44. *The Characteristic Features of the California Gold Quartz Veins.* Waldemar Lindgren, Washington, D. C.

The writer described the extent and associations of the veins, bringing out the fact that they are in all manner of wall rocks, although especially in the auriferous slates. They were shown to be true fissure veins that cut the walls at all angles, although mostly along the strike. Direct issue was taken with the view that they are replacements of limestone or related rock, for it was shown that while the veins are siliceous and filled with quartz, the wall rocks have very generally suffered carbonatization. Finally the source of the gold was placed in deep seated regions, whence it had been brought by uprising solutions.

On the conclusion of the paper, the customary votes of thanks were passed to the local committee, to the Johns Hopkins University and to others whose efforts had made the session a success. The next place of meeting, a year hence, has not been settled. On the whole, the meeting was the best attended and most interesting and successful yet held. J. F. Kemp.

Columbia College.

THE BALTIMORE MEETING OF THE AMERICAN MORPHOLOGICAL SOCIETY.

The Society met on Thursday morning in the lecture room of the Chemical Building and again upon Friday afternoon, adjourning for the intermediate sessions of the Society of Naturalists. In the absence of Professor C. O. Whitman, President of the Society, Professor W. B. Scott, of Princeton, Vice-President, took the chair. Among those present at these sessions besides those who presented papers were Alpheus Hyatt, Edward S. Morse, Edward D. Cope, Samuel F. Clarke, C. F. Herrick, Henry F. Osborn, E. A. Andrews, W. H. Dall.

The officers elected for the year 1895 were:

President—Professor Edmund B. Wilson, Columbia College.

Vice-President—Professor W. B. Scott, Princeton College.

Secretary and Treasurer, Dr. G. H. Parker, of Harvard University.

The following are abstracts of the papers presented:—

Dr. C. W. Stiles, of the U. S. Agricultural Bureau, presented the first paper upon *Larval Stages of an Anoplocephaline Cestode* and exhibited specimens of Distoma (Polyorchis) molle (Leidy, '56), S. & H., '94; of Dioctophyme gigas, Rud., and of Distoma tricolor, S & H. Five hundred of the last named species are ready for distribution as exchanges to college zoölogists.

Professor William A. Locy, of Lake Forest University, presented the first paper on *Primitive Metamerism in Selachians, Amphibia and Birds.* It has been generally assumed that the metameric divisions of the Vertebrates depend primarily on the middle germ-layer, and that whenever they appear in the ectoderm they are secondarily moulded over the mesodermic segments. This proposition is not supported by these observations. We find in very young embryos of amphibians and birds, primitive metameric divisions which effect the entire epiblastic folds and in Selachians extend also out into the germ-ring. They are present before any protovertebræ are formed and are most clearly marked in the border regions. These segments become later coincident with the so-called neuromeres, but it is to be noted that they are by no means confined to the neural tube. The time-honored designation 'metamerism of the head' should be interpreted as meaning regional metamerism not as a different form of segmentation from that which affects the trunk region. This paper was discussed and the accuracy of the author's observations was questioned because of the conspicuous character which he assigned to

certain surface markings never observed by others. The opportunity given for examining the specimens, however, proved that the markings could be faintly seen as described by the author.

Dr. Locy's second paper was a *Note on the Homologies of the Pineal Sense-Organ.* The basis for determining homologies of the two epiphysial outgrowths of Petromyzon, Teleosts and Lacertilia has been furnished by recent publications by Studnicka, Hill and Klinckowström. Basing a comparison upon innervation and also upon the history of the vesicles, we may regard the upper epiphysial vesicle in Petromyzon as corresponding to the epiphysis of Teleosts and Lacertilia, and the lower epiphysial vesicle as equivalent to the anterior vesicle of Hill (which early absorbs) in the teleosts, and to the pineal eye in the Lacertilia.

