Moreover, such Carnivora, among modern species, will also devour the eggs and young of other Carnivora. Therefore the development of equally strong parental instincts in the Carnivora themselves would have come about in the same way. It is evident, that, in this manner, carnivorous animals of comparatively small size may have been the means of exterminating the largest and most powerful beasts and reptiles.

Among nearly all of the existing mammals and birds, the parental instinct is very remarkably developed in one or both sexes, usually more so in the female. Many species, now abundant, would soon become extinct if the parents did not have remarkable sagacity in protecting their young against numerous enemies. Many reptiles, fishes, insects, and still lower forms, also show wonderful maternal instincts. We cannot suppose that their ancient allies had these instincts in the same way, nor to the same extent. In many cases the enemies to be protected against are of comparatively modern origin. New modes of parental protection must, therefore, have been developed or acquired as new enemies appeared. The ways in which different species protect their young are exceedingly varied, as all naturalists know ; and many areas wonderful as any habits known among the lower animals.

The development of the powerful parental instinct for the protection and care of the young, in the earliest races of man, must have been of vital importance in man's struggle for existence in his primitive and comparatively helpless condition.

In fact, it is evident, that without this strong impulse, and the intelligence necessary to make it effective, neither man, nor any of the species of mammals belonging to the higher orders, could have existed, even for a short period.

Possibly the variations in the degree of development of the parental care, in different races of man, may be connected with the increase of some races and the extinction or decline of others. A. E. VERRILL.

LAKES AND VALLEYS IN NORTH-EASTERN PENNSYLVANIA.

H. D. ROGERS, many years ago, pointed out the connection between the lakes and the northern drift in Pennsylvania. In a recent report of the second geological survey,[1] Mr. White gives fuller information on this interesting question, and shows that the numerous ponds north of the Delaware Water-gap (forty-two are enumerated) are generally held in either drift-barrier or drift-enclosure basins, though the depth of some of them seems partly dependent on local erosion in soft shale. The largest is about two square miles in area, and nearly all are less than forty feet in depth. Their shape is generally round or oval; but Long Lake, a narrow expansion of Tunkhannock Creek, three miles long, is an exception to the rule; and, unlike the others, it stands just outside the so-called 'terminal moraine,' or margin of the glaciated area. Glacial action is not regarded as having effected great destructive changes in the pre-existing topography, except in the way of 'pushing or disrupting' rocks that were divided into blocks by joints. The corniferous limestone, especially, has suffered in this way; and its great bowlders, 'many of them as large as a good-sized house,' are strewn beyond its outcrop over a scored and polished surface of cauda-galli grit. It would be interesting to learn if such corniferous bowlders are limited to the glaciated district, and do not occur farther south as a result of simple weathering. All the larger valleys of this region contain modified drift, on which the streams flow without reaching the rocky bottom. In the Delaware and Lehigh valleys, this drift extends far beyond the limits of glacial action; but in the Schuylkill valley, which heads outside of the glaciated area, it is absent altogether (p. xvii.). At and above the Delaware Water-gap, the rocky channel is filled with drift to a depth of probably one hundred feet. All the line of outcrop of the Marcellus shale, from north of Rondout, N.Y., past Port Jervis, where the Delaware joins and flows along it, even beyond Stroudsburg, a distance of ninety miles, is an old, wide, deep valley, buried in stratified drift; but on passing out of the glaciated area, just south of Sciota, some distance after the Delaware turns southward through its gap, the same weak shale is occupied by a valley less than a tenth of its former width. It is therefore suggested that this buried valley was cut by streams under the ice of glacial times.

Narrow post-glacial channels of moderate length, cut in the rock by streams turned from their open pre-glacial valleys by drift-obstruction, are found at several points. The drift-filling of the old Sawkill is as much as three hundred feet deep; and the falls on its new channel are a result and mark of its recent adoption. Raymondskill Falls have the same cause. The Wallenpaupack takes a short cut of two miles, instead of following its old path of four miles, to the Lackawaxen, and, on its new course, has eroded a gorge seventy-five feet deep, ending in falls with a total descent of two hundred and sixty feet in a mile. Above the gorge, the stream meanders for ten miles over a broad, marshy flat, falling only half a foot to a mile, — the final stage of a lake that must have existed in the obstructed valley till the cutting of the gorge drained it. It is very plausibly suggested that all the cascades of this district "owe their origin to a similar diversion of their streams by the drift-dams thrown across their pre-glacial channels;" and we believe that this cause of gorge, ravine and cascade has a very general application in glaciated countries.

The greater part of the report following these introductory pages is devoted to a detailed description of the geological formations of the district.

Mr. Chance's surveys of the Delaware and Lehigh Water-gaps, in the same report, include fine illustration of these notable cross-valleys in contour-line maps and vertical sections; but their description is chiefly geological. It may be noted, that the disloca-

[1] G. 6. Geology of Pike and Monroe Counties, by I. C. White; Special surveys of the Delaware and Lehigh Water-gaps, by H. M. Chance. Harrisburg, 1882.

tion that determines the position of the Delaware Gap is regarded as warping or gentle transverse folding, rather than as a fault, as it has generally been considered (p. 338). The map of glacial striae included in this volume is constructed by Professor Lesley, from Mr. White's observations. It shows a general trend of striae S. 20 to 30° W., but with significant deflections on approaching Kittatinny and Pocono Mountains. A perched bowlder was found on the top of High Knob, 2,010 feet above tide, and glacial scratches were observed on Pocono Mountain at an elevation of 2,150 feet. W. M. DAVIS.

