Conclusion.

From this survey it appears that Dinosaurs were well represented in the Gosau beds. Most of the remains belong to two species of a quadrupedal carnivorous genus *Cratæomus*, which in many respects resembles *Scelidosaurus*. It is just possible that *Struthiosaurus* may prove to be the same genus, or may have possessed the teeth referred to *Cratæomus*. The genera *Hoplosaurus*, *Oligosaurus*, *Rhadinosaurus*, and *Ornithomerus* are only known from a few bones each; *Megalosaurus* merely from teeth. It is just within the limits of possibility that *Doratodon* may prove to be the jaw of *Rhadinosaurus*; but it is not likely to belong to the Crocodile, because true Crocodilian teeth occur. Hence there are certainly, with the *Mochlodon*, seven Dinosaurian genera, while there may be as many as ten genera. Of Crocodiles, Lizards, and Pterodactyles there are certainly at least one each. The Chelonians are represented by two genera and five species, two only of which are described. Thus the Gosau fauna includes in all fourteen genera and eighteen species of reptiles; and there is every reason to suppose that these formed but a part of the Reptilia living when the deposits were formed.

I can scarcely hope that my efforts have been in every case successful in determining the species to which these disjointed and often fragmentary bones should be referred; but I have throughout worked on the basis of anatomical structure, and indicated only such species and genera as the organization of the animals made inevitable.

I have now only to express my gratitude to Professor Suess for his kindness in allowing me to study this collection and retain the specimens so long in this country; and I would also express my thanks to Prof. Ramsay for permission to figure the skull of *Acanthopholis*; and to the Council of the Royal Society for assistance in carrying on this research.

APPENDIX.

Note *on the* Gosau Beds *of the* Neue Welt, West *of* Wiener Neustadt. By Prof. Edward Suess, F.M.G.S.

The Gosau beds have been deposited in *preexisting* valleys of the Triassic and Rhætic portion of our North-eastern Alps, and have suffered so much subsequent folding and dislocation that in the valley of the "Neue Welt," the spot where the bones were gathered which I sent to you, several shafts pass twice through one and the same seam of coal. The Gosau beds usually form green slopes at the foot of the great mural precipices of Triassic and Rhætic limestone. In the Gosau valley, near Halstatt, exposures are offered by a series

of ravines; in the "Neue Welt" (south of Vienna, west of Wiener Neustadt) a number of coal-mines give the opportunity of following the succession of beds, although they are highly disturbed here; and I believe that the succession is not very different in the two valleys, notwithstanding their distance apart.

The base of the Gosau beds is formed by a calcareous breccia of variable thickness, evidently the consolidated débris of the surrounding mountains.

Then follows a series of freshwater beds, sandstones, marls and a few seams of coal, accompanied by freshwater Mollusca such as *Melanopsis*, *Dejanira*, *Boysia*, *Tanalia*, *Cyclas*, and *Unio*, and the remains of a highly heterogeneous flora, comprising a true Palm, together with *Pecopteris Zippi*, *Microzamia*, *Cunninghamites*, and leaves of a dicotyledonous tree resembling *Magnolia*, &c., evidently the mingling of the younger dicotyledonous type with a number of surviving older types. It is this horizon which has yielded the reptilian bones.

Deposits of a brackish character, with *Cerithium*, *Omphalia*, and *Actæonella*, begin to appear above the freshwater beds, sometimes apparently intercalated with them and accompanied by gravel beds and conglomerate, sometimes also by the first true marine strata, usually characterized by *Hippurites organisans* and *Nerinæa bicincta*.

The next group is formed by a loose marly limestone or a calcareous marl crammed with reef-building corals and with masses of *Hippurites cornu-vaccinum*, *Hipp. sulcatus*, *Caprina Aguilloni*, *Sphærulites organisans*, and a good number of highly ornamented Gasteropoda. This is the true French Turonian zone of *Hippurites cornu-vaccinum*.

