Problems of the Development of Nerves," by Ross Granville Harrison. When the rudiment of the limb of a tadpole is transplanted it acquires after a time nerves which are connected with the nerves of the region of implantation. The nerves have the same arrangement and distribution as those of the limb in its natural position. This is the case even in limbs taken from individuals which have undergone their development after having been deprived of their nervous system and also in the accessory limbs which sometimes bud out from the transplanted appendages. The nerves in question are not preformed in the transplanted limb but they actually grow into it, their mode of distribution being determined by the structures within the latter. The development of an embryonic nerve ceases and degeneration sets in as soon as the connection with its ganglion is severed.

SOCIETIES AND ACADEMIES

THE GEOLOGICAL SOCIETY OF WASHINGTON

THE 193d meeting of the society was held on May 8, 1907, Vice-president Campbell in the chair and sixty-two members present. Under the head of informal communications Mr. F. E. Wright exhibited artificial crystals of silver, copper and diopside produced under various conditions in the Geophysical Laboratory of the Carnegie Institution of Washington and discussed briefly the bearing of the different modes of formation on the general theory of the precipitation of native copper and silver ores. Mr. Lawrence La Forge exhibited a new orthorhombic pyroxene found in a slag at Bingham, Utah. Although this mineral was found by Mr. Wirt Tassin, of the National Museum, to have the chemical composition of a normal calcium iron pyroxene, crystallographically it was found by Mr. La Forge to be orthorhombic but with the same prism angle within the limits of error as ordinary monoclinic pyroxene. Six different crystal forms in all were observed, the prevailing habit being that of an elongated square prism, termination either by the base or by an oscillatory combination of the base and a bracydome. An attempt was made to determine the optical constants but was unsuccessful because of the dark color of the mineral and shattered condition of even very small crystals. Two sections, however, were ground thin enough to determine the extinction, which was found to be parallel and the orthorhombic character thus confirmed.

Regular Program

The New Map of the Yosemite Valley: F. E. MATTHES.

This topographic sheet of the U. S. Geological Survey, about to be published, affords a particularly instructive example of modern detail mapping, in that it suggests possible criteria for the guidance of the topographer in the construction of maps which shall embody a scientific interpretation of the relief.

The value of a map as a means of representing land forms depends upon two factors: selection of scale and contour interval, and ability on the part of the map maker to express topographic character. The latter prerequisite will not be considered in this discussion. Thus far the factors which have been determinative in the selection of proper scale and contour interval have, as a rule, been: purpose for which the map is made; degree of cultural development of region mapped; cost per square unit; funds available, etc. Definite physiographic criteria have not yet been considered in this connection although the present state of physiographic knowledge is such that the attempt to apply physiographic principles to the mapping of land forms seems opportune and justified. Most topographic maps give little more than an imperfect, incomplete picture of the relief. Others again are overburdened with unnecessary, irrelevant details. Some actually amount to misrepresentations, even though they be the product of sincere and painstaking effort. The topographer is to-day and always has been more or less uncertain as to the matter of detail. Both in the selection of scale and contour interval, and in the actual field sketching he is at a loss to decide which of the smaller topographic units he must show, and which he must leave out. He needs, in short, criteria to guide him where to draw the line.

The new Yosemite map presents a rather complex problem. Instead of analyzing it and developing the criteria from it, it will be preferable for us to begin by stating the criteria first and then to apply them to the particular case of the Yosemite map.

A topographic map of any kind, because of its small scale, can not undertake to depict the configuration of the land surface complete in all its details. It is essentially in the nature of an abstract, a graphic epitome of the relief. Like any literary abstract, it may be quite brief and confine itself merely to the leading facts; it may be more extended and enter into more or less detail. But whatever its degree of elaborateness, the abridgment of subordinate detail should be evenly maintained throughout, and, above all, its treatment should be *complete so far as it goes*.

The main principle then is that a map must tell a story complete in itself. Its scale and contour interval should be so selected as to admit of the full delineation of every feature essential to the story. No irrelevant subordinate detail should be included if possible.

Some concrete examples may be helpful in illustration.

Let it be required to portray a mountain range in its entirety, with nothing further than its leading characteristics; say a long and narrow block range uplifted along one side, much dissected and enveloped at its base in a broad cloak of waste. These facts may successfully be epitomized by a map on a scale of 1:250,000 with 100 or 200 foot intervals, according to the relief. A smaller scale might leave some of the facts in doubt; a larger scale would introduce superfluous detail.

