that the tetanus poison reaches the ganglia of the central nervous system, not by way of the circulation, but along the peripheral nerves.

YANDELL HENDERSON.

YALE UNIVERSITY.

SCIENTIFIC JOURNALS AND ARTICLES.

THE *Botanical Gazette* for November contains the following leading articles: G. T. Moore has published, with three plates, his second paper entitled 'New or Little Known Unicellular Algæ,' giving a detailed account of the life history of *Eremosphæra viridis*, and coming to the conclusion that for the present, at least, the genus should be classed with the Protococcoideæ; and also describing as a new genus a form which has been confused heretofore with *Eremosphæra*, and naming it *Excentrosphæra*. T. C. Frye has published, with one plate, an account of the development of the pollen in certain Asclepiadaceæ, his investigation having been suggested by the record that in certain members of this family there is no tetrad division. The development of the sporangium was found to be of the general type, the primary sporogenous cells passing over directly into pollen-mother cells; these latter divide in the usual tetrad manner, but subsequently through mutual adjustment the four spores are arranged in a linear series. Miss F. Grace Smith has published the results of a large number of observations upon the distribution of red color in vegetative parts in the New England flora. A general conclusion is reached that the statistical observations obtained fit no one theory of color in all particulars. Mr. George A. Shull has published, with illustrations, the results of observations upon 'Some Plant Abnormalities.' He records instances of fasciation in *Erigeron canadense* and *Echium vulgare;* abnormal foliage leaves in *Pelargonium* and *Hicoria*, and abnormal floral organs in *Lathyrus odoratus*, as well as in certain species of *Clematis*. Under the head of 'Briefer Articles,' E. B. Copeland has discussed Meissner's paper on evergreen needles, answering certain criticisms of the author, and presenting new observations; M. L. Fernald publishes a final paper upon the instability of the Rochester nomenclature, being an answer to papers of Messrs. C. L. Pollard, L. M. Underwood and N. L. Britton; and Charles Robertson has published a third set of observations of flower visits of oligotropic bees.

ANNOUNCEMENT has been received of the establishment of a new scientific journal entitled *Archivio Italiano di Anatomia e di Embriologia*, under the editorship of Professor Chiarugi, of Florence, already favorably known as the editor of the excellent little journal, the *Monitore Zoologico*. It is published with the cooperation of the professors of anatomy of Pisa, Padua, Sienna, Perugia, Ferrara, Genoa, Catania and Bologna. There has been a great awakening of anatomical and embryological study in Italy, but it has long been a matter of regret that although many important investigations have been published they have appeared in the proceedings of societies or in journals of very limited circulation, so that it has been very difficult for foreigners to secure access to this Italian work, much of which is extremely valuable. We shall, therefore, welcome a journal which will gather together and render more thoroughly accessible the results of anatomical and embryological research in Italy. The list of supporters of the new enterprise is a guarantee of its high character so that we may reasonably expect the new journal to rank as the equal of the best French and German journals. The subscription price for America is 31 francs, 50 centimes. The publisher is Luigi Niccolai, Via Faenza 44, Florence, Italy.

SOCIETIES AND ACADEMIES.

THE ANTHROPOLOGICAL SOCIETY OF WASHINGTON.

THE 322d meeting was held November 19. Dr. Walter Hough occupied the session with an account of the explorations among the ancient pueblos of northeastern Arizona, carried on by him last season. The paper was illustrated with maps and selections of artifacts from the two thousand specimens secured during the work. The paper was discussed by F. W. Hodge, J. D. McGuire, Hon. H. M. Baker, Mrs. Matilda C. Stevenson, and President W. H. Holmes.

The 323d regular meeting was held December 3. Mr. S. P. Langley presented a paper on 'The Fire Walk of the Tahitans.' Mr. Langley

gave an interesting account of his voyage to the Society Islands. A number of lantern views of the scenery of Tahiti, the natives, their houses and their arts, were thrown on the screen, accompanied by instructive remarks. The incidents leading up to the ceremony of walking over the heated stones of the taro oven were detailed and a series of instantaneous views on the screen showed graphically the fire walk in progress. Mr. Langley dissipated the mystery that has enveloped this startling ceremony since it was first described. Briefly, his investigations show that the volcanic rocks employed are non-conductors, and though very hot on the under surface, are cool enough above to be walked upon with bare feet.