This zone is succeeded by a series of loose grey and marly sandstones, likewise very fossiliferous. The reef-building corals and Rudistæ have disappeared or are very rare, corals being represented by a few species of *Cyclolites*, by *Diplochenium lunatum* and especially by *Trochosmilia complanata*. Here the first Ammonites appear. *Natica bulbiformis*, *Cardium productum*, *Protocardia Hillana*, *Trigonia limbata*, and *Janira quadricostata* are some of the most characteristic fossils.

In some places rose-coloured limestone beds with *Orbitoides* and the remains of a small Decapod are seen, which seem to succeed directly to this zone, which I have sometimes named the zone of *Trochosmilia complanata*.

The last and highest member of the Gosau beds is a series of sandy loose sandstone beds, containing no fossil except great numbers of *Inoceramus Crispii*.

I cannot, therefore, say positively that the age of the reptiles which you have had the kindness to study is quite exactly that of your Cambridge phosphate-beds; but it is certain that they are older than the true Turonian deposits, and especially older than the zone of *Hippurites cornu-vaccinum*.

EXPLANATION OF PLATES XXVII.–XXXI.

(All the figures are of the natural size, unless an enlargement is mentioned.)

PLATE XXVII.

Fig. 1. Dentary bone of right ramus of lower jaw of *Mochlodon Suessii* (Bünzel) seen from above, showing tooth-sockets, symphysial curvature, and ascending coronoid process.
2. Separate tooth of *Mochlodon Suessii* from the lower jaw, showing the internal aspect; enlarged twice.
3. Tooth referred to the upper jaw of *Mochlodon Suessii*, showing the ribbed external face of the crown; enlarged twice.
4. Side view of the same tooth, showing the worn internal edge of the crown and curved fang.
5. Left side of hinder portion of skull of *Struthiosaurus austriacus* (drawn reversed for comparison with fig. 7), showing downward direction of occipital condyle, foramina at base of skull, plate in front of the sella turcica, transverse groove on roof of skull, &c.
6. The same skull seen from the front, showing the parieto-frontal suture, form of the parietal bone, cerebral cavity, form of the basisphenoid and sella turcica, &c.
7. Right side of hinder part of base of skull of *Acanthopholis horridus*, Huxley, showing the united basioccipital and basisphenoid bones, with the line of large nerve-foramina. (Original in Museum of Practical Geology.)
8. Anterior aspect of same specimen, showing posterior plate of sella turcica.
9. Dentary bone of right ramus of lower jaw referred to *Cratæomus*. The specimen is seen from above, and shows tooth-sockets along the alveolar margin.
10. External aspect of same specimen, showing the large foramina below the alveolar margin and above the longitudinal angle.
11. Tooth referred to *Cratæomus*, probably from the lower jaw, showing cinguloid ridge at the base of the crown; enlarged twice.
12. Similar tooth, less worn, showing serrations on the right margin; enlarged twice.
13. Tooth referred to the upper jaw of *Cratæomus*, showing bevelled edges, probably due to wear; enlarged twice.
14. External aspect of same specimen; enlarged twice.
15. Tooth probably of the larger species of *Cratæomus*.
16. Anterior aspect of same tooth, showing cinguloid thickening on both sides of the crown; enlarged twice.
17. Dorsal rib from the right side, referred to *Cratæomus lepidophorus*, showing articular surfaces.
18. Transverse section from the proximal third of the same rib, showing transverse expansion of the superior plate and lateral compression of the body of the rib.
19. Middle of shaft of left tibia referred to *Cratæomus lepidophorus*, showing muscular ridges on the fibular aspect and commencement of proximal expansion.
20. Proximal portion of right fibula of *Cratæomus*, showing convex tibial aspect.
21. Tooth referred to *Megalosaurus pannoniensis*; one and a half times natural size. [The serrations are not directed upward so much as in the figure.]
22. Anterior aspect of the same tooth, showing limit of the serrations.
23. Transverse section of base of same tooth, showing posterior compression.
24. Tooth of a Crocodile, with slight lateral ridges and worn crown; enlarged twice.
25. A smaller more compressed and curved Crocodilian tooth, showing one of the lateral ridges; enlarged twice.
26. Claw phalange, probably of *Rhadinosaurus*.
27. Internal surface of first left costal plate of *Emys Neumayri*.

Plate XXVIII.

