Art. II.—*On the* Tuatara (*Hatteria punctata*, Gray); *or Great Fringed Lizard of New Zealand.* By F. J. Knox, L.R.C.S.E.

[*Read before the Wellington Philosophical Society, July* 17, 1869.]

By the kindness of Dr. Hector, I have been enabled to peruse a recent minute description of the *Tuatara*, or Fringed Lizard. I take the more interest in this truly scientific memoir of Dr. Albert Günther, as it brings to my recollection a circumstance which occurred, now twenty-six years ago. In 1842, a family of the name of Houghton resided on Somes' Island, and, amongst the usual accompaniments of the human family, had a few rabbits. The family shortly after left the island, and took up their residence in Wellington. On leaving, a daughter of Mr. Houghton missed a favourite rabbit, and commencing a thorough search, put her hand into one of the numerous sand holes, and grasped what she joyfully supposed to be her lost rabbit, but found it was a live specimen of the *Tuatara*. The specimen lived for some time, but receiving—owing to the very primitive condition of the colony—by no means the attention it deserved, it died; and I attributed its death to too sudden an exposure to the noonday sun. I however was enabled to anatomise it. The skeleton, more especially, was preserved with the greatest care, and so much of its anatomy as would preserve was sent to the British Museum.

Until lately, I have never seen another specimen, but many have, however, been procured since the establishment of this Museum. I am now able to bring under the notice of the Society, the result of a careful anatomical examination of two specimens. These observations have been drawn up from my notes on the original specimen sent to the British Museum, in 1842, and from the dissection of the two specimens placed at my disposal by Dr. Hector, the skeletons and soft parts of which I have placed in the Museum. Both specimens were females; the ova varying in size from almost microscopic, to two lines in diameter, and thus indicating a maturity in the individual specimens.

I shall now state a few of the points in which I differ from Dr. Günther.

1st. In the description of the head, it appears to me that he has lost sight of the basis on which all researches in "comparative anatomy" is founded, *i.e.*, that of man, as compared with other animals, and adopts a nomenclature of such complexity, as would confine the future investigations into the history of the animal creation, to the mere compiler, the *closet* naturalist. I take as a sample the *os quadratum*, p. 4, which he describes as a distinct elementary bone, without stating that it is merely a portion of the human temporal bone. The scientific anatomist, in his researches into the structure of the animal kingdom, knows that the temporal bone undergoes almost innumerable changes during its development from the embryo, and is composed, even at an advanced period of life, in man, of various separate centres of ossification, deposited in a cartilaginous basis; in fishes, uniting with other bones of the cranium; in birds, remaining separate; in reptiles, uniting with other bones, but still readily recognizable as being that centre of ossification in the temporal bone in man, articulating with the lower jaw.

The vomer (p. 5) is another example in which Dr. Günther evidently proposes to give a new nomenclature to every animal.

As a comparative anatomist, I should look for the vomer in all animals as forming the mesial division between the right and left nostrils; for instance, in the Cetacea (adult) I find an extensive union, and even a difficulty in naming the bones after the universally received type; but it matters not, provided the bone forms the division of the nostrils, and thus performs the

function of the human vomer. I have before me, at this moment, the skeleton of the Gallaxias, in which the bones of the cranium defy any precise nomenclature.

The Tuatara, and other nearly allied species, show a structure in the osteogenesis, or growth of the vertebræ, which does not appear in any other class of the vertebrata. I allude to the supposed power of reproduction of the caudal vertebræ when mutilated. In one of the specimens before the Society, it will be observed that the 34th vertebra is distinctly divided in the middle into an anterior and posterior portion; and I have observed, in the preparation of the skeleton, that it is at this part that the tail gives way, and not, as might be supposed at a joint.

Scientific anatomists have, for fifty years and upwards, satisfied themselves that the cranium is simply a continuation of the vertebral column; and three to seven have been selected as the probable number of vertebræ thus *specialized*, more or less, in the various formations. If, however, the very earliest type of a vertebra is to be seen in the caudal vertebræ of the lizard, such difficulties as Dr. Günther has found in the osteology of the Tuatara, will be more easily understood.

In a subsequent paper on the Green Lizard, which I hope to have the honour of reading to the Society, I shall allude more fully to this very interesting enquiry. I shall be able to demonstrate, that should the tail suffer mutilation, the injured part will, no doubt, heal over, but will not reproduce distinct vertebræ. I draw this conclusion from the careful examination of the specimen of the Green Lizard, which I deposited in the Museum, in 1862.

The caudal vertebræ, in most animals, become rudimentary, reduced, in short, to the centrum or body of the bone; and it was at one time the universal practice to dock the tail and ears in dogs, and even in horses, these mutilations were permanent deformities, and never reproduced.

As I shall add to this short notice carefully drawn up tables of weights and measurements, etc., I shall not detain the Society with any further minute remarks, with the exception of teeth, in which I find so marked a difference, as to constitute a distinct species from those Dr. Günther has described. The Tuatara is an *acrodont;* the teeth being, as it were, chiselled out of the bone.