Again, let it be required to represent the general character of the sculpture of the range. Suppose the range to have been partially glaciated. The new map must be on such a scale as to allow of the distinction between the principal forms of glaciation and those of subaerial erosion. It should be large enough then to admit of the clear delineation of such forms as cirques, arretes, cols, U-canyons, etc., on the one hand, and the characteristic forms of stream and weather erosion on the other. These conditions may be satisfied by a scale of 1:100,000 and 100 or 50 foot intervals. It should be noted that this involves a grouping of the land forms into categories of a new sort. Each group constitutes the record of a certain event in the history of the relief of the range. Together the forms of such a group furnish an index of that event, and collectively they may be conveniently referred to as index forms. The index forms of one event are not necessarily all the product of one and the same process, in fact they seldom are. The index forms of alpine glaciation, for instance, include forms of degradation and of aggradation, and so necessarily do those of subaerial erosion.

If a map then is to tell a complete story, it must aim to show all the essential index forms of one certain event. If it falls short of this it tells the story incompletely; if its scale is such as to admit of subordinate features, the story is unnecessarily encumbered, and the additional cost of mapping is virtually wasted.

Finally, let it be required to make a map of a small portion of the range in question, in order to bring out the local happenings by which a certain feature is differentiated from others of a similar kind. For instance, in the glaciated portion of the range, a certain cirque or canyon may be found possessing decidedly aberrant characteristics. These, being due to local influences, require for their study a map showing the particular index forms in which the incidents due to these local influences may be read. Such a map is the new detail map of the Yosemite Valley (scale 1: 24,000). It aims to represent a glaciated canyon of exceptional form with sufficient detail to shed light on the cause of its aberrant character. Comparison with the standard Yosemite Quadrangle, published several years ago, is interesting in this connection. That sheet, drawn to a scale of 1:125,000, successfully expresses the general character of the sculpturing of the Sierra Nevada. It shows distinctly the glacial sculpture, on the one hand, and the non-glacial, on the other. It shows the Yosemite Valley together with a host of other glaciated canyons and valleys; but besides giving us an inkling of its unusual nature, tells us nothing except that it has glacial characteristics. The new detail map, on the other hand, depicts the Yosemite Valley, not merely as a glaciated canyon, but as a glaciated canyon in a region of unusual rock structure. It is a map giving index forms of differential erosion and cliff recession, and brings out the fact that the aberrant character of the Yosemite topography is intimately linked with the structural vagaries peculiar to the rocks of the Yosemite region.

Geology of the Canal Zone: ERNEST HOWE.

Passing from the Atlantic to the Pacific, the line of the Panama Canal traverses three well-defined topographic divisions. The first is that of the lower valley of the Chagres and includes the swampy lowlands that extend from Limon Bay nearly to Bohio. This division ends at San Pablo, about six miles below the point where the Rio Obispo enters the Chagres. The second division is that of the summit region and extends from San Pablo to Pedro Miguel, while the third lies between Pedro Miguel and La Boca, and like the first is low and swampy. The relation of these divisions to one another is well shown by the map of the proposed lock canal, the two regions of low relief being marked by artificial lakes while the summit region is traversed by the canal cut.

Although difficult to decipher, on account of the deep covering of red clay and vegetation, the geology is itself quite simple. The oldest rocks of the region are andesitic breccias that occur in the central area between Mamei and Empire and again in the higher hills northeast of Panama. Northward sedimentary rocks occur resting on the older igneous mass and gently inclined toward the Caribbean, so that in passing from the interior toward Colon successively younger beds are encountered. They are well stratified and contain abundant fossils of early Tertiary age. Nearly the same conditions prevail on the Pacific side. On both sides are stratified deposits of acid pyroclastics, the most conspicuous being near the city of Panama. Dikes and large cross-cutting masses of augite-andesite or basalt have invaded all of the older sedimentary rocks, and occur in great abundance in the southern and central parts of the zone; they represent the last phase of active vulcanism in the region.