Fig. 1. Proximal portion of left scapula, showing humeral articulation, probably referable to *Mochlodon Suessii*. [The articular surface is longer than in the figure.]
2. Dermal plate referred to *Cratæomus*, terminating at each end in a free spine.
3. Another dermal plate, with free spines at the ends and similar tubercles in the middle portion.
4. A dermal plate bearing a horn-like spine, also referred to *Cratæomus*.
5. A small scute referred to *Cratæomus*, probably from the ventral region.
6. Distal portion of right femur of *Ornithomerus gracilis*, showing part of the lateral trochanter on the inner side of the shaft.
7. Transverse section of the same bone at the proximal fracture, showing medullary cavity.
8. Right postfrontal bone of a Chelonian, seen from above, showing the cranial scutes, referred to *Pleuropeltus Suessii*.
9. Internal aspect of the same specimen, showing postorbital ridge and surfaces for union with adjacent bones.
10. Proximal end of right fibula of *Crocodilus proavus*.
11. Transverse section of the same bone at the distal fracture.

Plate XXIX.

Fig. 1. Superior aspect of left humerus of *Cratæomus lepidophorus*.
2. Inferior aspect of right humerus of the same species.
3. Proximal surface of left humerus, showing expansion of the radial crest.
4. Inferior aspect of distal end of a humerus referred to *Cratæomus Pawlowitschii*.
5. Transverse fracture of proximal end of the same specimen, showing medullary cavity.
6. Side view of claw-phalange of *Cratæomus*.
7. Internal aspect of proximal end of left femur of *Crocodilus proavus*.
8. Outline of proximal articular surface of the same specimen.
9. Ulna of *Crocodilus proavus*.
10. Proximal articular surface of the same specimen.
11. Radius of *Crocodilus proavus*.
12. Distal end of the same bone.
13. Proximal end of the same bone.

Plate XXX.

Fig. 1. Superior surface of parietal bone of a small Dinosaur, probably *Mochlodon Suessii*.
2. Side view of an angular truncated dorsal piece of dermal armour of *Cratæomus*.
3. Posterior aspect of dorsal vertebra of *Cratæomus Pawlowitschii*, showing transverse processes and fractured base of the neural spine.
4. Left side of early caudal vertebra of *Cratæomus Pawlowitschii*. [An earlier caudal exists with the short caudal rib unankylosed.]
5. Left side of dorsal vertebra of a Dinosaur, referred to *Cratæomus lepidophorus*.
6. Right side of mid cervical vertebra of *Crocodilus proavus*.
7. Anterior aspect of the same vertebra.
8. Posterior aspect of dorsal vertebra of *Crocodilus proavus*.
9. Left side of dorsal vertebra of *Crocodilus proavus*.
10. Anterior aspect of lumbar vertebra of *Crocodilus proavus*.
11. Left side of the same vertebra.
12. Left side of an early caudal vertebra of *Crocodilus proavus*.
13. Inferior aspect of the same vertebra.
14. Anterior aspect of the same vertebra.

Fig. 15. Side view of rib and part of superimposed plate, showing the rib free from the plate at the number 15, and the great expansion of the costal articulation at the other end. *Pleuropeltus Suessii.*
16. Right hyoplastral element of *Emys Neumayri.*

PLATE XXXI.

Fig. 1. Anterior aspect of shaft of right femur of *Cratæomus Pawlowitschii*, showing the muscular ridges.
2. Antero-external aspect of right tibia of *Cratæomus Pawlowitschii.*
3. Thin slightly keeled dermal plate, probably lateral, of *Cratæomus lepidophorus.*
4. Posterior and inferior aspect of left femur of *Cratæomus lepidophorus.* The figure 4 is placed opposite the small lateral trochanter.
5. Anterior and superior aspect of right femur of *Cratæomus lepidophorus.*
6. Posterior and inferior aspect of shaft of left femur of *Rhadinosaurus alcimus.* The figure 6 is placed against the lateral trochanter.
7. Outline of the proximal fracture of the same bone.
8. Antero-inferior aspect of shaft of left humerus referred to *Rhadinosaurus alcimus.*
9. Outline of proximal fracture of the same bone.
10. Outline of distal fracture of the same bone.
11. One of the flat dermal plates of *Hoplosaurus ischyrus*, showing the cross-fibre structure.
12. Proximal end of a rib of *Cratæomus Pawlowitschii*, for comparison with fig. 17, Pl. XXVII. Compare Bünzel, pl. iii. fig. 5.
13. Superior aspect of first costal plate of carapace of a Chelonian, *Emys Neumayri.*

Synopsis of the Bones figured in these Plates, arranged under the Species to which they are referred.

