liver cells, but there is no answer to the meaning of the differences.

The work as a whole is a valuable treasure-house of knowledge that will save both investigator and student much time and labor. The author does not state which system will form the subject of the next volume, nor when we may expect it to appear. At the same rapid rate of work it will be due in 1902, and we feel sure that the same excellence will be maintained.

B. F. Kingsbury.

RIVER PROFILES.

An interesting and valuable publication of the Department of Hydrography of the U. S. Geological Survey on the profiles of rivers in the United States, by Henry Gannett, has just been published and is now available for distribution. It embodies within a hundred pages the leading facts of about one hundred and fifty of the most important rivers and streams of the country, noting their length, drainage area, the location of water power in their courses, their peculiarities of flow and the nature of their drainage basins.

The rivers selected are those which are the largest in size and bear most directly upon the varied interests of the country such as the Connecticut, Hudson, Susquehanna, Ohio, Potomac, Mississippi, Missouri, Platte, Colorado, Sacramento, Columbia and others. The figures for the table showing the height above sea-level and fall per mile were collected from various sources. Some were obtained from the report of the chief engineer of the U. S. Army, some from railroad companies when their lines cross the streams and some from the atlas sheets of the U. S. Geological Survey. In the case of such rivers as the Connecticut, Susquehanna, Mississippi and Colorado, where the surrounding country is in part or whole of peculiar physiographic interest, very excellent and vivid descriptions of its leading physical characteristics are given, which add to the interest, and render it valuable from an educational standpoint in geographic and physiographic instruction. The pamphlet is the result of much careful work and is the first attempt to collect and compile this information in its present form.

SOCIETIES AND ACADEMIES.

ZOOLOGICAL CLUB, UNIVERSITY OF CHICAGO. WINTER QUARTER, 1901.

I.

The first meeting of the quarter on Jan. 9 was devoted to a paper by Professor F. R. Lillie, entitled 'A Comparison of the Power of Regeneration in Three Genera of Planarians, viz., *Planaria*, *Phagocata* and *Dendrocœlum*.' The following is an abstract of the paper:

"The greater part of the large volume of recent work on regeneration of planarians has been carried out on a single genus, *Planaria*. Attention should be called to the importance of the comparative method in studies of this kind. This may be illustrated by some results of observations on two other genera, *Phagocata* and *Dendrocœlum*. These three genera are found living together in a single pond in Falmouth, Mass. *Planaria* is especially abundant in this pond, in some parts of which as many as twenty or thirty individuals may be found on the under surface of a single large stone. Scattered about among these individuals one finds usually from one-half to one-third this number of individuals of *Phagocata* and two or three specimens of *Dendrocœlum*. *Planaria* is thus much more abundant than *Phagocata* and the latter than *Dendrocœlum*. The last is more abundant relatively in portions of the pond where there is a large amount of vegetation growing on the bottom. The habits of life of the three genera in question are, however, very similar.

"*Phagocata* was found to resemble *Planaria* very closely both in the modes of, and capacity for, regeneration. *Dendrocœlum*, however, offers the greatest contrast to both *Planaria* and *Phagocata*. The first experiment was to cut a single specimen in half through the pharynx. The cut surfaces healed and the farther fate of the parts was as follows: The posterior part formed no new tissues, although it lived for some days; from the anterior part, on the other hand, there grew out a pointed piece, which acquired the characters of a tail. Two weeks after the operation this piece also died without any extensive remodeling of the whole having taken place. I afterwards repeated the ex-

periment several times with a similar result. Thinking that the failure to regenerate a head might be due to the presence of the pharyngeal pouch, I then cut fourteen specimens transversely behind the pharynx. Two days after the operation an interesting difference in the reactions of the anterior and posterior parts was noticeable. While the former reacted in all respects like normal individuals, the latter showed no definite reactions of any sort but remained scattered over the bottom, some with the ventral surface up. In six days all the posterior pieces were dead without having shown any signs of regeneration, while all the anterior pieces, kept in the same dish, were living and regenerating new tails. This experiment was afterwards repeated with similar results, and I soon became convinced that, in this form, while a tail might regenerate at any place from the pharynx back, a new head could not be formed in this region of the body.

"The question was now, could a new head be regenerated in front of the pharynx? So specimens were cut in two immediately in front of the pharynx. The result of these experiments was that, while a very narrow border of new tissue might be formed at the cut border of the posterior piece, there was never any regeneration of even the semblance of a head. The anterior pieces, on the other hand, regenerated a new tail as before, and also a new pharynx.

