

quence of the pre-existing better nutrition, and hence readier functional activity, of the left cerebral hemisphere.

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Onondaga Folk-Lore.

UNTIL recently David Cusick's "History of the Six Nations" was the chief treasury of Iroquois legends, though much could be gathered from the writings of early missionaries and travellers. These, however, paid more attention to customs of life. Of late more care has been given to the collection of stories, and with fair results, but many old tales have been forgotten. Even so prominent a legend as that of Hiawatha was unknown to the whites fifty years ago, but it may not be very old among the Indians themselves. As a frequent visitor to the New York Onondaga Reservation, I have occasionally obtained some material of this kind, part of which has been published, and can only regret not doing this earlier.

The Onondagas have a strong belief in witches, and take precautions against them. A clear-headed and intelligent Indian told me that he met a spirit one night, and described its appearance. He took a good look at it, not being afraid, for, being a Christian, he was sure no spirit could hurt him. Supposed witches are avoided or placated, but are not now punished, though once they were put to death. I have been in an unfathomed cave on the east side of the reservation, where, it is said, a witch was cut to pieces, and thrown into the rocky cleft, many years ago.

Pygmies are supposed to live under ground, sometimes appearing to men, and their old abode was pointed out to me. They are the Che-kah-ha-wha, or Small People, of the Onondagas; the Yah-ko nen us-yoks, or Stone Throwers, of the Mohawks; and the Ehn-kwa-si-yea, or No Men at All, of the Tuscaroras.

The tale of the vampire, which caused a change in the mode of burial, was first published by David Cusick. The version given me differs somewhat from this and that of Mrs. Erminnie A. Smith. Leaving out the graphic details for another time, the story may be briefly told. A man and his wife, with their father, one night occupied a deserted cabin. As the fire went down, a skeleton form appeared, killed the old man, and began gnawing his body. This aroused the younger persons, and the skeleton retreated when they stirred up the fire. By stratagem they escaped one at a time, but were soon pursued. Their friends came to meet them when they heard their cries, and they were rescued. The people assembled, found a skeleton in a bark coffin in the house, resolved to burn it; and out of the flames came a red fox, which burst through their ranks, and disappeared in the forest.

The story of O-kwen-cha, or Red Paint, deals with the marvels of magic, in which the boy proved powerful. He saved his grandmother by overcoming the great wrestler, and brought an uncle to life. By destroying a giant he restored another uncle; and by overcoming a wonderful dog, a third. The fourth uncle was delivered by a longer and curious trial, and he returned home with them, to find his grandmother grown old. By an odd expedient he restored her young looks, twisting a stick in the loose skin of the back of the neck, until all the wrinkles were drawn out of her face. I found a resemblance, in one part of this tale, to a Canadian legend related by Mr Chamberlain. Red Paint arranged the scattered bones, and then pushed against a tree, crying, "Look out, look out! this tree will fall upon you!" The bones united, jumped up, and ran away. In the Canadian story the boy shoots an arrow in the air, with a similar exclamation and result.

It is unlucky to shoot at the white sea-gull, the bird of the clouds, or the one that never lights on the ground, for it dives in the air, and the hunter misses his aim. If he does this twelve times, on the thirteenth he will vomit all the blood from his body. This is the bird which destroyed Hiawatha's daughter, and not the white heron.

The Great Mosquito was an immense creature, and did much harm. One story relates that the Onondagas and Cayugas destroyed him, but with much loss to themselves. Clark ascribes the victory to Hiawatha, but the usual hero is the Holder of the Heavens. On the Tuscarora Reservation, near Lewiston, the stone

is shown on which he rested, and the tracks of pursuer and pursued were preserved near Syracuse, N.Y., until quite recently. The bird-like prints of the monster's feet were described to me, and the place of his death yet retains its early name. All the stories agree in making the small mosquitoes originate in the decaying body.

The Onondagas raise the old tobacco (*N. rustica*), and it is used for sacred purposes, though not restricted to them. When medicinal plants are sought, a little tobacco is strewn around the first one found, and it is left for good luck. A little bag of tobacco is attached to the wooden false face, when this is left long unused, and this still remains on the one I have. Tobacco was always burned with the white dog.

The False Faces form a society, somewhat like medicine-men, and are supposed to have magic powers. The old masks are of wood, and these are like those described one hundred and fifty years ago. Green Pond, a little west of Jamesville, is one of the reputed early resorts of the False Faces, their magic powers opening the rocky walls. They still have feasts of their own, and assist at others.

