

sents a very large and singularly deep excavation upon its internal surface quite characteristic of the genus." The articular surface of the condyle looks backwards instead of upwards. The angle of the jaw is elongated and thin.

The infra-orbital is large and bounded posteriorly by an osseous bar.

It will thus be seen that, in those families of higher forms which compose the first group, the jugal arch presents a typical formation.

In the second group, the slight modifications indicative of weakness, to whatever cause they may be assigned, are amply recompensed by the presence of cranial crests for increased muscular insertion.

More or less disuse, as the result of the loss of masticatory power, which is not needed, has so modified the arch in the last group that it has become much reduced, and in some cases has entirely disappeared.

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Cambridge, April, 1892.

ATTEMPTED EXTERMINATION OF THE POCKET GOPHER, *GEOMYS BURSARIUS*.

THE ravages of the pocket gopher extended very generally throughout the State of Iowa, but came under my own personal notice in the rich and fertile farm lands of Poweshiek County and surroundings. The annual loss they occasioned became a matter of such serious moment to the farmers of this county that on Jan. 8, 1890, an unusually liberal measure was voted by the board of supervisors, to the effect that "a bounty of ten cents a head be paid on gopher scalps taken in Poweshiek County, subject to the same laws and conditions that pertain to the payment of bounties on wolf scalps, and pockets must be produced in each case before the claimant will be entitled to the bounty."

These concealed little pests not only feed on surrounding vegetation, but, what is worse on the whole, choke it out by the innumerable mounds of earth heaped up by them everywhere.

I have seen fields which were literally black with gopher hills, and, if rooting swine can be said to upturn a field, so can the gopher. Besides, the loss by accidents to machinery and animals occasioned by striking against the gopher hills, or by sinking into their runs or holes, is very considerable. So while it is not to be marvelled at that some concerted action should be taken towards the extermination of such a pest, yet the high price paid for the experiment must excite some comment.

Taking into account the liberal bounty offered, the universal prevalence of gophers in countless numbers, and the fact that their capture was attended with but little labor, and only trifling cost, it can readily be seen how trapping by men, as well as boys, was at once tremendously stimulated.

It actually became a lucrative employment, at which the trappers spent their time in whole or in part for practically the entire year. The trapping began as early as February, and continued as late in the fall as December; the result of it all being that the incredible number of 140,000 was trapped and paid for in Poweshiek County during eleven months of the year ending December, 1890. The gopher pockets were taken instead of their scalps, and the price paid for 140,000 pockets by one county amounted to \$14,000. As skill comes with experience, and as the great gopher populace of the county was but slightly thinned out, it was my judgment and that of others, that the catch of 1891 would considerably exceed that of 1890; some estimating the number that would be trapped as high as 200,000.

Accordingly the probable price which the county would have to lavish on gopher bounties bade fair to reach proportions that might bankrupt an ordinary county. While these facts were forcibly borne in on all taxpayers, yet the farmers were willingly taxed, even adding to the bounty in many cases to encourage trapping on their own lands, and stoutly defended the measure in opposition to the citizens of towns and villages who very unwillingly submitted to a taxation that seemed to them to discriminate between town and country rodents, believing that it was quite as fair and reasonable to apply the tax to the extermination of town rats as to field gophers.

An attempt to change the law failed, owing to the farmers' support, but in the winter of 1891 a resolution was passed reducing the bounty to five cents and requiring the claimants to present the fore legs instead of the pockets.

As a direct result of the reduced bounty, rather than a result of diminished gophers, the catch for the year ending December, 1891, was but 18,000, and of these no doubt a part was trapped in 1890. Trapping began in April and ended in December.

The gopher is a prolific rodent, and it seems almost absurd to believe that in a county where they probably number millions that their ranks have been noticeably thinned or their ravages diminished. The most sanguine supporters of the gopher bounty allowed not less than five years for their hoped-for extermination.

Taking into account their present numbers, their prolific natures, and underground habits, the attempt to oust them once for all seems almost a ridiculous undertaking. But what renders the present errand particularly bootless is the gopher at large in surrounding counties where no bounty is offered for their capture. The most persistent concerted action on the part of all the counties, while it might check the pestiferous gopher, could scarcely expect to destroy it; much less can an isolated county like Poweshiek, in the very heart of a gopher paradise, expect to reach that unattainable end.

Among the interesting nuts to crack offered the bounty supporters are a few considerations like the following.

As the gophers are thinned out in Poweshiek to the point where trapping is less profitable than in adjoining counties, the elastic consciences which some trappers are said to have will suffer them to trap outside and sell to the more liberal county, in spite of the binding oath which they must take.

But another absurd temptation was placed in the way of the faltering trapper. He could, in Iowa County, present to the county auditor the fore-legs of the gopher he had trapped, and draw his bounty where fore-legs were equivalents of scalps, and by crossing the line he could present the pockets of the self-same abused gopher and draw from the Poweshiek treasury an additional bounty on their pockets, thus making the poor gopher do him double duty. It is a known fact that all have not been slow in rising to their opportunities and drawing double bounty on the unfortunate victims of the trap.

In trapping gophers, it is the common practice to dig down and bury ordinary steel traps in their runs, and to visit these at stated intervals. The traps are not baited.

Among the gophers caught albinos are met with occasionally. During the fall of 1890 there were brought to me several gophers with white pelage — a dirty white — looking like a winter coat.

If albinos, their eyes were not pink, which suggested the possibility of an overlooked variety. From Mr. F. W. Porter,

the auditor of Poweshiek County, who has furnished me many facts and figures, I learn that trappers speak of a white variety, counted by them particularly wary and hard to catch.