MOCHLODON SUESSII (Bünzel).

Dentary bone, Pl. XXVII. fig. 1; teeth, figs. 2–4; scapula, Pl. XXVIII. fig. 1; parietal bone, Pl. XXX. fig. 1.

STRUTHIOSAURUS AUSTRIACUS, Bünzel.

Hinder portion of skull, Pl. XXVII. figs. 5, 6.

ACANTHOPHOLIS HORRIDUS, Huxley.

Hinder portion of base of skull, Pl. XXVII. figs. 7, 8.

CRATÆOMUS (species uncertain).

Dentary bone, Pl. XXVII. figs. 9, 10; teeth, figs. 11–16.

CRATÆOMUS PAWLOWITSCHII, Seeley.

Femur, Pl. XXXI. fig. 1; tibia, fig. 2; fibula, Pl. XXVII. fig. 20; humerus, Pl. XXIX. figs. 4, 5; dorsal vertebra, Pl. XXX. fig. 3; caudal vertebra, fig. 4; dorsal rib, Pl. XXXI. fig. 12; dermal armour, Pl. XXVIII. figs. 2–4.

CRATÆOMUS LEPIDOPHORUS, Seeley.

Femur, Pl. XXXI. figs. 4, 5; tibia, Pl. XXVII. fig. 19; humerus, Pl. XXIX. figs. 1–3; dorsal vertebra, Pl. XXX. fig. 5; dorsal rib, Pl. XXVII. figs. 17, 18; claw-phalange, Pl. XXIX. fig. 6; dermal armour, Pl. XXX. fig. 2, Pl. XXXI. fig. 3, Pl. XXVIII. fig. 5.

HOPLOSAURUS ISCHYRUS, Seeley.

Dermal scute, Pl. XXXI. fig. 11.

MEGALOSAURUS PANNONIENSIS, Seeley.

Tooth, Pl. XXVII. figs. 21–23.

ORNITHOMERUS GRACILIS, Seeley.

Femur, Pl. XXVIII. figs. 6, 7.

RHADINOSAURUS ALCIMUS, Seeley.

Femur, Pl. XXXI. figs. 6, 7; humerus, figs. 8–10; claw-phalange, Pl. XXVII. fig. 26.

CROCODILUS PROAVUS, Seeley.

Vertebræ, Pl. XXX. figs. 6–14; femur, Pl. XXIX. figs. 7, 8; fibula, Pl. XXVIII. figs. 10, 11; ulna, Pl. XXIX. figs. 9, 10; radius, figs. 11–13; teeth, figs. 24, 25.

PLEUROPELTUS SUESSII, Seeley.

Postfrontal bone, Pl. XXVIII. figs. 8, 9; rib, Pl. XXX. fig. 15.

EMYS NEUMAYRI, Seeley.

Costal plate, Pl. XXVII. fig. 27; Pl. XXXI. fig. 13; hyoplastral plate, Pl. XXX. fig. 16.

The species described which are not figured are *Doratodon carcharidens*, Bünzel, *Oligosaurus adelus*, Seeley, *Arœosaurus gracilis*, Seeley, and *Ornithocheirus Bünzeli*, Seeley.

DISCUSSION.