The paper was discussed by Mr. Townsend, W J McGee and Walter Hough. A vote of thanks of the Society was tendered to Mr. Langley for his valuable paper.

Dr. John E. Walsh, of the Peary Relief Expedition, read a paper, entitled, 'The Eskimo, their Country and Habits.' Dr. Walsh gave an account of the environment of the northern Eskimo as affecting their mode of life, their dwellings and arts. He found no evidences of social organization or religion among these Arctic Highlanders beyond certain minor customs. Dr. Walsh's paper was favorably received. In reference to the tattoo marks of the women spoken of by Dr. Walsh, W J McGee discussed the kinship of the Eskimo, adducing evidence that these marks were for the purpose of indicating relationship. Dr. D. S. Lamb and Dr. Frank Baker remarked upon the series of Eskimo skulls presented by Dr. Walsh. These skulls are notably scaphocephalic. Dr. Walsh also exhibited a number of ethnological specimens from his collection.

Walter Hough.

PHILOSOPHICAL SOCIETY OF WASHINGTON.

The 541st regular meeting was held November 23, 1901. Dr. W. H. Dall spoke on 'The True Nature of Tamiosoma,' a fossil found in California in 1856 and described by Conrad. Its nature has been much discussed for nearly half a century and there has been great diversity of opinion as to its relationships. The speaker has recently acquired sufficient material to show that some former studies were based on broken specimens, and some on an inversion of the object. It is now clearly seen to be a barnacle.

Mr. J. F. Hayford discussed the question, 'What is the Center of an Area or the Center of a Population,' with especial reference to the general popular notion that the latter is the point which has as many people on one side of it as on the other. The difficulty with this definition is that the point varies according to the direction chosen; the only point that remains fixed, whatever fundamental directions are chosen, is that analogous to the center of gravity of an area; the sum of the squares of the distances from *this* center to all the elements of the area (or population) is a minimum. An ingeniously cut figure showed at a glance the absurdity of the popular idea. Mr. O. H. Tittmann read from an article written by Professor Hilgard in 1872 giving predictions on the movement of the center of population of the United States.

The 542d meeting was held December 7, 1901, Vice-President Gore in the chair.

Mr. Radelfinger presented a curious series that he had met with in differentiating a complex variable.

Professor T. J. J. See, of the Naval Observatory, presented the results of his recent measures of the diameters of the planets by daylight: the observations were made near the close of the day, when the sky was sufficiently lighted to prevent or at least to diminish the error from irradiation. Professor Campbell had made daylight measures on Mars in 1894, but all other published diameters are based on night work. The daylight observations are remarkably consistent, so that the speaker thought the results on Jupiter and Saturn might be relied on to 1 part in 1000. All the results are sensibly lower than former measures gave, *e. g.*, Jupiter, 38″.40 by night, 37″.65 by day; Neptune, 2″.25, and 2″.00, respectively. The densities of the planets as computed from these new values of the diameters are much increased. Similarly the diameters of Jupiter's satellites and Titan were measured. (The paper will appear in the *Astronomische Nachrichten.*)

Dr. A. F. A. King read a paper on the 'Etiology of Intermittent Fever,' in which he discussed *sunlight* as a factor in promoting sporulation of the malarial parasite, which he maintained would not take place in continued darkness. Hence 'chills' do not occur at night; races with non-translucent skins are immune; sunshine increases fever, cloudiness decreases it; spontaneous cures were explained by the shade of hospitals; the red light of the blood promoted the vital activity of the parasite, violet light restricted it, hence the cure by Prussian and methylene blues; quinine cured by its fluorescence accentuating the violet rays. (The paper will appear in the *American Journal of Medical Sciences.*)

CHARLES K. WEAD,
Secretary.

BIOLOGICAL SOCIETY OF WASHINGTON.

THE 344th meeting was held on Saturday evening, November 30.

William Palmer read some extracts from an illustrated article in one of the Sunday papers, on the alleged occurrence of toads in solid rock, and exhibited plaster molds from which some of the illustrations had been made. One of these molds, made over a dead frog, appeared in the picture labeled, 'a mold in which a frog lived for four days,' while the cast of a salamander was figured as 'a salamander emerging from a plaster mold in which it had remained for several days.'