Under the title: '*The Quadrille of the Centrosomes*' *in the Echinoderm egg; a second contribution to biological mythology*, Professor E. B. Wilson, of Columbia, presented the somewhat surprising results of his renewed investigation of the phenomena of fertilization in the eggs of the sea-urchin. Rabl had predicted in 1889 that the union of the germ-cells would be found to involve a conjugation of centrosomes or archoplasmic elements in addition to the well-known conjugation of nuclear elements. Fol's celebrated paper on the *Quadrille of the Centrosomes* in 1891 was apparently a triumphant fulfillment of the prediction, and, having been immediately and universally accepted, exercised an important influence on the current theories of inheritance. A prolonged research upon the eggs of *Toxopneustes variegatus* shows, with a high degree of certainty, that Fol's results were based on material prepared by defective methods; that his account of the origin of the archoplasm is fundamentally erroneous; that no 'Quadrille' occurs in the American species at least, and that his account of it is largely mythical. Results essentially similar and fully corroborating the above have been reached in the Columbia Laboratory by Mr. A. P. Mathews in the eggs of *Arbacia* and *Asterias*. In all these cases the egg-centrosome and archoplasm degenerate and completely disappear after formation of the second polar body, and, therefore, do not play any part in the fertilization. The sperm-archoplasm is derived not from the tip of sperm but from the middle-piece (as in the earth-worm and in the axolotl) and by division gives rise directly to the amphiaster of the first cleavage without any participation of an egg-centre or egg-archoplasm. All the stages in the fertilization process of *Toxopneustes* were exhibited by the author in photographs taken with an enlargement of one thousand diameters with the coöperation of Dr. Edward Leaming, of the College of Physicians and Surgeons, New York. These photographs illustrated furthermore the effect upon the egg of various reagents, a considerable number of which have been carefully tested. Fol's picro-osmic mixture was shown to be very defective, causing more or less marked disorganization of the archoplasmic structures and producing various artefacts. The 'centers' (centrosomes) of Fol were unquestionably such artefacts, produced by the shrinking and clotting together of the archoplasmic recticulum. In properly preserved material (sublimate-acetic, Flemming's fluid, etc.,) the archoplasm-masses ('astrospheres') consist of a uniform reticulum and contain no centrosomes.

In a second paper on the '*Polarity of the Egg in Toxopneustes*' Professor Wilson described the results of his observations on the paths of the pronuclei in the transparent living egg. The very unexpected result was reached that in this case the ultimate vertical axis of the egg ('egg-axis' proper) does not necessarily coincide with the polar axis but may form any angle with it; but the plane of first cleavage is nevertheless

always nearly through the entrance-point of the sperm. Regarding the former point there is a possible source of error in that the excentric egg-nucleus may wander from its original position (near the polar bodies), so that the diameter passing through it no longer represents the egg-axis. (This cannot be determined from the polar bodies, since they quickly become detached from the egg). Many facts indicate, however, that such wandering does not occur. If it does not, then the polarity of the egg is not primordial but induced, and one of the most fundamental characteristics of the egg is thus brought into the category of epigenetic phenomena.

Professor Charles S. Minot, of the Harvard Medical School, presented a paper upon *The Olfactory Lobe.* He showed that of eleven layers of cells in the olfactory lobe only the inner two layers belong to the cerebral cortex proper, proving that the olfactory lobe is a ganglion structure belonging to the sensory ganglion series with certain great secondary modifications. This is further supported by the fact that the lobe primarily connects with the brain at a point topographically similar with a point midway between the 'dorsal zone' and the 'ventral zone' of His. In a second paper Professor Minot pointed out as a *Fundamental Difference Between Animals and Plants*, of value principally in teaching, that while animals feed typically upon solids, plants always procure their food in a gaseous or liquid form. This paper was discussed by Dr. Locy, Dr. Humphries and several other botanists and zoölogists present, the point being raised that plants manufacture their own food and that when plant assimilation really begins it is practically analgous to that of animals, as it consists in the taking up of solid particles.

