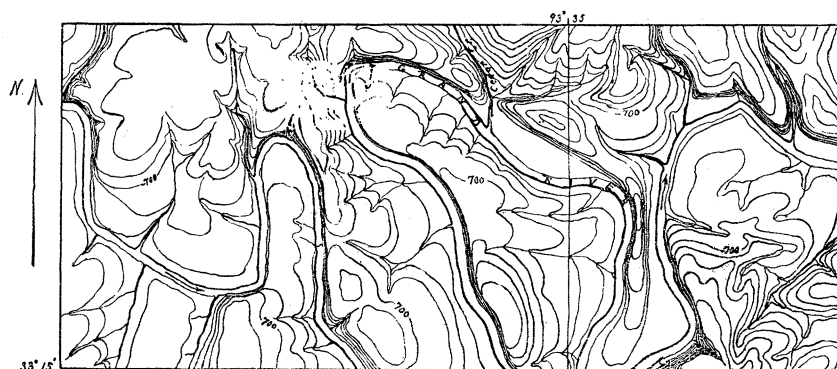


thin covering of the rocks of that formation; that these rocks were subjected to subareal erosion before and probably during the Pennsylvanian epoch and that coal-measure strata probably never covered the dome of the uplift; that since this time the region has been continuously above water level. According to this record the sculpturing of the topography must have been uninterrupted in progress from the end of the Paleozoic to the present time.

Professor Davis sees evidence in the character of the relief that denudation progressed to such a degree that the present upland was a lowland—"well into Tertiary time, and that the new trenches of the Osage and its neighbors were begun in consequence of an uplift somewhere about the close of Tertiary time"—as opposed to this conclusion we have the fact that the Ozark plateau is at present much above the limits which we recognize Tertiary seas to have reached. The altitude of the Tertiary margin of the Mississippi embayment in southeastern Missouri is under 400 feet A. T. The summit of the Ozarks is, however, as much as 1,700 feet above sea level and the greater portion of the upland is over 1,000 feet, and was consequently at least 600 feet above the Tertiary sea level. Could a country having this altitude above contiguous seas be in a base-leveled condition? Further, another fact to reconcile with this hypothesis is the finding of certain chert gravels fringing the Osage and other valleys of the Ozarks, not very high above the present channels of the streams, which we provisionally correlate with the Orange sands

pect certain peculiar features of topography to prevail. Thus, with a stream not yet at base level we should look for its channel to constantly hug the hill on that side of the stream which is impinged by the current; here we should expect to find bluffs developed and maintained; conversely, on the "lee" side of the stream, we should expect to find such flat alluvial plains as exist, with comparatively gentle slopes thence to the uplands. Further we should expect to find the points or promontories of uplands which are nearly surrounded by the loops of the river, sloping somewhat gradually towards their ends and not terminating in bluffs. These features are pronounced, in part at least, to a striking degree along the Osage. They are details which could not be brought out on the maps of the scale of those thus far made of the Osage country, but the constancy with which the stream clung to the bluffs on the impinging side was impressively seen during the recent trip along that river, while the form of the projecting uplands is well illustrated by the following copy of a portion of a map of Grand River, one of the tributaries of the Osage, recently surveyed by Mr. C. F. Marbut, of the Missouri Geological Survey. On the hypothesis advanced the precipitous slopes characterizing the upstream sides of the hills here shown are the result of the sapping action of the stream; the gradual slopes of the downstream sides are primarily a combined result of the lateral movement of the channel accompanying the expansion of the meanders, and of its downward movement by corrosion.

It is true that similar features would result with the trench of



Scale, 1 mile to 1 inch.

Contour-interval, 20 feet.

MEANDERS OF GRAND RIVER, A TRIBUTARY OF THE OSAGE.

of the Mississippi, of probable late Tertiary age. These imply the existence of such valleys with approximately their present phases in late Tertiary times. Still, as the correlation of these gravels is as yet confessedly quite hypothetical, this consideration cannot claim much weight.