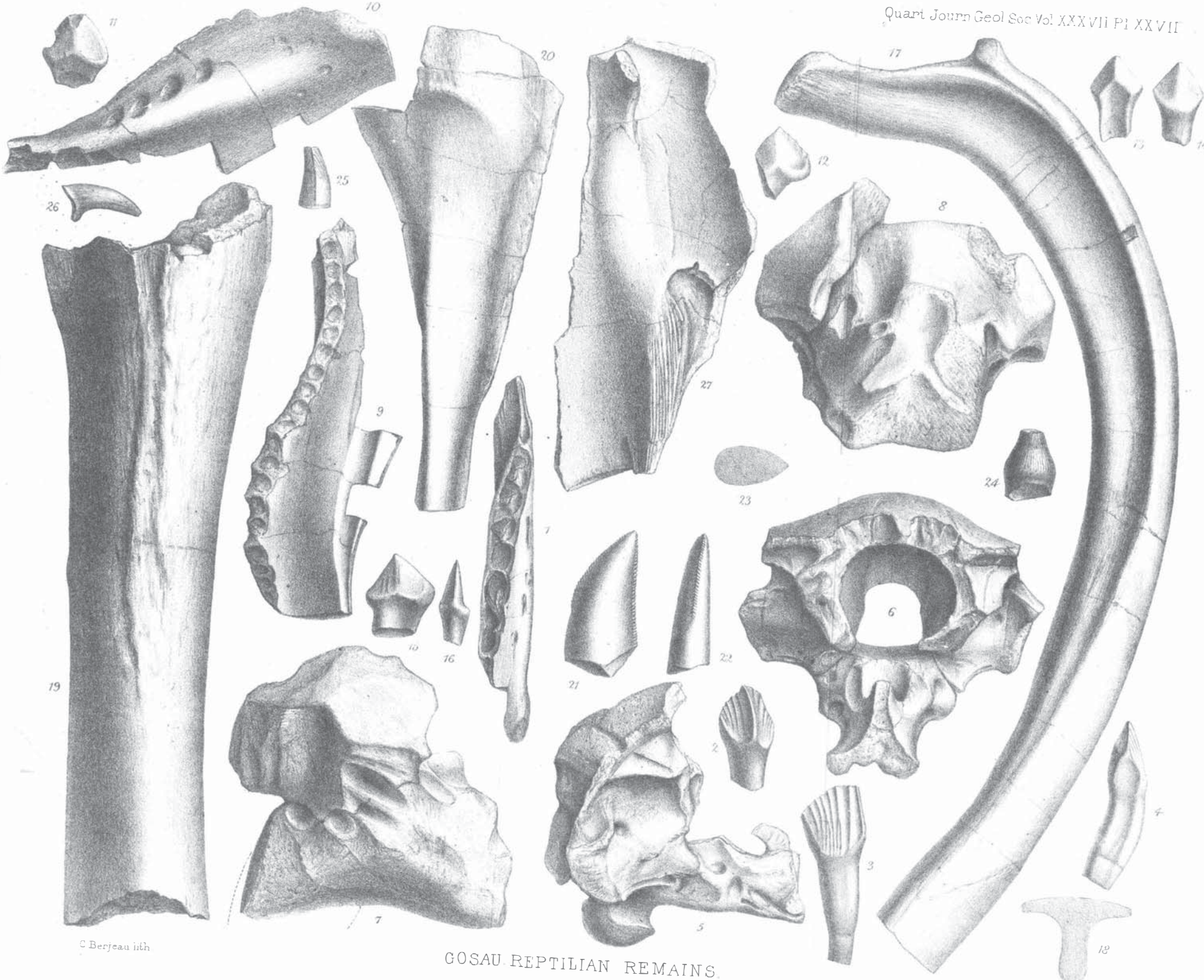
Mr. HULKE considered Prof. Seeley's paper a very valuable communication, throwing, as it did, fresh light upon an important group of fossils the true nature of which had before been but imperfectly apprehended. So far as he had been able to judge from a cursory inspection of the fossils, he did not doubt the accuracy of Prof. Seeley's interpretations. He called attention to the anterior extremity of the mandible of *Mochlodon*, which had sutural indications of a prædentary ossification, such as he thought he had seen in *Hypsilophodon*; and he mentioned the difficulty which the downward extension of the Dinosaurian inner trochanter appeared to him to offer to the hypothesis of its homology with the human trochanter minor, an extension which suggested that it might rather be homologous with an outgrowth of the middle part of the linea aspera to which the short head of the biceps is attached.