E. W. Nelson presented a paper entitled 'A Naturalist in Yucatan,' describing the country and its flora, touching also on the ruins at Chichenitza, Uxmal and other points. The little known east coast was partly explored and Cozumel Island visited during Mr. Nelson's trip, and a number of colored lantern slides illustrated some of the most interesting features of plant and animal life observed.

H. J. Webber spoke of 'Strand Flora of Florida,' illustrating his remarks with many views of both the eastern and western coasts and describing the manner in which certain plants aided in forming sand dunes, and others such as the mangroves, in making small islets which later on were added to the mainland. The characteristic plants of various portions of the coast were noted, and the speaker drew attention to the marked difference shown by some plants, the grape nut for example, according as they grew inland or were exposed to the salt winds from the ocean. F. A. LUCAS.

THE AMERICAN CHEMICAL SOCIETY, NEW YORK SECTION.

AN unusual degree of interest has been manifested in the work of the Section during the present season. Very full programs have been offered at every meeting, and the attendance has been unprecedented. It has been necessary to hold a special meeting in order to dispose of the great number of available papers, and other special meetings will probably have to be held in the spring. The membership of the Section has increased steadily, and is now over four hundred and fifty. The committee to secure funds for the endowment of the research medal and for the encouragement of research among the members of the Section consists of Mr. Clifford Richardson, Professor C. F. Chandler, Mr. Maximilian Toch, Dr. Theron C. Stearns and Dr. William Jay Schieffelin. It shall be the endeavor of this committee to secure a large endowment fund and to suggest an appropriate name for the Section medal, as well as the detailed conditions governing its award. Since the last report of our meetings appeared in SCIENCE, the following papers have been presented:

Special Meeting, November 1.—Edmund H. Miller, 'On the Composition of the Ferrocyanides of Cadmium'; Marston Taylor Bogert and David C. Eccles, 'On the Production of the Imides of Succinic and Glutaric Acids by the Partial Hydration of the Corresponding Nitriles'; W. G. Lindsay, 'On a Colorimetric Method for the Estimation of Sulphur in Pig-iron;' Thomas F. Hildreth, 'On the Determination of Manganese in Spiegel'; John A. Mathews and William Campbell, 'The Alloys of Aluminium.' This paper was profusely illustrated by lantern photographs. It was presented in two parts. The first part being a review of recent work upon the constitution of alloys, with explanation of the nature of solid solutions, eutectics, pyrometric and metallographic methods of alloys, research, etc., the second part embodied the results of the re-

searches of the authors while in Professor Sir William Roberts-Austen's laboratory.

Regular Meeting, November 8. C. W. Volney, 'The Decomposition of Sodium Nitrate by Sulphuric Acid,' in which he showed that the reactions were much more complicated than has been generally supposed. Martin L. Griffin, of Mechanicsville, N. Y., 'The proximate analysis of the spent alkali liquor from the reduction of poplar wood for paper stock by the soda process, with a description of the method.' Mr. Griffin said that these liquors contain nearly 10 per cent. of acetic acid. The possible recovery of this great quantity of acid offers an interesting problem for chemists. Phoebus A. Levene's 'Preliminary Communication upon Gluco-Phosphoric Acid' was read by the secretary. William Campbell, of London, gave an illustrated talk upon his studies of the constitution of 'The Alloys of Copper and Tin.' Daniel D. Jackson, 'The Photometric Determination of Sulphates,' with exhibition of the apparatus. John A. Mathews, continuing his talk upon the constitution of alloys begun at the meeting of November 1, spoke upon 'Alloys and the Phase Rule.' This paper was illustrated with lantern diagrams and showed how the phase rule may be of use in explaining problems of equilibrium in such complex substances as alloys.

