. The final synopsis of the idiochromosomes is deferred to the prophases of the second division, somewhat as that of the two equal microchromosomes is deferred until the prophase of the first division in *Anasa*, *Alydus* and some other forms. A remarkable result of the difference in this regard between the forms that possess and those that lack a true accessory chromosome is that in the former case (*Anasa*, *Alydus*, etc.) the first division of the small central chromosome is a reduction-division and the second an equation-division; while in the latter case (*Lygæus*, *Cænus*, etc.) the reverse order manifestly occurs. The relation of these observations to earlier ones by Paulmier, Montgomery and others was pointed out, with a discussion of their bearing on the Mendelian phenomena of heredity and the problem of sex-determination.

Professor Crampton presented briefly some of the conclusions drawn from the results of his work upon variation, correlation and selection among saturnid lepidoptera. The earliest

studies showed that eliminated individuals, when compared with similar members of the same group that survive, prove to be more variable and of somewhat different types, although this relation between variability and selection is not a constant one. The characters utilized for these preliminary studies, namely, certain pupal dimensions and proportions were of such a nature that they could not serve the pupa directly in any functional manner, wherefore it was concluded that their condition of correlation formed the actual basis for the selective process, formative correlation being also distinguished from functional correlation. That the general condition of correlation among the structural characters of pupæ formed, indeed, the basis for selection was further indicated by the results of a statistical study of the correlations between various characteristics of pupal groups from several different animal series; although an advantage did not always appear in favor of the surviving group. On the basis of the foregoing, a general theoretical conception was developed, according to which the whole series of internal elements and the whole series of external influences were regarded as involved in the determination of the general condition of correlation or coordination that formed the basis for selection, as adaptive or the reverse.

M. A. BIGELOW,
Secretary.

DISCUSSION AND CORRESPONDENCE.

PRE-PLEISTOCENE DEPOSITS AT THIRD CLIFF, MASSACHUSETTS.

TO THE EDITOR OF SCIENCE: It has been suggested by several writers (Shaler and Verrill) that Tertiary and Cretaceous deposits may occur on the floor of the sea north of their known occurrence on Marthas Vineyard and Cape Cod. Their northerly occurrence on land has not been noted except for the Miocene greensands at Marshfield, Mass. (Duxbury sheet, U. S. G. S.). During the spring field season at Harvard University the writer reexamined the coast from Boston Harbor to Peaked Cliff, fifteen miles southeast of Plymouth harbor, in order to test, by

means of the excellent cliff sections, the suggestion of the occurrence of such deposits. Pre-Pleistocene deposits were found at Third Cliff, twenty miles southeast of Boston, and possibly at Peaked Cliff, southeast of Plymouth.

The section at Third Cliff shows yellow clays at the base conformably overlain by yellow and white sands and succeeded by a bed of bright red sands with an unconformity at their base. On the eroded edges of the red and white beds are deposited dark, glauconitic and lignitic clays and sands. The entire series of beds has a total maximum thickness of sixty or seventy feet, and outcrops for a half mile along the cliff face. Absolutely no erratic material occurs either within the beds themselves or along the lines of unconformity.

The lithologic characters of the lower beds are like those so persistently characteristic of the Cretaceous from Marthas Vineyard to New Jersey; while the upper beds of dark clays appear to be homologues of the Miocene at Gay Head and at Marshfield. This fact, together with the evidence of the unconformities and of the lignites is being examined with a view toward suggesting probable correlations with the deposits worked out at Gay Head by Professor Woodworth (*Bull. Geol. Soc. Amer.*, VIII., 1897, 197-212); although the absence of specific paleontologic evidence renders such correlation merely tentative. The detailed descriptions of the beds and the conclusions inferred with respect to their age will be published in a later paper.

ISAIAH BOWMAN.

CAMBRIDGE, MASS.

EXOGLOSSUM IN THE DELAWARE.

THE occurrence of the little minnow, *Exoglossum maxillingua* (Le Sueur), in the Delaware basin is of interest. So far as I am aware, it has not been taken in any of the tributaries of the Delaware before the capture of two examples which I caught in the Red Clay Creek, Chester County, Pa., during April of 1904. In this instance I am indebted to Mr. Alfred C. Satterthwait, who assisted me in securing the specimens. When

first seen, I was under the mistaken impression that they were simply young unmottled examples of *Catostomus commersonii*.

In the Susquehanna basin this fish is abundant and I have also met with it in tributaries of the Allegheny in Pennsylvania, especially near Cole Grove, in McKean County.

HENRY W. FOWLER.

ACADEMY OF NATURAL SCIENCES,
PHILADELPHIA.

SPECIAL ARTICLES.

THE BRAIN OF THE HISTOLOGIST AND PHYSIOLOGIST OTTO C. LOVÉN.

PROFESSOR LOVÉN, the Swedish histologist and physiologist who will be best remembered for his discoveries of the endings of the taste-fibers in the papillæ of the tongue of mammals, as well as of the vaso-dilator nerves, had expressed it as his wish that his brain be preserved after death and studied by his friend and associate, Gustaf Retzius.

With characteristic care and skill Professor Retzius has just published his studies upon Lovén's brain in *Biologische Untersuchungen*, Vol. XII., 1905. The brain exhibits a richness of fissures and these are marked by a superior degree of tortuousness and ramification. The subparietal region is very complex in its surface configuration, while the central (motor) regions are only moderately developed. The cortical centers for speech and language formation are notably large, and Professor Retzius brings this fact into relation with Professor Lovén's notable powers of clear, exact and logical expressions of thought in words; less so in the way of oratorical *finesse* than in the talented use of the best and most adequate expressions. The weight of the brain is not given in this report though its size is said by Retzius to have been well above the average.

EDW. ANTHONY SPITZKA.

APPLES INJURED BY SULPHUR FUMIGATION.

RECENTLY some injured *Esopus Spitzenburg* apples were received at the New York Experiment Station with a request to diagnose the trouble. They were of the first grade, each fruit wrapped in paper, and packed in a bushel box. The financial loss was important, as a