With the exception of beds of heavy conglomerate in the vicinity of Bohio, all of the sedimentary rocks of the Isthmus consist of argillaceous sandstones, greensands or fine sandy shales; limestones, except high up the Chagres River and in the neighborhood of Empire, are unknown. The rocks are well bedded with moderate northerly dips north of the central region, while the sediments south of the Culebra Cut are inclined in the opposite direction. The oldest beds are Eocene, while the youngest, found near Colon, are late Oligocene. The complete section is preserved only on the northern flanks of the isthmus. Excavation for the locks at Gatun will be in argillaceous sandstones of the early Oligocene throughout, and actual tests on the spot have shown that they are capable of withstanding pressures many times greater than those to which they will be subjected by the lock walls. The earth dam that will be thrown across the valley at Gatun will rest in part upon alluvial material filling a deep gorge cut by the Chagres in Pleistocene time. For more than 100 feet below the surface this alluvium consists very largely of fine blue clay and silt and will be entirely impervious to water. Foundations for the locks at Pedro Miguel will be in the sandy shales and sandstones of the Culebra beds of Eocene age, while the material at the lock site at Sosa at the Pacific end of the canal is massive augite-andesite. The dams at La Boca and Sosa will be of earth and will rest upon alluvial clays of the lower Rio Grande valley.

Recent Changes in the Ice Fields of Glacier Bay, Alaska: CHARLES WILL WRIGHT.

Mr. Wright described in some detail the recent remarkable general recession of the glaciers in Glacier Bay, Alaska. A summary of the geologic history of Muir Glacier was also given and the probable causes of its local advance and recession discussed. In this connection Mr. Wright emphasized particularly the choking and congestion at the valley outlets, as at the mouth of Glacier Bay and locally at Muir Glacier, and the consequent cutting off of warm tidal currents from the ice front. Under such conditions the ice front advanced rapidly, until later on partial removal of the barrier or sinking of the land, the tidal currents regained access to the ice fronts and inaugurated the present period of rapid recession. FRED E. WRIGHT, *Secretary*

DISCUSSION AND CORRESPONDENCE

DOUBLE-ENDED DRUMSTICKS

TO THE EDITOR OF SCIENCE: The impression was received by more than one person who visited the St. Louis Exposition, that one of the Filipino tribes gathered there used a double-ended drumstick, grasping it in the middle and beating alternately with the ends. Professor O. T. Mason, to whom I applied for light, has most kindly informed me that double-ended drumsticks are occasionally employed to produce variations in sound, the two ends being differently constructed. May I ask if any of the readers of SCIENCE can furnish me with the name of a Filipino or other tribe, who handles a drum-beater as above described? I may add that I am especially desirous of knowing of the existence of any photograph showing such a grasp.

H. NEWELL WARDLE

ARE BULLS EXCITED BY RED?

TO THE EDITOR OF SCIENCE: Is there any real evidence to the effect that bulls are excited by the color red? And how is it with other animals? According to the newspapers, a bull in Sunbury, Pa., charged a window in a millinery store containing an exhibition of red hats and wrecked the store. Is this merely a newspaper myth? X.

NOMENCLATURE OF THE CHIRONOMIDÆ

TO THE EDITOR OF SCIENCE: In 1899 Kieffer proposed *Ceratolophus* (*Bull. Soc. Ent. France*, p. 69) as a new genus of Chironomidæ (Midges) with '*femoratus* (Fabr.)' as type. In 1906 the same author reserved this name (Genera Insectorum. Chironomidæ) for a group not containing the type; he also placed '*femorata* Meig.' in two genera at the same time, viz.: *Palpomyia* (p. 63) and *Serromyia* (p. 65). Further, *Ceratolophus* was preoccupied in 1873 (Bocourt, Reptiles).

It is evident that the nomenclature of certain genera of the Chironomidæ is confused and it is a pity that many authors seem to think that thorough unraveling of the nomenclature is unnecessary, when monographing or revising. G. W. KIRKALDY

SPECIAL ARTICLES

SPECIFICATION OF DIAGRAMS IN APPLIED GEOMETRY

BY far the greater amount of weariness in reading geometric discussions comes, I think, from the needless labor of searching for and translating the letters describing a figure, into the symbols of the vectors. I have, therefore, been asking myself, whether a few simple rules might not be devised for drawing conventional diagrams, so as to quite eliminate quantities other than those used in the computation. The following plan has assisted me and may be worth remark.

Every vector or arrow is reckoned from a heavy black dot, which I shall call the *but*, to the barb.

When two vectors from the same origin are collinear, the larger vector should step around the barb of the shorter, in the same way in which electrical engineers represent insulated circuits which cross. Conventionally, therefore, a small semicircle, to be called the step-over, is drawn around the arrow point of the shorter vector, *r*, as in Fig. 1.

The barb is generally to be drawn *on one side* only, as in the harpoon, and the letter or specification of the vector placed near the barb and (when necessary for clearness) on the same side of the shaft with the barb and step-over. Where several vectors coincide the line may be thickened.

Right angles should be indicated by an arc joining the line. Other angles marked.