Another hypothesis which has been thought by us to suggest an explanation of the sinuities of these streams, has gained some strength through the observations of a recent boat trip down the Osage River, from Osceola to its mouth. If we take the case of a stream with a slightly sinuous course and of considerable declivity, moderately incised in a nearly flat, or even in an undulating country of horizontal strata—such as might exist in a newly emerged land surface soon after its emergence—we can understand that meanders will tend to develop somewhat as they do in the alluvial plain of a stream which has reached base level. Where the current impinges sapping will increase the convexity and the sinuities will become more pronounced. Inasmuch, however, as the declivity of the stream is great, corrosion is still active and the channel thus sinks vertically at the same time that it moves laterally, and in this respect its development will differ from that of a channel in a base-leveled alluvial plain. As a natural result of this process we can see how the stream will eventually shape for itself a tortuous and steep-sided valley, with very narrow flood plains until the channel has reached base level, when corrosion will cease and lateral degradation will increase; then, swinging from bluff to bluff in a secondary system of sinuities, the stream will sap its bordering hills and widen its flood plains. If this explanation be a true one we should ex-

pect previously developed meanders in the manner suggested by Professor Davis; for we cannot conceive of a meandering channel sinking absolutely vertically. Lateral degradation and movement must always accompany corrosion and vertical lowering of the channel; if the meanders existed originally their shapes must have been modified to the present forms. Hence the effects cited would seem to be attributable to one of two causes, or to both combined. The question is whether one is not all sufficient; whether a previous base-leveled condition is a necessary assumption.

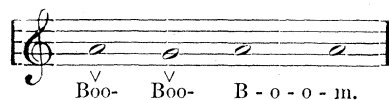
#### THE BOOM OF THE PRAIRIE CHICKEN.

BY T. A. BEREMAN, MOUNT PLEASANT, IOWA.

How many of your readers ever saw a prairie hen, or, as they are commonly called in the west, the "prairie chicken?" Doubtless many have seen dead ones, killed and shipped for the market, but I dare say that many of your younger readers, especially those living in the cities and towns, have rarely seen a live one. In 1945, when I came to Iowa, and for several years afterwards, they could be seen here in flocks of thousands together. But now there are only a few remnants of them left; here and there, in isolated fields, some dozen or two survivals have been permitted to remain. They are what is called the pinnated grouse of North America, and were formerly inhabitants of New Jersey, Pennsylvania and Kentucky, and all the western prairie country.

But at present I only desire to call attention to the matinee songs of this wild bird of the prairie. Some morning in the

month of April, when the sun rises clear and the air is crisp and frosty, go out upon the suburbs of a prairie town, away from the usual noises of the village, and listen. In a few seconds, if you can recognize the sound, you will hear, above everything else, the male birds go "boom, boom, boom." This is not a sharp, shrill cry, but a round, full, detonating cannon-like sound, which may be heard at long distances. It comprises three clear, distinct musical notes, corresponding with the "do, si, do" of the diatonic scale. The first two are quarter notes, and the last is drawn out to a full note, and even a prolongation of that. Probably some idea of it could be had from this representation:



This "booming" may be heard every spring along in March and April, and sometimes till May on clear frosty mornings about sunrise and for an hour or two afterwards; and for that reason I have sometimes from my own fancy called them "sun worshippers." It is worth an hour's walk to go out and see these birds when engaged in their booming orisons. As I have heard thousands of them booming at one time along in the forties and fifties, and have cautiously crept up to within a few yards of them when they were in plain view, let me try and describe them if possible.

The males have two neck tufts of feathers, two or three inches long, one behind each ear, and ordinarily they lie down close to the neck. Also on the sides of the neck and extending about two-thirds of the length of it, are two bare patches of skin capable of being inflated with air until they show out on either side as large as a small orange, and are nearly the color of an orange. Now, the proceeding is something like this: The bird stands unconcernedly among his companions for a minute or so, and then suddenly he spreads his tail to its fullest extent like a fan; his wings are spread and thrust down to the ground similar to a turkey gobbler's action; he walks around and about, rubbing his wing feathers upon the ground, his feet go patting alternately so rapidly you cannot count the motions, his head and neck thrust forward horizontally, the two tufts of feathers are erected like two great horns, the bare skins on the sides of the neck are inflated and then comes "boom, boom, b-o-o-m." This is repeated every few minutes for one or two hours in the morning, when no more is heard until near sundown in the evening.

#### A SILK-SPINNING CAVE LARVA.

BY H. GARMAN, LEXINGTON, KENTUCKY.