Dr. Arnold Graf, of Columbia, presented the next paper upon *The Origin of the Pigment and the Causes of the Presence of Patterns in Leeches.* The pigment originates in the excretophores. These are wandering cells which pick up excretory substances from the walls of the capillaries; one part of the cells wanders to the funnels of the nephridium and thus delivers their contents into the nephridium, while another part of the excretophores wanders under the skin emerging along the lines of least resistance, which lie between the muscle bundles. The color patterns of the leeches vary, therefore, according to the arrangement of the musculature. In *Nephelis* the longitudinal musculature is developed most strongly and consequently the pattern consists in longitudinal stripes. *Clepsine* has as a consequence of its parasitical mode of life a strongly developed dorso-ventral musculature and therefore the pattern consists in spots, the longitudinal stripes having been interrupted and broken up by the transverse and oblique muscle bundles. The bearing of these facts is very important. The color pattern of the leeches is not in itself adaptive; it is entirely incidental and secondary to the musculature which is essentially adaptive. A change in the musculature would result in a change in the superficial color pattern. This shows how a very striking superficial character may originate without any adaptive significance and as a secondary inheritance.

The following paper by Professor H. T. Fernald, of Central College of Pennsylvania, was entitled *Homoplasy as a Factor in Morphology.* A review of zoölogical literature in the past ten years shows that in every group of animals beginning with the sponges and extending up to the highest vertebrates the phenomenon of parallel or homoplastic development is becoming increasingly apparent. Numbers of cases were cited from all classes of animals showing that identical structures, produced independently in different phyla, are extremely numerous.. The paper was discussed by Professors Hyatt,

Cope and Scott, who pointed out that while the term 'homoplasy' was proposed by Lankaster the phenomenon itself was early pointed out by Darwin and has been fully elucidated by palaeontologists.

Mr. Seitaró Gató, of the Johns Hopkins University, gave a demonstration of some parts of the Ectoparasitic Trematodes including a number of features from his full memoir upon this subject recently published in Japan.

Mr. A. P. Matthews, of Columbia, followed with a paper on the *Morphological Changes in the Pancreatic Cell, corresponding with Functional Activity.* The cells of *Necturus* are exceptionally large and favorable for observation of the changes which occur before and after feeding. The striated appearance of the outer zone of the pancreatic cell is due to coarse cytoplasmic filaments or threads which end in the centre of masses of chromatin within the nuclear membrane. In fact, these threads are directly continuous with the cytoplasmic reticulum in the inner zone; these threads are often coiled and in such cases explain the structures known as *Nebenkerne.* When the gland is secreting the zymogen granules and reticulum are washed out of the cell by lymph currents and new thread substance is manufactured by the chromatin. During the so-called 'rest' of the cell the thread substance degenerates into zymogen granules and the cytoplasmic reticulum of the inner zone. The zymogen granules grow by accretion. The thread substance grows by accretion at the chromatin end. The nucleus undergoes no appreciable changes. There are indications that the chromatin is a ferment, and that it is the essential formative element of the cell; probably this is true of all the cells and all chromatin; if so, the character of cytoplasm and new chromatin formed will depend on the character of the nutrition. It is possible that the chromatin of embryonic cells differentiates as a result of differentiations dependent upon the location in the segmenting cell mass of the chromatin of the original blastomeres. If this is true it is unnecessary to assume that characteristics are represented definitely in a so-called 'stirp' located in the chromatin.

Professor J. S. Kingsley, of Tufts College, next presented a paper upon the *Anatomy and Relationships of Pauropida*, on behalf of Mr. F. C. Kenyon.