I have been often asked whether the curious silver brooches have any significance as emblems or charms. None at present, certainly. Originally made by white men, their manufacture at last passed into Indian hands, and they were used simply as ornaments. All my crosses had been worn by Pagans. I have many forms of these brooches, but they are becoming rare. They are circular, square, lyre-shaped, diamond-shaped, stars, single or double armed crosses, Masonic emblems, combinations of hearts and crowns, etc. Some persons have attached much mystery to these double-armed crosses, as though they were antique and rare. I have had a number from Onondaga Indians, who recently used them. Among many silver ornaments and brooches, I have had and seen but one brass brooch.

There are some wampum stories, and much that is curious in its use. The Iroquois had no true wampum until the Dutch came, but may have used colored sticks or quills. An Onondaga tale makes Hiawatha's wampum of eagle-quills, and ascribes the invention to him. He alone could call down the wampum bird.

Some of the old feasts and games are yet retained. Both Seneca and Onondaga snow-snakes are made, and much used; a boy often holding several in his hand, and throwing them one after another. The boys also use the javelin a great deal; and another favorite game with children is mumble-the-peg. Their name for violets signifies "heads entangled," the flowers being interlocked and pulled apart. Lacrosse has almost disappeared, base-ball taking its place. Among implements and ornaments I still find early forms; but they are fast being displaced, and some which I used to see cannot now be found at all. W. N. BEAUCHAMP.

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Osteological Notes.

CONSPICUOUS by its prominence, occupying the lateral regions of the mammalian cranium, and connecting these with the face by an osseous bridge, is the series of bones known as the jugal or zygomatic arch. As this arch presents many modifications in the various orders, for the full understanding of its morphology it will be necessary to trace out its correlations not only with the neighboring structures, but also with the habits and environment of the animal. Composed often of three bones,—the malar or jugal in the centre, flanked on either side by the zygomatic process of the squamosal and by the malar process of the maxilla,—the arch may be reduced to two, the process of the squamosal and the jugal, or the process of the squamosal and the post-orbital process of the frontal. The number of bones present depends upon the advanced or receding position occupied by the orbit, also upon the position held by the articulation of the mandible in relation to the orbital cavity, whether this be above, below, or on a level with it. Although the arch in certain cases is very imperfect, it can never be said to be entirely absent. The strength of the jugal arch, the most important factor in its existence, depends upon its line of direction, whether this be straight or curve!, and upon the amount and manner of this curvature; upon the number,

size, extent of surface, and mode of union, of its component bones. These, in their turn, are correlated with the articulation of the lower jaw, and with the amount of surface presented by the ascending ramus; with the neighboring fossæ, crests, and processes; with the dental series; and necessarily with the muscles concerned in mastication, varied as they are in their action.

The jugal arch, as it exists in the order of the *Carnivora*, offers perhaps the most instructive example of the various points to be considered in its morphology. Take the cranium of the tiger as a type of the cats (*Felidae*). In this, the arch, composed of three bones, —the squamosal, malar, and maxilla, —presents an extraordinary, horizontal curvature, thereby vastly increasing its expanse, giving great width to the temporal fossa, and consequently allowing a corresponding development of the temporal muscle, which, taking its origin from the largely expanded surface of the parietal, and from the occipito-sagittal crest, passes forwards and downwards, to be inserted into the high, wide, oblique, coronoid process of the mandible.

The increase in length of the arch, due to the great horizontal curvature, is also seconded by the advanced position of the orbit upon the skull, and to its height above the level of the articulation of the mandible.

The vertical curvature of the arch, with the convexity above and the concavity below, denotes increased power of resistance to the strain produced by the muscular fibres of the masseter, which, springing from the under side of the arch, are carried obliquely backward and downward to be inserted into the deeply grooved ascending ramus. The action of the pterygoids, which is similar to that of the masseter, is also relatively powerful. The fibres rising from the pterygoid fossæ and plates are inserted into the inside of the angular portion of the lower jaw, and into the neck of the condyle. The suture by which the jugal process of the squamosal and the malar are joined extends very obliquely through a greater portion of the arch; this obliquity imparting much strength to the bony structure, and giving force to assist the pressure upward.

The convex surface of the transverse condyle of the mandible, received into the deeply grooved glenoid cavity, forms the hinge-like articulation fitted for the vertical action of the jaw, and which is necessary for the prehension, tearing, and division of the flesh by means of the characteristic incisors, canines, and molars.

In the order of the *Edentata*, the cranium of the great ant-eater (*Myrmecophagus jubata*) exhibits a jugal arch which is the extreme opposite of that which has been thus partially described. In the ant-eater the arch is very incomplete, consisting of a short styliiform process given off by a very rudimentary jugal, and of an extremely small, tuberos, zygomatic process from the squamosal, no union being formed between the two. There is no post-orbital process of the frontal, and indeed no separation between the orbital and temporal fossæ. Under these circumstances, the muscular development concerned in the preparation of the food is very feeble, correlated as it is with the entire absence of teeth, and any necessity for mastication.