Regular Meeting, December 6. W. H. Birchmore presented an introductory paper, 'Notes and Studies on Molds and their Allies,' accompanied by an exhibit of many specimens. Professor Edgar F. Smith spoke on 'The Value of Electrolytic Methods in Chemical Analysis,' urging upon chemists their use or at least a fair trial of them. He contrasted the advantages of the electrolytic methods with the usual gravimetric methods. Professor Smith stated that twenty-five of the seventy elements could be conveniently determined in this way, and that more than one hundred and fifty separations were possible. Particular mention was made of the electrolytic determination of copper, mercury, bismuth, cadmium, molybdenum and uranium. He also mentioned a rapid electrolytic method for the oxidation of sulphur in natural sulphide minerals, by means of a current of ten or fifteen volts and one ampere. The sulphide is mixed with fused caustic potash in a nickel crucible which is made one of the electrodes, and a stout rod dipping into the fused caustic alkali is the other electrode. Fifteen minutes serves to oxidize completely the sulphur in pyrites, and most other natural sulphides require less time. Professor Wilder Bancroft read a paper upon 'Analytical Chemistry and the Phase Rule Classification.' Dr. Francis G. Benedict, in a paper upon 'Some Aspects of Ventilation,' gave experimental evidence to show that the high temperature and excessive humidity of expired air is a more potent factor in producing discomfort among those who have to breath it, as, for example, the inmates of a crowded and ill ventilated room or hall, than is the presence of a high percentage of carbonic acid. The experiments were made with human subjects in Professor Atwater's laboratory, and the results are interesting in that they are very much opposed to general ideas upon this subject and to the results which have been published by previous experimenters as well.

JOHN ALEXANDER MATHEWS,
Secretary.

THE NORTHEASTERN SECTION.

AT the last regular meeting of the Section held on November 19, 1901, the following officers were elected for the year 1901–1902: President, L. P. Kinnicutt; Vice-President, Charles R. Sanger; Treasurer, B. F. Davenport; Secretary, Henry Fay.

Professor A. A. Noyes addressed the Society on the 'Importance of Catalytic Agents in Chemical Processes.' The lecture was illustrated by numerous experiments, and was discussed under the following headings: (1) Catalytic Action in which the Catalyser Combines Temporarily with one of the Reacting Substances. (2) Catalytic Action by Absorbent Contact Agents. (3) Catalysis by Electrolytic Agents. (4) Water as a Catalyser. (5) Catalytic Action of Acids, Bases and Salts. (6) Catalysis by Enzymes. (7) Colloids.

At the next regular meeting to be held December 17, Professor C. F. Chandler will address the Section on 'Electro-Chemical Industries at Niagara Falls.' HENRY FAY,
Secretary.

THE LAS VEGAS SCIENCE CLUB.

THE usual monthly meeting was held November 12. Mr. Cockerell briefly reviewed the work of the members during the past summer. At the end of June the top of the Las Vegas Range (11,000 feet) was revisited, and a considerable collection was made, including a number of species of insects new to New Mexico. The insects of this collection are now being recorded in *Psyche*. Mr. Cockerell exhibited two stone spear-heads, which he found on the top of the Las Vegas Range. Seven members of the club spent a part of the summer on the coast of California, where special attention was paid to the Mollusca. Mrs. Cora W. Hewett exhibited a series of shells which she had collected at Coronado, Point Loma and La Jolla. Mr. Cockerell exhibited the internal shell of *Tethys* (*Neaplysia*) *ritteri*, a new species which he found at San Pedro, and named after the director of the University of California Marine Station at that place. This *T. ritteri* was about 21 cm. long, and differed from *T. Californica* in wholly lacking the bars of white and dark brown on the inner surface of the swimming lobes, these parts being of a pale seal green; it also differed in having oblique, flame-like, blood-red markings on the sides of the body. Outside of the Mollusca, some study was made of the insects of the California coast, and several new species of bees were obtained. Mrs. Cockerell found at San Pedro the hydroid *Aglaophenia octocarpa* Nutting, new to the United States.

Mrs. W. P. Cockerell described how she had succeeded in obtaining the eggs of *Argynnis nitocris nigrocærulea* at Beulah. The larvæ which hatched from them had gone into hibernation without feeding. A communication by Mr. Cockerell and Miss Mary Cooper on the genus *Ashmunella* was presented, and a series of the shells was exhibited. The most interesting was a new species, proposed to be called *Ashmunella antiqua*, found fossil in the Pleistocene beds of Las Vegas, N. M. It resembled in most respects *A. thomsoniana*, but wholly lacked the parietal tooth. Miss Ada Springer exhibited the vertebra of a bison which she had found in the charcoal zone of the Las Vegas (Arroyo Pecos) Pleistocene.