The intermaxillary bones, Dr. Günther describes, as each supporting a single tooth, "notched, or serrated, at the crown in individuals of middle age;" and he gives an engraving, not only of the young, but of the middle-aged specimen, where there appears only a single notch, given with two points. In one of the two specimens I have prepared, this description corresponds, but in the other I find each tooth divided by two notches into three pointed cones. Thus, the superior maxillary supports, what appears to me, six teeth on each side, including the intermaxillary, of a similar description, each notched into three points. And as a great difference from Dr. Günther's description, I find three on the posterior part of the palatal plate of the maxillary bone similarly notched, separated by a deep groove from those on the alveolar edge. The teeth in the lower jaw admit of easier description: on each side of the symphysis, I observe, as in the intermaxillary, a tooth notched into three points; the outer point slightly diverges, and represents a canine tooth, scarcely visible at first, but increasing in size to a line in length. The system of dentition would therefore stand thus:—

Upper jaw, alveolar edge . . .	6 + 6 =	12
,, palatal plate . . .	3 + 3 =	6
Complex teeth . .		18

Lower jaw, complex teeth . . .	1	+ 1 =	2
„ alveolar edge, simple teeth	14	+14 =	28
			30

No. 1 Skeleton.

	oz.
Weight of animal	6

Measurement.

	in.	lines.
Snout to cloaca	7	6
Cloaca to tip of tail	7	0
Total length	1 2	6

VERTEBRÆ.

Cervical	8
Sternal	3
Abdominal	11
Lumbar	3
Sacral	2
Coccygeal	23
Total number	50

No. 2 Skeleton.

	oz.	grs.
Weight of animal	6	120

Measurement.

	in.	lines.
Snout to cloaca	7	$6\frac{1}{2}$
Cloaca to tip of tail	8	$11\frac{1}{2}$
Total length	1 4	6

VERTEBRÆ.

Cervical	8
Sternal	3
Abdominal	11
Lumbar	3
Sacral	2
Coccygeal	36
Total number	63

Weight of skeleton . . . . . 306 grains.

Remarks.—The *hæmapophyses* (V-shaped bones) I observe, throughout the whole spinal column, connected with the inter-articular cartilages; in neck, rudimentary (but formed of three points of ossification), disappearing along the

thoracic, abdominal, lumbar, and sacral vertebræ, but again appearing between the thirty-fourth and thirty-fifth vertebræ, rapidly increasing in size, (forming a safe canal for the blood vessels), and gradually decreasing, together with the *neural* and articular processes, until the *centrum* appears like a minute cylinder, divided in the middle of its length, indicating the part which gives way when the tail is accidentally injured. This fissure can be observed in the thirty-eighth vertebra, and a separation may consequently take place in any of the remaining vertebræ. From the peculiar form of the *medulla spinalis*, I feel assured, that when injured, the complete vertebræ will not be reproduced, but will present the appearance as seen in the skeleton No. 1, in which the total number of vertebræ is fifty; and the termination of the tail is composed of a deposit of earthy matter of about one inch in length. The series of triangular processes, considered by Dr. Günther as true ribs,—similar to the false or floating ribs in the mammalia—appear to me, after a careful removal of the integuments, to be dermal productions, much resembling those rib-like processes as seen in the engraving of the Plesiosaurus.

Art. III.—*On the Anatomy of the* Naultinus Greyii, Gray, *or Brown Tree Lizard of New Zealand.* By F. J. Knox, L.R.C.S.E.

[*Read before the Wellington Philosophical Society, August* 14, 1869.]

During the month of January, 1862, a specimen of this reptile was sent to me by a friend, and I examined it with great care. Many points of great interest presented themselves to me, more especially the separation of the tail. In an animal so highly organized, *more especially in the skeleton*, it appeared to me to be an impossibility, that the complex mechanism of so important a part of the animal economy should be suddenly removed, and not only the life of the animal in no way jeopardized, but that the tail, in its entirety, would be reproduced. Nay, more, that the animal had been seen, after the violent separation of the tail, to search for it, and stick it on again! I found, on careful dissection, that the statement, in so far as the detaching of the tail from the body, was correct, but that the separation not only occurred at a particular part of the spine, but presented an obstacle to its regeneration, which appeared to me, and still appears, impossible. I found the divided or separated surface finely dovetailed; the one (proximal extremity of the skin) presenting no dentations, but a perfectly smooth margin; the scales surrounding the part arranged in symmetrical order, whilst on the separated part or tail, eight wedge-shaped processes projected beyond the skin of the tail. (See preparation of the dried skin.) These eight processes were entire, and not caused by a tearing process, but were arranged in pairs :—

Dorsal margin	1 pair
Abdominal margin	1 „
Lateral margin	2 „
Total . . .	8

As I attentively observed the separation of the tail, I found that a delicate white cord was gradually leaving a canal in the tail portion. This I recognised to be the *medulla spinalis* (see preparation in phial), and necessarily rendered, in my belief, the power of reproduction still less possible. I may add that the tail in the living animal is in no respect brittle, as stated by some