Between these two extreme modifications there are many intermediate forms of the jugal arch. In some of the *Rodentia*, although the arch is relatively weak, as shown by the downward convexity in its vertical curvature, the masseter has other points of fixed insertion, by which means the masticatory powers are fully sustained. Moreover, the antero-posterior form of condyle is received into an undefined fossa situated upon the side of the cranial wall, whereby a corresponding amount of dental energy is imparted, suited to the habits of the rodent. Cope and Ryder have attributed the peculiarities of the dental system in this order to the mechanical consequences of an increase in the length of the incisors, which increase is due to their continued use. By a similar process of reasoning it may be shown that the imperfect condition of the arch in some of the other orders is correlated with an entire absence of the teeth, with a feeble muscular energy, and a loss of mastication, all being the result of continuous disuse.

In short, it may be said in general that the great development of the arch is dependent upon modifications which are strictly due to use, while its weakened and imperfect condition is equally the result of modifications which are due to disuse.

There seems as yet no evidence afforded by paleontological research to show that the jugal arch has undergone any special changes since the days of the *Creodonta*, the ancestors of the cats. We may therefore conclude that the phylogenesis of the *Carnivora*, at least, remains essentially the same, so far as this portion of the skull is concerned.

D. D. SLADE.

Cambridge, Mass., Dec. 5.

BOOK-REVIEWS.

A Revision of the South American Nematognathi or Cat-Fishes.

By CARL H. EIGENMANN, Ph.D., and ROSA SMITH EIGENMANN.
San Francisco, Cal. Acad. Sci. 8°. \$3.

THIS extensive work will be highly welcomed by ichthyologists. It is based on several thousand specimens from the Museum of Comparative Zoölogy at Cambridge, Mass. The material was collected chiefly during the Thayer Expedition. Besides that, numerous other collections were studied; for instance, that of Senhor Honorario, made in Goyaz, that made by his Majesty Dom Pedro II in Rio Grande do Sul, and that made in Lake Titicaca by Professor Alexander Agassiz and Mr. S. Garman.

In all, 101 genera and 467 species are enumerated. Full descriptions of most of the species in the Museum of Comparative Zoölogy are given. The synonymy is treated in full, and the bibliography is given at the end of the volume. In this we should like to add Dr. C. B. Bruhl's "Osteologisches aus dem Pariser Pflanzengarten" (Wien, 1856), containing descriptions and figures of the osteology of *Aspredo*, *Loricaria*, and *Hypostoma*.

Besides the index of species and genera, a geographical index is added, and a map with especial reference to the localities where collections have been made. Both will be of great help to the student.

The different forms are referred to eight families, seven of which are confined to tropical America. The relationship of families and subfamilies is expressed by a phylogenetic diagram.

The nearly cosmopolitan family *Siluridae* (it is only absent in Australia) reaches its greatest development in South America, where it is represented by six subfamilies. The *Bunocephalidae* are found in the whole course of the Amazon and in Guiana. The *Diplomystidae* are represented by a single genus and species from Chili, the *Diplomystes papillosus*, Cuv. The family *Hypophthalmidae*, with the genera *Hypophthalmus* and *Helogenes*, is confined to the northern Amazon and Guiana. The *Pygidiidae* contain eleven genera, and are found in mountain-streams of Chili and the Argentine Republic. The *Argiidae*, the anatomy of which needs further study, have only three genera. They are characteristic of the Andes of Peru, Ecuador, and Colombia. The *Loricariidae*, with twenty-four genera, occur east from the Argentine Republic to Central America, west in Ecuador and Colombia. The seven genera of the *Callichthyidae* extend from La Plata to Rio Orinoco, and in the Amazon as far as Nauta.

The authors may be congratulated on this work, which will be of the greatest value to the student of fishes. Thanks are due to the California Academy of Sciences for publishing this work. It forms Volume I. of a new series of publications, called "Occasional Papers of the California Academy of Sciences."

AMONG THE PUBLISHERS.

"FROM Babel to Comparative Philology" is the title of a chapter in Dr. Andrew D. White's "Warfare of Science," which will open the January *Popular Science Monthly*. It gives the origin of the legend in regard to the great tower and the confusion of tongues, and also traces the early history of the belief that Hebrew was the only language spoken by God and men before Babel was undertaken. The second article in the great series on "The Development of American Industries since Columbus" will also appear in that number. The special topic is "Iron Mills and Puddling-Furnaces," being a part of the general subject of iron and steel, which is being treated by Mr. William F. Durfee. Like the opening paper, it is copiously illustrated, and much more readable than the title would indicate. Professor Huxley has attacked the idea that the people who spoke Aryan were one distinct race. His discussion of this point will be printed in the *Popular*