being a common Cat Bird in which the haemapophysis had disappeared from the first dorsal rib, the true ribs being thus reduced to five in number.

It is quite possible that reduction in the dorsal region has been carried almost to its utmost extent among birds and existing facts seem to support this theory.

Among the highly specialized Passeres, the normal number of ribs, counting as the first the most anterior that is connected with the sternum, is uniformly six.

Close to the Passeres stands the heterogeneous group of birds termed Picariæ, many of which are doubtless survivals of the ancient forms from which the Passeres have been derived.

If this be the case the line of descent of these Picarians is a long one and in many respects they may have undergone more modification than their more recent relatives.

Certain it is that in this group we find, with very few exceptions, those birds having the smallest number of ribs, sometimes only five pairs, and at least once, in our Night Hawk, only four.

In the Swifts, near relatives of the Goatsuckers, it is not asserting too much to say that we can actually see the process of rib reduction going forward, for among these birds we find many specimens with six pairs of ribs, rarely one with seven, and in the majority of cases six complete pairs of ribs and the lower portion of a seventh, and this lower rudiment is present in varying proportions.

Lower in the scale, among the Amphibians, the number of vertebræ is inconstant, even in such species as *Necturus* and *Menopoma*, whose pre-sarial vertebræ are fewer in number than in any mammal.

Necturus may have eighteen or nineteen pre-sacrals, *Menopoma* nineteen or twenty, *Siren* forty-one, forty-two or forty-three, and *Amphiuma* sixty-four or sixty-five.

Variation in the number of caudals is, of course, to be expected, but in the long-bodied *Siren* and *Amphiuma* it may amount to as many as five or six vertebræ.

A curious variant has been noted in the sacrum of *Menopoma*, which Huxley, in the last edition of the Encyclopædia Britannica, describes and figures as composed of two vertebræ.

Unfortunately the specimen on which the figure and description are based was abnormal, for, like the Salamanders, *Menopoma* has normally but one sacral, and an intermediate condition, a *true* abnormality, may exist of ten vertebræ connected with the ilium on one side and one on the other.

It is evident from the instances just related that a considerable amount of individual variation in size, proportion of various bones, or even in the presence of certain bones, may exist in a given species.

Differences of size, unless excessive, are of little value, provided the parts retain their relative proportions and in judging of differences of proportion the question of age must be taken into account also.

Broadly speaking, variations are of two kinds, due to modifications of development or of structure, and the importance of any departure from a given type depends very largely on the answer to the question, to which of these two categories does the variation belong.

Modifications of development produce individual variations of size and strength, length of limb and power of jaw, modifications of structure—when *constant*—give rise to specific, generic or ordinal distinctions, as the case may be.

In the occasional extra molar of the Orang the extra ribs of birds, the tarsal tubercle of the Great Auk, and the varying number of vertibræ in Amphibians we have variations of structure that, being inconstant, have no specific value, and yet have a morphologic meaning of their own.

The extra molar of the Orang is probably a reversionary character, the extra ribs of the Auk and the little nodule occupying the place of the missing metatarsal certainly indicate an ancestral form with a longer body and four toes.

In the abnormal sacrum of the *Menopoma* and the five pairs of ribs of the Cat Bird we have progressive variations, and these are of much rarer occurrance than retrogressive characters.

The parapophyses in the sacral vertebræ of Cormorants are teleological modifications, efforts to provide an additional brace for the pelvic walls of these strong swimmers.

The differences in the axial skeleton of birds and Amphibians indicate that variation in this region is not greatest in animals now possessing the largest number of vertebral segments, but in those whose embryology hints at the existence of more vertebræ in their comparatively immediate ancestors than are possessed by the descendants of these forms.

This would account for the frequent appearance of extra ribs in birds, the inconstancy of the number of vertebral segments in Urodele Amphibians, and the constancy in the vertebral column of mammals.

To conclude, many variations are reversionary in character, some progressive, and some due to physiological causes, most, if not all, have some definite meaning in their abnormality.

NOTES ON JAPANESE METEOROLOGY.

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DESPITE the humid climate of Japan, rheumatism is very rare among the natives, which is probably due to the practice of daily hot bathing.

The meteorology of Japan is exceedingly peculiar and of exceptional interest. As particular influences in the process of acclimatization may be mentioned, lessened, eliminatory activity of the lungs, increased activity of the skin, diminished cardial circulatory power. A prolonged residence in the Japanese climate is productive of general physical relaxation, with increased susceptibility to cold. After a two years' residence in Japan, Europeans feel the necessity of wearing more substantial winter clothing, as the climate seems to have become harsher since the beginning of their sojourn. Any foreigner who permanently resides there and wishes to feel at ease must resort to the hot bathing of the natives; being in Japan, he must do as Japanese do. Europeans, on their first arrival, are very prone to rheumatism, and even perfected acclimatization does not do away with that propensity. The hot-bath habit is singularly favorable to perfect acclimatization; it, and also the customary and frequent hot tea, mitigates the depressive influence of the summer kakké months, the wet season of June, July, and August. Strange to say, in their national disease, beriberi, there is an entire absence of perspiration; these patients perspire only in their last agony. One should think, after that, that the Japanese would consider baths as remedial in kakké. Strange to say, it is not so; they consider it only as an essential and, for them, very pleasant part of the toilet.

In kakké the popular verdict is, and has always been, that it is detrimental. The altitudinal is their most efficient treatment. Such a treatment is always, at least in our European and American experience, a dry one; dry air. It is not so in Japan; in their mountains, even as high as 3,000 feet above the sea level, you will find an increase of humidity, due to the precipitation from the volcanic peaks. Even in this heavy humidity, where they are endeavoring to cure a disease in which perspiration is suppressed, they do not give to the hot baths which are used there as much, but not more than in other not sanitary places, credit for any good accruing to the patients. And, in fact, if hot bathing contributed to the cure, such an influence would be observed at the sea-level as well as in high altitudes.

Of course, I cannot treat the question expressed here. Let me only say that, in my opinion, humidity has nothing to do, directly at least, with beriberi; it is not a climatic rheumatism. Its cause is the action of a carbonic poison in the blood, and that poison cannot be eliminated through the influence of hot water. Hot bathing, as I said, has nothing to do with it, either directly or indirectly. Indirectly humidity has, because it keeps the carbonic gases together and prevents their dispersion. The oxydizing influence of the pure air of the mountain heights has everything to do with the cure.