Mr. CHARLESWORTH remarked on the difference between the teeth in the upper and lower jaw of *Mochlodon*.

Dr. MURIE pointed out that the work of Prof. Seeley showed that much caution must be exercised in accepting hurried descriptions of genera and species from fragments.

Prof. BOYD DAWKINS stated that his examination of the American collections of Secondary Saurians proved that the so-called Megalosaurian type of teeth was exhibited by forms belonging to very different genera.

The AUTHOR agreed with Prof. Dawkins's views concerning the Megalosaurian teeth, and agreed that teeth were not sufficient alone for generic determinations.



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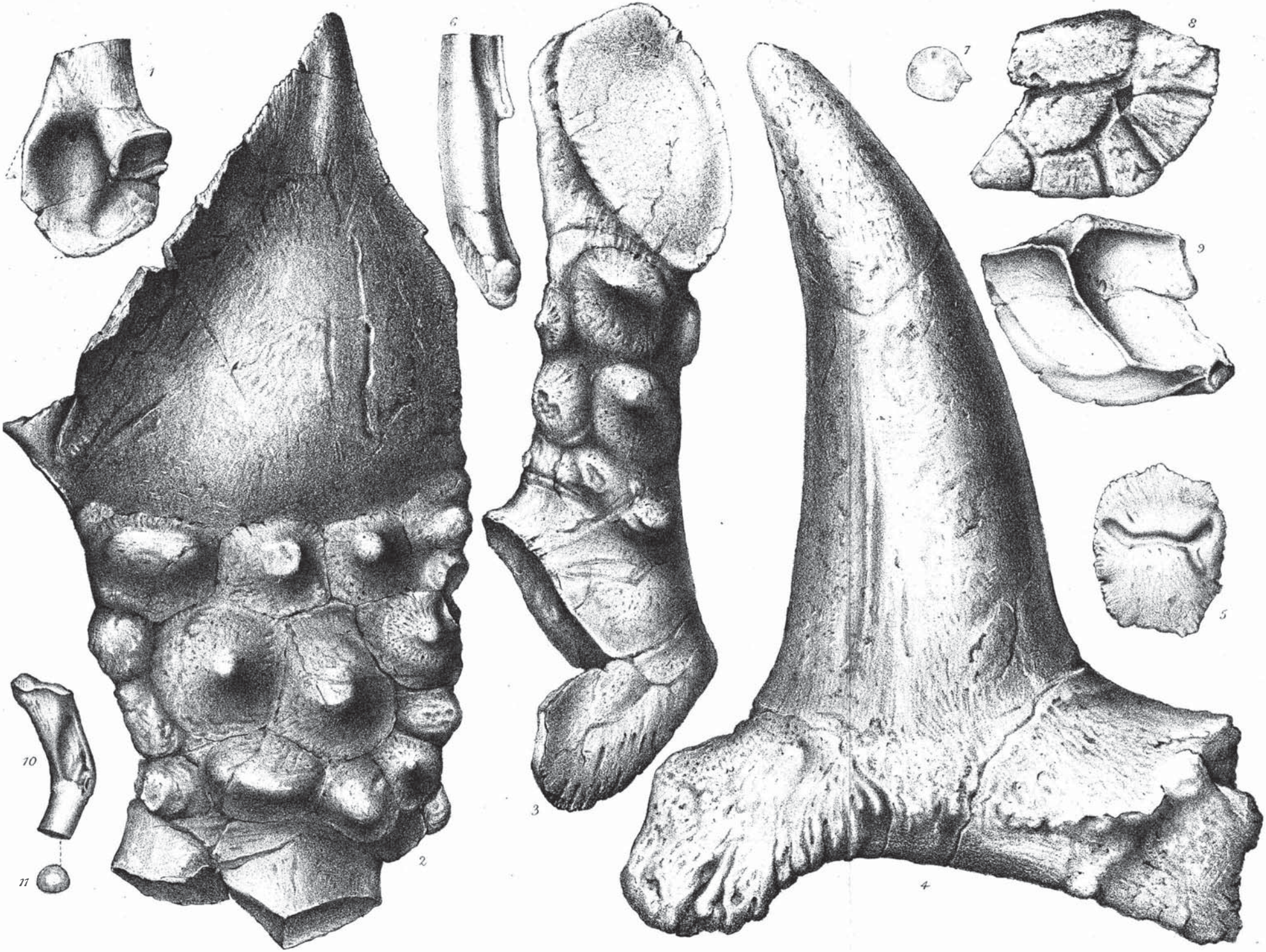