One caught in Grinnell was marked with hinder parts white and fore parts brown.

To those who have not seen the pocket gopher, it may be well to state that they are a small rodent of about the same color as, and perhaps a shade larger than, the domestic rat.

They have no external ears, have small bead-like eyes, a short tail, and powerful fore-legs, armed with strong claws for digging; and, what is very characteristic, they have large extensible cheek pouches or pockets. The presence of the gopher is made known to you by its mounds of earth, about the size of large ant-hills, rather than by its own presence, for it is rarely indeed that they are seen.

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WIND-STORMS AND TREES.

Two very severe wind-storms have recently swept over Iowa which injured trees of all kinds, but especially some of the conifers. I have no record of the velocity of the wind in the storm of several weeks ago. It was less severe, however, than the one of last Friday. According to the weather office observations as reported in the *Iowa State Register* of April 2, the maximum speed was sixty-four miles an hour at 2 P.M. in Des Moines, Iowa. The gale started at daybreak, "By 11 the wind had reached an average velocity of fifty miles an hour, and it was approaching the danger-point. It kept gradually increasing until 2 P.M., when the wind-gauge at the top of the Federal building swung around to an average velocity of sixty-four, with sudden flaws above the 100-point." The weather observer, Mr. Schaffer, states that at the period of its greatest velocity the amount of pressure thrown against houses, glass, etc., was fifty pounds per square foot. The wind on Friday came from the south-west, and later shifted to the west. The severe wind-storm of several weeks ago came from the north. As usual in storms of this kind old and poorer branches fell readily, and trees suffered severely in consequence of the injury because of the many open wounds. I shall give a few illustrations how different trees were affected. On the college grounds, there are cultivated a large number of European as well as native trees. A few old trees were blown down, but these were partly decayed in the interior. Both gales seem to have been hard on some of the conifers. In some cases the ground was strewn with green leaves and short branches. In point of greatest injury Norway spruce (*Picea excelsa*) stands first. The branches broken off varied from one to six years' growth, mostly two and three years. It is also noticeable that many of the branches did not break at the beginning of the year's growth but in the middle. In many cases the branches are stripped of their leaves in the direction of the wind, — south, west, and north sides of the tree. The Scotch pine (*Pinus sylvestris*) is also affected, but in this case branches only, as a rule, were severed from the plant. The branches vary from one to six years' growth, occasionally more, but mostly within this limit. The same tendency to snap off in the middle of the year's growth may be observed. Few leaves were blown off.

Black spruce (*Picea nigra*) stands next. Some branches and leaves were broken off, though not nearly as many as in the other species.

White spruce (*Picea alba*) was also affected, but it seems able to stand the severity of the wind much better than the Norway spruce and Scotch pine. It is followed closely by the Hemlock (*Abies Canadensis*),—injury mostly confined to the leaves. There is only a single tree on the ground, which grows in a somewhat less exposed place than the white and Norway spruce, so that it may not be a fair test.

Red, or Norway pine (*Pinus resinosa*), some branches blown off and but few leaves. White pine (*Pinus strobus*), few leaves, a number of branches.

Balsam Fir (*Abies balsamea*) has suffered less than any of the above, a few branches were blown off.

Austrian pine (*Pinus Austriaca*) and Dwarf Mountain pine (*P. pumilio*) have lost few leaves and branches. The red cedar (*Juniperus Virginiana*) should be classed with it. An occasional branch of *Larix europæa* and *L. laricum* may be found.

On the whole, the deciduous trees have fared better than the evergreens. Some species of willows (*Salix*) have lost many branches. The cottonwood (*Populus monilifera*) and soft maple (*Acer saccharinum*) have lost some branches. Honey locust (*Gleditsia triacanthos*), hackberry (*Celtis occidentalis*), hard maple (*Acer barbatum*), green ash (*Fraxinus viridis*), *Crataegus punctata* have not suffered.

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RUSSIAN SUNFLOWER INDUSTRY.

THE sunflower, as a garden plant, has been known all over Russia for many years, but only in certain districts has it been cultivated on a large scale as an industry. The first cultivation of sunflower seed for commercial purposes began, says the United States Consul General, at St. Petersburg, in 1842, in the village of Alexeievka, in the district of Berut-chinsk, government of Voronezh, by a farmer who was the first to obtain oil from the seed. This farmer soon found many followers, and the village of Alexeievka soon became the centre of the new industry. The government of Voronezh is even now the chief district in European Russia for the growing of the sunflower. Besides the district of Berut-chinsk, this plant is cultivated on a large scale in the districts of Novokhopersk, Ostrogoshk, Bobroosk, Valouisk and Korotoiaks. From the government of Voronezh the cultivation of sunflowers spread to the adjacent governments of Tambov and Saratov, where there are large fields cultivated with this plant, particularly in the latter government. The people of the province of the Don and the governments of Simbersk and Samara are more or less engaged in this trade, in fact in the entire south east of Russia the sunflower furnishes a prominent product of the farm. Two kinds of sunflower are grown in Russia — one with small seeds, used for the production of oil, and the other with larger seeds, consumed by the people in enormous quantities as dainties. In the district where the seed is cultivated on a large scale, the plant has been continually grown on the same soil for many years in succession, thus producing a special disease of the plant. The sunflower seed is used principally for obtaining sunflower oil, which, owing to its nutritious qualities, purity, and agreeable flavor, has superseded all other vegetable oils in many parts of the country. In general, the cultivation of the sunflower in Russia is considered to be very profitable. At the average yield of 1,350 pounds to the acre, and at the average price of $\frac{3}{4}$ d. a pound, the farmer receives an income of about £4 an acre, and this income can