"In the next experiment the heads of five individuals were removed by a transverse cut just behind the eyes. The heads did not regenerate, but in five days it was apparent that the decapitated pieces were regenerating new heads; in one piece the eyes could already be seen. On the next day eyes had appeared in all. The capacity for regeneration of a head was thus demonstrated.

"Two questions now remained: Was the regeneration of a new head due to the size of the piece, or to the position of the cut? and how far back does the capacity for regeneration of a head extend? The first question received a very simple answer; the head was first cut off just back of the eyes, and then from the anterior end of the major piece a small transverse piece was cut. In six days a rudimentary head with eyes developed on the front end of the small piece in one of three specimens.

"How far back does the capacity for regeneration of a head extend? We have seen that it cannot be formed from tissue just in front of the pharynx, but that it can be formed just back of the eyes. Twelve specimens were cut transversely about half way between the front end of the pharynx and the anterior end of the body. The reactions of both parts were perfectly normal, though the headless parts reacted much less rapidly than the parts with heads. In seven days both parts were rapidly regenerating and eyes had appeared in the headless parts; in the head-bearing parts the new pharynx was regenerating in the new tail. Both kinds of parts then completed the regeneration rapidly, though even after nineteen days the normal proportions were not restored.

"Thus in *Dendrocœlum* new tissue may grow out in the form of a tail at any transverse level of the body, excepting only the most anterior part to a very short distance back of the eyes; the capacity for regeneration of a head, however, is limited to the anterior third or fourth of the body. I do not mean to assert that the formation of a new head back of this level is completely impossible. Some one may at any time demonstrate, by taking suitable precautions, that a new head may be formed back of this level. But it is shown very clearly by these experiments that the power of regenerating a new head is largely, if not entirely, confined to the prepharyngeal part of the body in *Dendrocœlum*, and that it is always greater at any more anterior transverse level.

"Thus it is demonstrated that in *Dendrocœlum:* (1) The power of regenerating a head is limited to a small part of the body. (2) That a new tail may be generated at any transverse level. (3) That the capacity for remolding degenerating parts into normal proportions is very limited. (Limitation of 'morpholaxis,' Morgan.) (4) That there is a relation between the power of regeneration in this form and the power of performing the usual coordinated movements, the latter power always being slight in parts incapable of regeneration. This

last fact leads me to think that the nervous system plays an important part in regeneration of planarians. A paper, soon to appear, will deal more fully with these facts and the interpretation of them.''

At the second session of the Club, held on January 23, Miss Elizabeth Meek gave the results of a statistical study of variation in the mandibles of the stony-beetle. An abstract of this paper has already appeared in Vol. XIII. of Science.

C. M. Child,
Secretary.

TORREY BOTANICAL CLUB.

At the meeting of the Club on May 14, 1901, the scientific program was as follows: Professor Underwood spoke on 'The Genus *Pteridium*,' the type of which is the widely distributed and well known *Pteris aquilina* of Linnæus. It was separated from the genus *Pteris* by Gleditsch in 1751, followed by Scopoli in 1760. The principal generic character as distinguished from *Pteris* is the presence of a double indusium. Specimens of various species, varieties, and forms were shown, including extremely large specimens of *Pteridium aquilinum* collected by the speaker in southern France. Three species may be recognized in North America. The first of these is the common and variable *Pteridium aquilinum*, of which the recently described variety *pseudocaudatum* Clute is more or less common from New Jersey southward. The second species is *Pt. caudatum*, found in the extreme tropical of Florida. The third, which occurs in the West Indies, seems to be identical with a species originally described from Brazil, though it has been confused with a species from the Society Islands. Species from South Africa, India, and the Hawaiian Islands were also mentioned.

Dr. D. T. MacDougal gave an account of 'Carpotropic Movements of Flowers,' taking his illustrations from plants in bloom at the time. The two classes of movements of flowers are the induced or protective and the developmental or automatic. Of the former, the wild carrot furnishes a good example, its umbels being erect during the day and pendent or inverted at night. The segments of the perianth of the tulip also furnish a good illustration of movements induced by changing conditions of temperature.

Developmental movements, *i. e.*, those due to forces which originate within the plant, are well shown in the inflorescence of *Allium Neapolitanum*. The inflorescence here is nodding when in the bud, but the development of the flowers sends a stimulus to the curved portion of the peduncle, causing it to straighten. In addition, the plant is provided against accident by the fact that each pedicel has the power of independent movement. Each pedicel will bend so as to erect the flower if the peduncle is prevented from straightening. Under normal conditions the pedicels take positions separating the flowers equally. In *Claytonia Virginica* the buds are nodding, the flowers erect. After fertilization, there is another curvature, more abrupt and nearer the base of the pedicel. In *Streptocarpus*, the flower-stalk is curved and somewhat coiled in the bud, while the open flower is horizontal, bending the stalk at a right angle, and after fertilization the maturing fruit becomes erect. The movements of the fruit, in many cases at least, are for the better dissemination of the seeds, and the movements of the flower are commonly connected with methods of fertilization. Dr. MacDougal referred also to the curious development of the cotyledons in *Streptocarpus*. One of the cotyledons ceases to grow after a time, while the other elongates very much. In one species, this cotyledon remains the only foliage of the plant.