AN APPARENTLY NEW ANIMAL TYPE.

PROF. F. E. SCHULZE, who already ranks so high among zoölogists, has now another claim to distinction, through the discovery of an animal quite different from any thing hitherto known.

The animal was observed in the salt-water aquaria of the zoölogical institute at Graz. It is a thin plate, about 0.02 mm. thick, and only a few millimetres in diameter. It constantly changes its form. It is translucent, and grayish white in color. At rest it is rounded in outline, but may draw itself out into a long thread, which may so curl and twist, that it recalls a Persian or a Turkish letter. The movements are usually so slow as to be barely perceptible, as the animals creep along upon their under surfaces.

Microscopic examination shows that the whole surface of the body is ciliated. Close under the upper surface is a layer of highly refractile balls from 5 to 8 μ in diameter, and distributed pretty evenly. Besides these, there are other balls nearer the under surface, which seem to be essentially different from those first mentioned. There is no indication of internal organs, nor of only bilateral or radiate symmetry: the organism is uniaxial. Schulze names it the ciliated plate, Trichoplax, with the specific name adhaerens, because it clings so closely to the surface on which it is moving.

Such an organism one would expect to find related to the protozoa; far from it, for two different epithelial layers of cells form its upper and lower surfaces, and contain between them a fully developed layer of connective tissue. The upper epithelium is composed of large, flattened, polygonal cells: the lower epithelium, on the contrary, is composed of cylinder-cells, whose outer ends form a mosaic of small polygons, but whose inner ends terminate in processes that are lost in the connective tissue. This last, forming the middle layer of the body, consists of spindle-shaped and branching nucleated cells, which are probably contractile, and are embedded in a hyaline basal substance. The balls above mentioned are contained in large cells. There are, then, three layers, which from their relations would naturally be compared with the ectoderm, mesoderm, and endoderm of other metazoa; but the justification of this comparison must await a knowledge of the development of the organism.

Professor Schulze speculates as to the relationship of this creature, but finds it impossible to assign it to any known class. Although it has been watched for a year, no sign of metamorphosis or of reproduction has been observed; but Schulze thinks it possible that it may have multiplied in the autumn by division.

It seems to me that the animal bears a strong resemblance to a sponge larva. The surmise that it is the young of a porifer may be a useful hint for the further study of this singular form.

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THE COLOR-PREFERENCES OF THE HIVE-BEE.

DR. HERMANN MÜLLER, who does not accept the results of Sir John Lubbock's studies of this subject as very conclusive, has himself made a considerable number of observations in the same line (*Kosmos* for Jan.). Though too few to serve as a basis for very broad generalization, they give, so far as they go, a strong degree of proof to several points previously theoretical.

The colors experimented upon were not artificial, but actual floral colors, prepared for use by gumming fresh petals between two ordinary microscope-slides, care being taken that no protruding parts were left, and that the margin was sealed with gum-water, to prevent the possibility of any odor from the petals influencing the bees in their choice.

The bees to be observed were at first accustomed to visit uncolored slides, smeared with honey, exposed close by their hive, and gradually removed, in the course of several days, to a distance of twenty-six metres, where they were replaced by two slides of the colors to be compared, similarly smeared, and placed one decimetre apart. Each bee was marked on its back with an oil-color, by which it was recognized on its different visits. It was found later, that bees from distant hives, if caught on flowers a few steps from the place of observation, and transferred to the honeyed slides under a tumbler that had been sweetened in the same way, usually returned regularly.

In the different observations a number of marked bees were employed, both as a means of economizing time, and to compensate for the somewhat different preferences of individual insects. To eliminate the influence of location, the positions of the slides under observation were changed from time to time.

The general results reached are as follows: —

Leaf-green is less attractive to bees than the colors usually found in flowers adapted to pollination by them.

The colors of these, which may be conveniently called bee-flowers, are, without exception, preferred to fulgent colors, like the yellow of buttercups and the scarlet of some poppies, which usually occur in flowers open to a mixed circle of visitors, or adapted to humming-birds. The extent of their choice in each case may be seen from the annexed table; the figures indicating the relative number of visits, on a basis of 1,000 to each bee-flower color. (Table I.)

Fulgent colors are less attractive to bees than the neutral tint which precedes them in the development of the flower.

Bright yellow is less distasteful than other brilliant colors, but it is least acceptable of the colors found in bee-flowers. (Table II.)

Yellowish white and white are at least as attractive to Apis as many shades of purple, but less so than blue and violet. (Table III.)

Blue is preferred to the red of bee-flowers, or is at least equally acceptable, in the shades tested. Pure deep blue is even more attractive than violet. (Table IV.)

With the exception of blue, violet is more attractive than other colors experimented with. (Table V.)

Red, in the shades found in bee-flowers, constantly surpasses only yellow in its attractiveness for the hive-bee. It is equalled or surpassed by all other colors used for comparison. (Table VI.)