Mr. Emerson Atkins showed a series of drawings of the mouth-parts of wasps and bees. The series indicated an evolution from the type with six-jointed maxillary palpi and four-jointed labial palpi, the joints in each case about equal in length, to forms with five-, four-, three- or two-jointed maxillary palpi, and labial palpi with the joints much elongated and very unequal. It was remarked that the maxillæ increased in size, while their palpi diminished. Mr. John McNary communicated a series of drawings illustrating the venation of the middle of the tegmina in various genera of grasshoppers, viz., *Trimerotropis*, *Leprus*, *Arphia* and *Dissosteira*. It was possible to recognize the same veins as are found in the upper wings of Lepidoptera, but whereas in the Lepidoptera they are very constant and very useful for generic classification, in the grasshoppers, which are more primitive insects, they are found to be extraordinarily variable. If one were to depend on the venation for generic characters in Orthoptera to the same degree that one does in Lepidoptera, *Trimerotropis laticincta*, for example, could be split into three genera.

T. D. A. C.

THE TEXAS ACADEMY OF SCIENCE.

THE first regular meeting of the Texas Academy of Science for the present academic year was held in the chemical lecture room of the University of Texas, at Austin, on the evening of October 26, 1901, when Professor J. C. Nagle, of the Agricultural and Mechanical College of Texas, the newly elected president of the Academy, presented his inaugural address on 'The Influence of Applied Science.'

"My purpose," he said, "is to touch upon a few only of the general features of the world's progress, in which applied science has been an aid not only to material development, but to researches in pure science as well, and to suggest, if possible, some means by which the workers in applied science may be brought to contribute more largely towards advancing the purposes and aims of the Texas Academy of Science."

Continuing, the speaker said: "If the recorded history of the world's progress in thought and material prosperity for the last

two thousand years be roughly divided into two parts—the latter one dating practically from the beginning of the nineteenth century—and if the causes making for the amelioration of man's condition during these two periods be examined, we shall see that a single century of applied science has done more for the world's direct advancement in enlightenment, tolerance and real culture, as well as in material progress, than was accomplished in the preceding nineteen hundred years. Furthermore, a comparison of the opportunities and advantages possessed by man at the beginning, the middle and the end of the nineteenth century will show how much the rate of progress was accelerated during the latter half of the century, and if, judging by this, any prediction for the future may be ventured, we may gain some faint idea of the place applied science is destined to fill in the next fifty years."

Among the subjects dwelt upon somewhat in detail were astronomy, physics, especially electricity, civil engineering, chemistry and biology, with special reference to bacteriology. This address will appear in full in Part II. of Volume IV. of the *Transactions* of the Academy soon to be published.

The second meeting for the year was held on November 22. Mr. T. U. Taylor, professor of applied mathematics in the University, read an abstract of his report to the Hydrographic Division of the United States Geological Survey on the 'Water Power of Texas.' In this report he treats of the water power of the State, both existing and prospective, with special reference to that of the following rivers: Pecos, Devils, San Felipe, San Antonio, Guadalupe, Comal, San Marcos, Colorado and tributaries, Brazos and tributaries. The potential water powers at Llano and Marble Falls are considered in detail, and the latter is pronounced as having the grandest possibilities of any place in Texas. Llano and Marble Falls are in the heart of one of the finest granite regions of the country, and every unit of power could be made to pay in that industry alone.

A translation of a part of the introduction to Dr. Ferdinand Roemer's 'Kreidebildungen von Texas,' by Dr. Frederic W. Simonds and Edmund Wild, was read by the latter. 'Die Kreidebildungen von Texas' contains observations upon the geology of the State made fifty years ago. It is, in fact, the foundation of Texas geology, and won for its writer the title 'Father of the Geology of Texas.' This work has been a fruitful source of inspiration to later writers upon the geology of this region, and it is now the intention of Messrs. Simonds and Wild to make it accessible to all by means of a carefully prepared English translation.

The midwinter meeting of the Academy will be held simultaneously with that of the State Teachers' Association in Waco during the holiday recess.

Frederic W. Simonds,
Secretary.
University of Texas.

The Boston Society of Natural History.

At the meeting of the Society, held November 6, 1901, Professor William Morris Davis spoke on 'River Terraces in New England,' with a view to supporting a recent theory to account for the successive stair-like terraces with concave fronts found in many New England valleys. A buried ledge of gradual slope encountered by a meandering stream in its sidewise swingings, throws the stream to one side, and prevents its further cutting action at that point. When the stream, in subsequent swinging across the valley floor, returns once more to the attack, it encounters the ledge at a lower level, and is again turned back; thus the terraces as formed are protected from erosion.