In the Bulletin of the Essex Institute, Vol. XIII., 1891, I described a singular larva from Mammoth Cave, which was compared with larvæ of the Dipterous genera *Sciara* and *Chironomus*, to which it bears some resemblance. Since this larva was discovered a lookout has been kept for other specimens in hope of learning something of the adult, but thus far no additional examples have been seen. My search has been rewarded, however, by the discovery of a second larva, very different from the first but in its way almost as strange. Evidently it is a related insect. I take it to be the young of some cave-inhabiting fly.

Large examples measure 12.5 millimetres in length by 1 millimetre in greatest diameter. The body is composed of twelve somites behind the head, very distinct from each other and gradually increasing in diameter from the first to the seventh, after which they remain constant to the twelfth, which is only about one-half the length of the preceding somite and not more than one-fourth its size. The head is very small, and is enclosed in a smooth and shining crust of a pale yellowish brown color. The body terminates in a double finger-like clasping organ.

On a visit to a small cave near Lexington, Kentucky, some months ago my eye was caught by a glistening thread on the limestone forming the side wall of the cavity, about four feet from the floor. Thinking it was the trail left by a spider, I began to follow it carefully, expecting by this means to come upon the insect. Instead of a spider this larva was found,—a translucent

slender thing which might easily have been overlooked even when one was engaged in following the thread upon which it lived. A touch was sufficient to put it in motion, then a touch at the opposite extremity would cause it to move backward with equal address. But nothing would induce it to leave the thread, and I have since learned that the heat from a burning candle applied to its body and destroying its life leaves it clinging to this fragile object. Not even spiders show such tenacity in retaining possession of their egg-cases, or webs, when in danger, and I infer that the welfare of this larva is intimately associated in some way with the silken path it makes along the face of the rocks. The thread is always occupied by a single individual, and may be a foot or more in length. I have found no examples nearer the floor than three feet.

The larva clings to its thread by means of pads provided with very minute chitinous asperities. One such pad occurs at the anterior ventral margin of the second, and another in the same position on the third, some. These form rather large transverse rounded folds of the skin, covered posteriorly with dark denticles in numerous short series. The fourth somite lacks the pad, but on the ventral side and anterior margin of each of the succeeding divisions is a pad of another form, these being broader but not extending so far up the sides. When creeping an undulatory motion passes along the body, the pads dragging it forward, the posterior appendage apparently aiding by seizing the thread.



The details of structure have not been thoroughly worked out. In a general way the head is like that of the larva described in the Bulletin in 1891, but the large ocellus-like smooth areas of the Mammoth Cave larva are not present in this, although I find smaller oval areas surrounded by black rims and accompanied by pigment spots, which appear to represent these structures. The mouth parts are much like those of larval *Sciara*. The palpi which project from the under side of the head spring from the maxillæ. In very young examples I can make out large ducts which convey a secretion of some kind (doubtless the material of which the silken fiber is composed) to the under side of the head. No outward trace of respiratory organs is apparent. Four dark-brown Malpighian tubules can be seen, through the body-wall, opening independently into the intestine.

On the dorsal middle line near the anterior margin of each of the somites 8 and 9 is a turret-shaped prominence, the nature of which I have not determined. The top is sometimes a trifle impressed as if there were an opening to a gland beneath the skin. They can not be stigmatal prominences, for these are always paired. A study of sections may yield an explanation of them.

The habit of living upon the side walls of the cave is probably a means of avoiding enemies. Few of the predaceous cave species would find the larvæ there. The only available food would seem to be occasional tallow drippings and the molds growing on them.

Silk spinning is not general among Dipterous larvæ, but the cave species is not peculiar in this regard. I suspect that the Mammoth Cave larva produces a thread also. Among ordinary Diptera the clover midge (*Cecidomyia trifolii*) occurs to me at this moment as an example of species which produce material in the nature of silk. It envelops itself in a rather tough papery cocoon when ready for pupation.

A VERY bright comet has suddenly appeared in the western sky, and is attracting attention from the unexpected manner in which it has presented itself. The object from present accounts was first seen on the 8th inst., by persons living in Utah and Wyoming. It is very bright, about of the second or third magnitude, and has a tail that has been reported to be from five to twelve degrees in length. The comet is moving very rapidly to the east, and the only orbit at hand, at present, indicates that it is now passing away from the earth and will diminish very rapidly in brightness.