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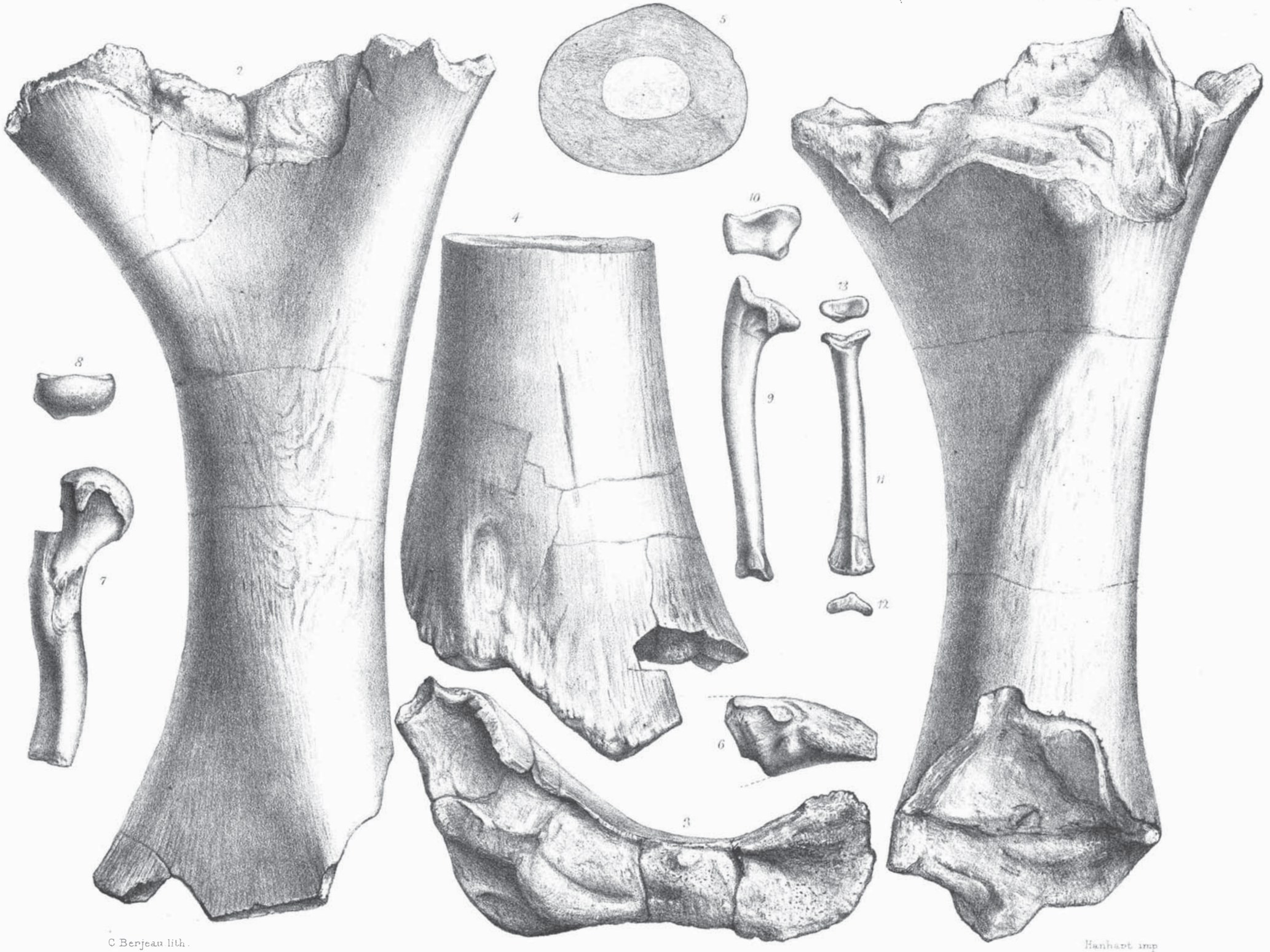