At the meeting of November 20, 1901, Professor E. S. Morse presented the results of his researches on living Brachiopoda. He gave an account of the habits of *Lingula* and *Glottidia* and called attention to their marvelous vitality. He described in detail the structure of the leading forms and announced for the first time the œsophageal glands in *Lingula*. A correlation was shown between the presence or absence of setæ and the development of the pedicle; the errantian forms and those moving freely on the pedicle having the setæ greatly developed, those more restricted in their motion having shorter and fewer setæ, while those with lower valve fixed to the rock, such as *Mergerlia*, *Crania*, etc., are without setæ. In the young of all forms studied, the setæ were present, and of great

length. The cœcal tubes, which Dr. Sollas has shown to be probably organs of tactile impression, were wanting in the errantian forms, more or less abundant in those moving freely on a fixed pedicle, and in those fixed by the lower valve, abundant, and in *Crania* even branching. He described the external glands of *Terebratulina*, as well as the strand-like bundle of sperm cells. He insisted that the Heart of Hancock was not a pulsating organ, and was inclined to believe that the 'accessory hearts' were genital in their nature.

GLOVER M. ALLEN,
Secretary.

DISCUSSION AND CORRESPONDENCE.

CONNECTICUT RIVERS.

IN the issue of SCIENCE of November 29, 1901, Professor W. M. Davis reviews my paper on 'The River System of Connecticut' (*Journal of Geology*, IX., 1901, pp. 469–485) and expresses his doubt respecting the principal thesis of the paper; namely, that Connecticut rivers betray by their orientation a controlling influence of joint or fault planes. The subject of stream orientation is a large one and the explanation offered a somewhat new one for American rivers at least. The thesis is one not easily demonstrated as respects the larger area treated, and the review seems to me to be in the main an eminently fair one. From it I infer, however, that my paper may in some particulars be susceptible of misinterpretation, and, therefore, take this opportunity to correct certain impressions which appear in the review, so as, if possible, to prevent further misunderstanding.

If I have omitted to speak at length of the particular controls of stream orientation other than by joint and fault planes, it has not been because I would ascribe little importance to them, but because in a general paper dealing with a special kind of control it was obviously impossible to treat all at length. On page 474 it was stated:

"It is not to be expected that the actual course of a stream will now be coincident with or even absolutely parallel to any fault direction, for there have unquestionably been many local conditions which have produced larger or smaller migrations of the river channels. Their general direction has, however, it would seem, been maintained despite the minor accidents which have marked their life histories, and even under so revolutionary a change as complete reversal of drainage."

I should certainly agree with Professor Davis when he says that, "it is inherently improbable that the Pomperaug fault lines possess an extension all over the State in systems so rigid as are here postulated." And it was a matter of some surprise to me when the natural trough lines were found in so many instances to correspond to known fault directions of the Pomperaug Valley. Some explanation of this may, however, be found in the fact that the lines noted for the master streams of the State correspond in direction, not to the prevailing faults in the Pomperaug Valley, but rather to the exceptional ones. In the Shepaug Valley immediately adjacent to the Pomperaug, however, the only control observable is from the four directions of faulting which *prevail* in the Pomperaug Valley. It is my anticipation that when the theory is applied in detail to the broader area of the Connecticut Valley, and the directions of streams carefully compared with the directions of the actual *minor* as well as major faults of that Newark basin, a control will be recognized to have gone out from the planes of faulting. That the directions which were discovered in the Pomperaug Basin will be found to be the only ones I do not of course expect, and it is quite likely that in certain areas they may not appear at all. That an elaborate system of joints and faults, analogous to that of the Pomperaug Valley exists and is accountable for the zigzag outlines of the trap hills scattered over the Connecticut Valley seems to me, however, hardly to admit of doubt. That such a system ceases to exist beyond the border of the Newark is, in my view, inherently improbable.

I should be the last to wish to push the theory of control of streams by fault and joint planes beyond what the facts warrant. In the Pomperaug Valley itself the faults supposed to control the drainage were in the majority of instances discovered. In the near-lying area, *e. g.*, the Shepaug river basin, where the rivers adhere to the four prevailing fault directions of the Pomperaug Valley, this explanation seems