Dr. N. L. Britton gave an account of 'An Undescribed Species of *Stachys*.' He remarked that many North American species were until a few years ago referred to the *Stachys palustris* of Europe, but have more recently been recognized as distinct. A plant which grows on the sand hills along the beach near New Dorp, Staten Island, is really very different from the European *S. palustris*, and may safely be considered a new species. It has been collected in Michigan by Mr. Farwell and a specimen from Illinois is in the Chapman Herbarium. The species is apparently confined to sandy shores.

M. A. Howe,
Secretary pro tem.

THE MINNESOTA ACADEMY OF NATURAL SCIENCES.

THE April meeting of the Academy, which proved to be a very interesting one, was addressed by Mr. F. K. Butters, who spoke on the 'Fungus Flora of Minnesota.' The more fundamental relationships of the fungi were illustrated by slides, taken from Engler and Prantl's 'Pflanzenfamilien,' and also by original microphotographs of common minute Phycomycetes and Ascomycetes, as well as by a large number of photographs of the fleshy fungi of the locality, taken in the field to show their natural conditions of growth.

The speaker pointed out that the fungi are to be considered as one of the most successful groups of the plants, showed by their diversity of form, the great variety of conditions under which they will grow and their numerical importance. In Minnesota the number of species is probably in excess of the flowering plants. The diverse conditions under which fungi will grow, *e. g.*, in water, upon living plants and animals, on decaying organic substances, in humus and in sand containing a minimum amount of organic matter was illustrated. Attention was called to the fact that on account of the great number of spores produced wherever there is suitable environment there also will be numbers of plants. The diverse forms of fungi are modifications of a few types to be regarded as distinct phylla and parallel lines of development sometimes exist in different groups.

The lecture was productive of a very general discussion of local fungi and was greatly enjoyed by the large audience present.

F. G. WARVELLE.

DISCUSSION AND CORRESPONDENCE.

GEOLOGY OF CHINA.

TO THE EDITOR OF SCIENCE: In the discussion in the last number of SCIENCE of my article in *McClure's Magazine*, there are some things which deserve attention in order to get the facts fairly before the public.

1. It is proper for me to state that the title of the paper and the headlines were put in by the editors; so that I was in no sense responsible for them. I think that in the article itself there are no offensive claims to original discovery.

2. The quotation from Geikie's 'Great Ice Age' (p. 699) is unfortunate for my critic, since it was that very quotation which misled me during a considerable portion of my trip. In this quotation Geikie says, "Its materials [those of the loess], we may believe, are largely of *fluvio-glacial* origin, and represent in great measure the flood-loams swept down from the mountains and plateaux when these supported extensive snow-fields and glaciers. But, as Baron Richthofen in his great book on China has demonstrated, the loess, as we now see it, owes its structure and heaping up to the action of the wind, and is even now forming and accumulating in many regions of Asia. It is, in short, a true steppe-formation." On page 697 Geikie had said, "According to Przevalski, undoubted traces of former glaciation are seen in the Suma-Hada range, west of Kalgan in China." My first point was to visit this mountainous region west of Kalgan supposed both by the Russian and by Geikie to be the source of the loess in Eastern China. But we found no indications of glaciation in that region, and pursued our investigations sufficiently to convince us that there were none; so that Geikie's theory of the 'fluvio-glacial origin' of the loess falls to the ground in that region. That came pretty near being a discovery.

3. On the same page Geikie says, "Kropotkin's researches have led him to conclude that the whole of the upper plateau of Asia and its border-ridges were under a mighty ice-cap." Assuming the truth of these statements, Geikie says upon the next page, "The mountain-valleys everywhere contain wide and thick sheets of rounded blocks, and coarse and fine gravel, which are in every respect comparable to the fluvio-glacial gravels of the Alps. But in none of the descriptions of these which I have read is there any clear indication as to whether the deposits occur in successive terraces like the high- and low-level terrace gravels of the Alpine lands of Europe. Something like this arrangement seems to be present in the valleys of the Thian Shan, and may possibly refer to recurrent phases of glaciation." In accordance