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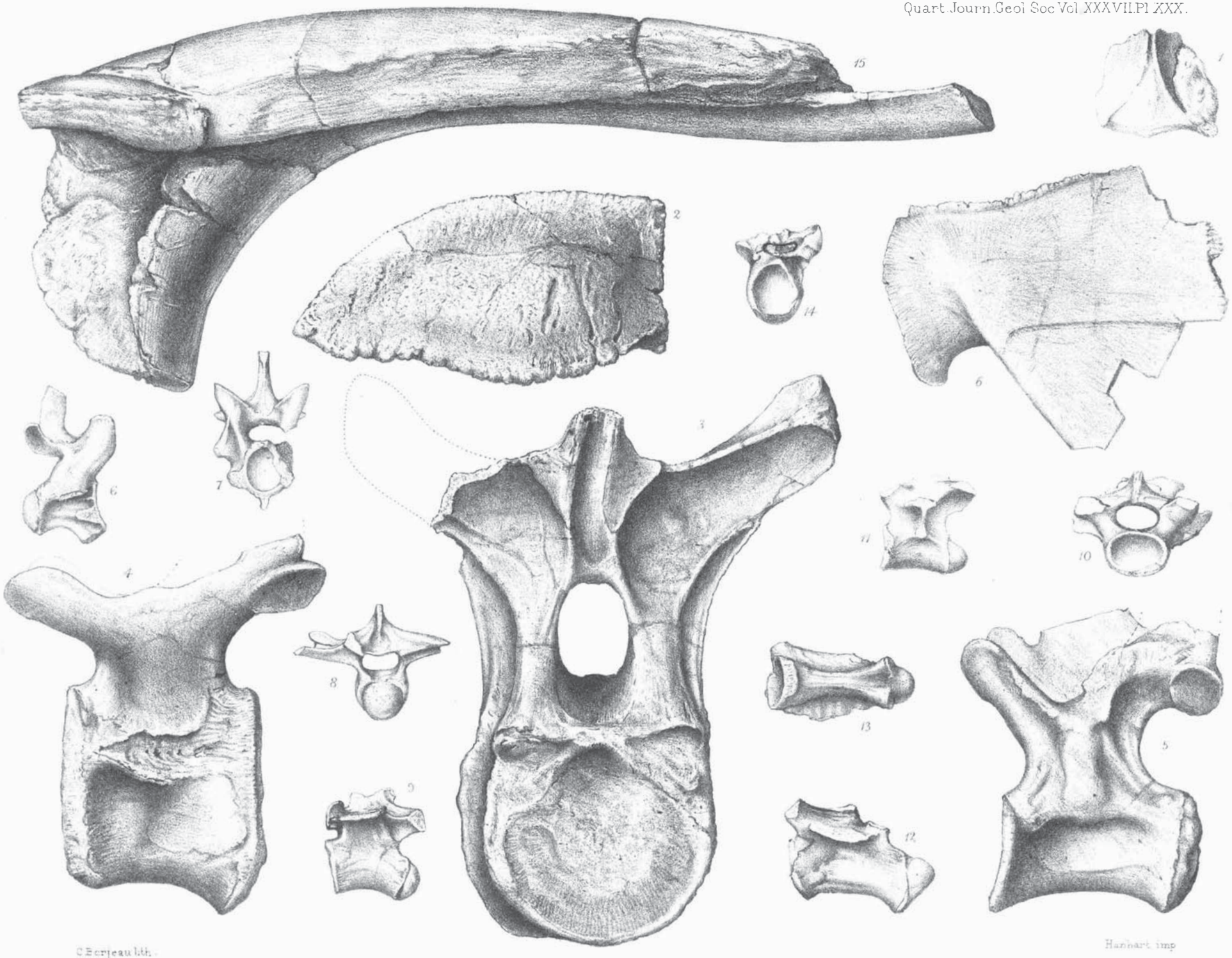

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