Professor Alpheus Hyatt, of the Museum of Comparative Zoölogy, Cambridge, presented a paper summing up his researches upon the *Parallelisms between the Ontogeny and Phylogeny of Pecten.*

Professor Andrews submitted for Professor T. H. Morgan, of Bryn Mawr, some of his observations recently made in Naples at the American table supported by the Smithsonian Institution. It is found that the unsegmented eggs of a sea-urchin may be broken into minute fragments which develop into perfect larvæ. One such fragment may be one-fiftieth of the volume of the egg and yet develop into a gastrula if it contain a male and a female pronucleus. The gastrula thus produced is so exceedingly small that three in a row are no longer than an infusorian, such as *Paramoecium.* The volume of such a gastrula is one-sixty-fourth part of that of a normal gastrula. While the number of cells in a normal blastula on the point of invaginating is five to seven hundred, the number in one of the minute blastulas at the same stage may be as small as sixty. With such facts we explain the known difficulty in rearing larvæ from isolated cells of late cleavage stages, as due to a limit in the number of cleavages possible before gastrulation. That is, gastrulation comes after a definite number of cleavages and a cell has its possible cleavages reduced in a certain ratio by the number of preceding cleavages.

The paper of Professor F. H. Herrick, of

Adelbert College, upon the *Biology of the Lobster* will be printed in full in a later number of SCIENCE.

CURRENT NOTES ON ANTHROPOLOGY (II.).

NATIVE ASTRONOMY IN MEXICO AND CENTRAL AMERICA.

AT the International Congress of Americanists, which met in Stockholm last August, two papers were presented which ought to give pause to those would-be critics who of late years have been seeking to belittle the acquirements of the semi-civilized tribes of Mexico and Central America. Both are studies of the positive astronomic knowledge which had been gained by the observers among those tribes. One is by Mrs. Zelia Nuttall, and bears the title, *Notes of the Ancient Mexican Calendar System.* It is intended merely as a preliminary publication to a thorough analysis of this system as it was carried out in Mexico, and contains only the outlines of her discoveries. These are, however, sufficient to support her thesis, that the astronomer-priests possessed a surprisingly accurate knowledge of the exact length of the solar year, of the revolution of the moon, and of the synodical revolution of the planet Venus.

The second paper is by Dr. Förstemann, who is the foremost student in Germany of the contents of the books written in the hieroglyphic script of the ancient Mayas. He takes up page 24 of the Dresden Codex, and explains its meaning. This page has been long recognized as a sort of abstract or table of contents of those which follow it in the Codex, but its exact bearing has not previously been interpreted. Dr. Förstemann shows by ingenious and accurate reasoning that it relates chiefly to the synodical revolution of the planet Venus and its relation to the courses of the sun and moon.

RECENT AMERICAN LINGUISTIC STUDIES.

IT is gratifying to note that the immense field of native American languages is finding cultivators in many countries.

Even in England, where so little has been done in this direction, a special fund has been raised called the 'vocabulary publication fund,' which prints and issues (through Kegan Paul, Trench, Trübner & Co.) short grammars and vocabularies of languages from MSS. in the possession of learned societies and individuals. The first printed is a grammar and vocabulary of the Ipurina language, by the Rev. J. E. R. Polak. This is one of the Amazonian dialects, and though we were not without some material in it before, this addition to our knowledge is very welcome.

From the same teeming storehouse of Brazil, Dr. Paul Ehrenreich has lately published in the Berlin *Zeitschrift für Ethnologie*, his excellent studies in the language of the the Carayas and Cayapos. They are practically new in matter and form. The Puquinas are a rude tribe who live about Lake Titicaca. M. Raoul de La Grasserie has lately issued (through Koehler, Leipzig) a number of old texts in their language; and Dr. Max. Uhle has collected considerable material in it as spoken to-day. Dr. A. F. Chamberlain, in the American Anthropologist for April last, analyzes a number of neologisms in the Kootenay language; while our knowledge of the remote and confusing dialects of the Gran Chaco has lately been notably increased by the activity of the Argentine scholars, Macedo and Lafone-Quevedo, in editing from rare or manuscript works the notes collected by the early missionaries.

AMERICAN ONOMATOLOGY.

THE study of the meaning and origin of geographical names has a higher purpose than to satisfy a passing curiosity. They are often the only surviving evidences of